Henry Hudson Shoreline Stabilization Study

Research and Recommendations

June 2011

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Research and Recommendations Report

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1 INTRODUCTION

Ocean and Coastal Consultants Engineering, P.C. (OCC) has been contracted by the Town of Bethlehem to conduct a Shoreline Stabilization Study for Henry Hudson Park. The goal of this project was to recommend the most appropriate method for shoreline stabilization, based on the site constraints and project requirements. Selection of the preferred system included an evaluation of the site's environmental conditions, regulatory requirements, public access, upland and adjacent uses, constructability and cost; soft engineering recommendations presented in the Hudson River Shoreline Restoration Alternatives Analysis were included. The results of this study include a detailed implementation plan, from regulatory permitting through construction.

1.1 BACKGROUND

The Henry Hudson Park is a 51 acre park located in the Hamlet of Selkirk, in the Town of Bethlehem, New York. The site shoreline was built up by federal dredging initiatives in the 1860's where the dredged soils were placed upland and contained through the use of timber cribs containing riprap stone. In the 1900's concrete capping was built on top of the cribbing.[1]

The park is open to the public and currently provides the public with a boat launch, picnic areas, a playground, and several fields and courts for active recreation. The Henry Hudson Park (HHP) serves as the Town's only public access point to the Hudson River.

The Hudson River shipping channel is used commercially for access to the Port of Albany from points south; large vessels and tankers are often seen passing the HHP. Conflict arises between recreational boaters and the wakes created by large commercial boat traffic. Furthermore, large vessel wakes have caused damage to docks and bulkheads in the HHP.

In March 2006, the New York State Department of Environmental Conservation (NYS DEC), in partnership with the Hudson River Estuary Program and the New England Interstate Water Pollution Control Commission, completed the report, Hudson River Shoreline Restoration Alternatives Analysis. This report analyzed five locations along the Hudson River for development of preliminary "soft engineering" designs, the HHP being one of the five locations evaluated.

Also in 2006 and 2007, the Town completed its Local Waterfront Revitalization Program (LWRP) and Master Plan. In 2007, the Town of Bethlehem was awarded a grant from the NYS DEC Hudson River Estuary Program for funding to conduct a shoreline stabilization study in the Henry Hudson Park. This grant for $24,750, along with the Town's match of $8,550, provided the $33,300 total budget for the Shoreline Stabilization Study.

[1] Town of Bethlehem's Permit Application for the floating fishing platform (2010)

The Town applied for a United States Army Corp of Engineers (USACE) permit for the addition of a floating fishing platform approximately 200 feet south of the existing boat launch in the fall of 2010 with the intent to begin construction of the platform by May 1, 2011. Based on current discussions with the Town construction will begin closer to the end of the summer 2011 season.

1.2 PROJECT LOCATION

Henry Hudson Park is located in the town of Bethlehem, which is just south of the City of Albany in Albany County, New York; in segment RM 152-94 (RM stands for River Mile, as defined by the USACE as a method to measure the river distance) of the lower Hudson River (Figure 1).

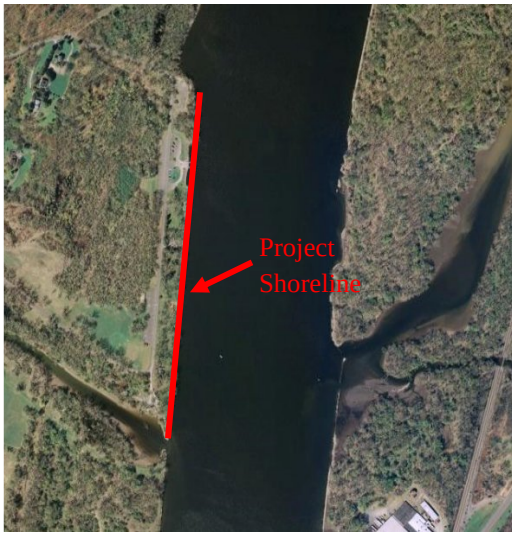


Figure 1- Henry Hudson Park Location

This portion of the Hudson River is narrow with extensive shoals and 29 tributaries; the slope of the river bottom is greater in this segment than others resulting in generally greater current velocities[2]. It is also part of the Hudson River Estuary.

The Hudson River serves as a navigation route for vessel passage; ships and barges traveling to the Port of Albany must pass by the project site to reach their destination. To support this traffic, the USACE conducted dredging projects in the early and mid 20th century to deepen the navigation channel resulting in major modifications to the Hudson River channel, which includes the portion of river adjacent to the Henry Hudson Park.

1.3 SCOPE OF WORK

The scope of work for this effort included completing background research on site and subsurface conditions, evaluating shoreline alternatives, recommending a shoreline stabilization system and determining an opinion of probable cost for the construction.

[2] Allen, Gregory; Cook, P.E., Thomas; Taft, Edward. *Hudson River Shoreline Restoration Alternatives Analysis.* 2006.

The first task was for OCC to perform an above-water inspection to assess the existing condition of the shoreline of the Henry Hudson Park ("Park"), using DGPS survey equipment and camera to locate important features such as the existing boat docks, wetlands, and shoreline structures.

The second task was to evaluate alternatives for erosion control along the entire study area. The evaluation considered factors such as environmental impacts; regulatory requirements; effectiveness; public access; upland and adjacent uses; and cost. This task included assessment of shoreline hydraulics including wake activity from passing vessels in the channel. Research was made into the approximate geotechnical/soil properties at the site and assumptions were made based on engineering judgment for the conceptual level design of shoreline stabilization measures. Soil borings were excluded from the current scope and budget but are recommended in future phases of the work.

Regulatory research was conducted during this task to determine which authorizations are required from federal, state and possibly local agencies such as the USACE, New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of State (NYSDOS) Division of Coastal Resources. OCC prepared a checklist of required permits and prepared discussion of possible regulatory issues and concerns. Research was also conducted to determine if funding in the form of grants and loans may be available to assist with the implementation of the study recommendations.

The report provides OCC's final shoreline stabilization recommendations as well as discusses all of the shoreline stabilization techniques that were considered, and the rationale for the decisions made. The report includes proposed concept sketches and preliminary opinions of probable cost (OPCs) for the construction of the concepts.

The report includes the summary of regulatory requirements and possible funding sources identified during OCC's research for available grants and loans. The report also contains discussion about the "next steps" of the project, including permitting, final design, bid assistance and resident engineering during construction. Approximate cost estimates for these future phases of work are also included.

An implementation plan has been developed to outline the various phases of the project moving forward and provides an approximate timeline for each. Items such as surveys and borings have been identified including approximate costs.

1.4 APPROACH AND ASSUMPTIONS

The first step in selecting the best methods for shoreline stabilization at the site was to understand the environmental conditions of the site and the physical characteristics of the river in the area. The shoreline conditions were initially evaluated by a visit to the site in early January and documented with GPS photographs (Appendix A). However due to snow cover and high water level, it was difficult to evaluate the extent of the damage. We conducted a second site visit in April 2011 once the snow thawed and documented the condition of the shoreline in photographs provided in Appendix B.

The second step in selecting shoreline stabilization methods was to evaluate the upland uses of the Park. The initial usages proposed for the shoreline segments were obtained from the Town of Bethlehem's Henry Hudson Park Master Plan, for the Local Waterfront Revitalization Program. The shoreline usages served as a basis for naming the segments identified in the report.

Aerial photographs and topographic surveys provided by the Town of Bethlehem provided insight into the original conditions of the site and the impact from dredging. Bank height and slope were calculated using existing information presented in the March 2006 report and topographic data provided.

Hydraulic information such as tides, flow and current data for the Hudson River was collected from the National Oceanic and Atmospheric Administration (NOAA) and the United States Geological Survey (USGS)at the following collection sites:

- **NOAA 8518989 Castleton, NY** - Approximately 1 mile south of the site. Provides tide predictions.

- **USGS Station 01359139 Hudson River at Albany, NY** - Approximately 7 miles north of the site. Period of record is from 1993 to present, and the datum of the gage is 0 feet NGVD of 1929. Provided daily, monthly, and annual water temperature and water level elevation.

- **NOAA 8518995 Albany, NY** - Approximately 7 miles north of the site. Established in 1981 and removed in 1987. Provides tide/water level data, tide predictions, datum's, and harmonic constituents.

- **USGS Station 01358000 Hudson River at Green Island NY** - Approximately 14 miles north of the site. Period of record is from February 1946 to the present, and the datum of the gage is 0.31 feet below NGVD of 1929. Provided monthly discharge data and peak stream flow, gage height levels, and water quality information.

- **USGS 01335770 Hudson River at Waterford, NY** - Approximately 17 miles north of the site. Period of record is from 1966 to present. Provided daily, monthly, and annual suspended sediment concentrations and discharges.

2 SITE CONDITIONS

2.1 EXISTING STRUCTRES

The Henry Hudson Park shoreline is approximately 2,680 feet in length and approximately 600 feet from the Hudson River's main navigation channel. The majority of the shoreline consists of deteriorated timber crib bulkhead wall built in the 1920's, with the upper bank filled with rock and capped with concrete (Figure 2).

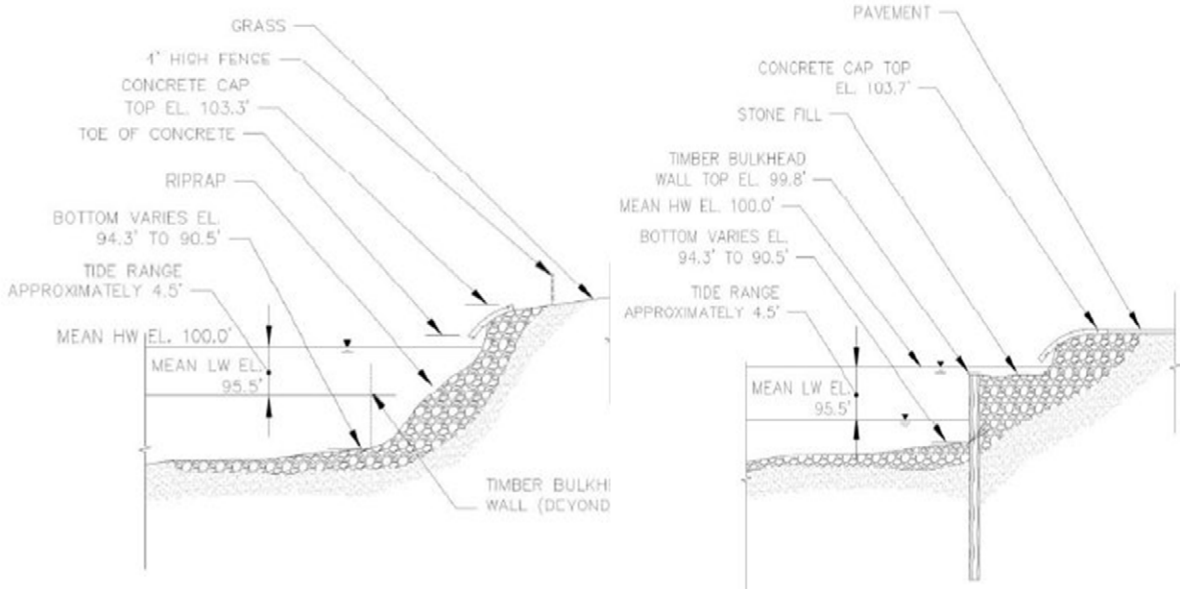


Figure 2- Cross Section Views of Existing Conditions of Shoreline[3]

The remaining shoreline is protected by the use of rock riprap revetment. A boat launch is located on the north end of the site with floating docks on either side which are removed seasonally. Piles of old timber cribbing material are present along the northern portion of the Park which otherwise remains undeveloped. The above mentioned structures are also shown in Figure 3 with their corresponding location at the site.

Figure 3- Existing Structures along Park Waterfront

The rock riprap revetment appears to be suitably protecting its portion of shoreline however slight erosion is apparent, the timber crib bulkhead is in poor condition and has failed in a number of areas;

[3] *Hudson River Shoreline Restoration Alternatives Analysis*, March 2006, Alden Research Laboratory

erosion of the upland is present at those areas in varying levels of severity. As a method of protection for the visitors of the park, there is 4 foot high fencing along the perimeter of the shoreline. In some areas the upland erosion goes beyond the fencing. If left alone, this area will continue to erode. Over time, this could create potential areas of hazards for young children or animals as they are more likely to slip under the fence. Photographs are included in Appendix A and B documenting these areas of erosion.

2.2 GEOLOGY

The bedrock geology of Henry Hudson Park area consists primarily of sedimentary rocks. Graywacke and shale from the Austin Glen formation account for over 60% of the Hudson watershed's bedrock material. This portion of the Hudson River basin is relatively narrow and steep-walled, and is underlain by Ordovician shale and sandstone with some chert and siltstone. Some Cambrian shale, conglomerate, and limestone are also present (Yozzo, et al., 2005).

The surface soils along the upland of the site consist of predominantly Udipsamments (sandy outwash soil), dredged material[4]; which consists of silt loam, classified as FINE-GRAINED SOILS, silts and clays (liquid limit less than 50%), and silt[5]. According to the report conducted by Environmental Data Resources Inc. (EDR) in 2009, there is greater then 60 inches of dredged material prior to reaching bedrock. These types of soils fall into AASHTO's A-4 classification for soil, which is known to have problems with erosion and be more susceptible to frost action.

Upon review of previous topographic surveys of the area dating back to 1898, the site was under water until 1925 when it was built up with dredged material by the USACE. At that time they dredged the navigation channel to 27 feet to allow larger vessels to navigate the Hudson River. In 1954, the channel was further deepened to 32 feet, which is its current maintained depth (USACE, 1995).

The Hudson River basin shoal and channel are composed of cohesive sediments, clayey silt interbedded with silt and fine sand, and the thalweg is mantled discontinuously with shell fragments and anthropogenic debris (Woodruff et al. 2001).

Research conducted by the Center for Rivers and Estuaries Earth Institute at Columbia University provided information on the types of sediments and their distribution in the Hudson River at the Project Site; this information is shown in Figure 4, Figure 5, and Figure 6.

[4] USDA, 2011, *Custom Soil Resource Report for Albany County, New York*

[5] Environmental Data Resources Inc., 2009, *The EDR Radius Map Report with GeoCheck for Lyons Road Property*.

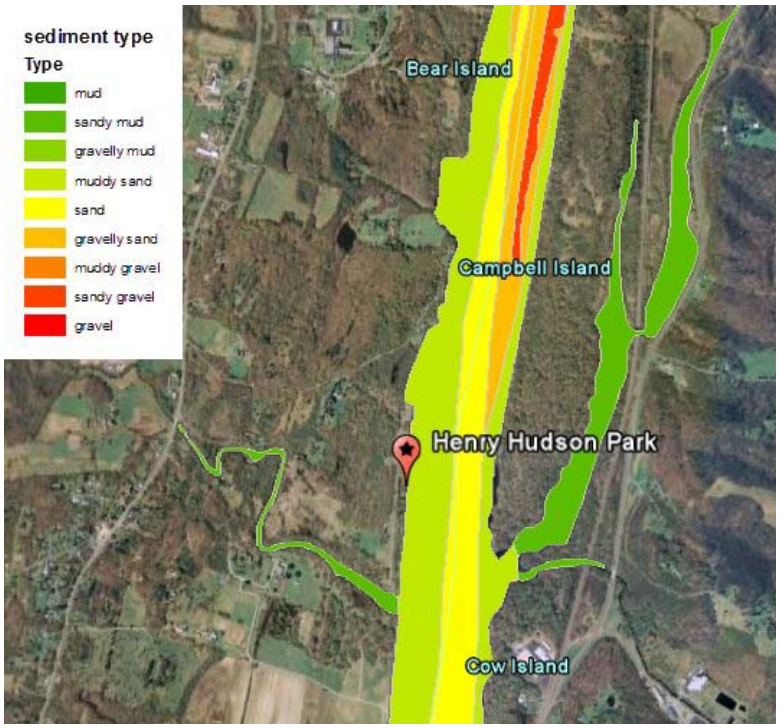


Figure 4- Sediment Type

As shown in Figure 4, the sediments in the vicinity of the Henry Hudson Park shoreline are made up of muddy sand. As shown in Figure 5, the sedimentary environments of the navigation channel has some dynamic wave activity (shown in dark brown) and the edges experience scouring (shown as light brown). Traveling towards the shoreline, non-deposition erosion occurs and then deposition.

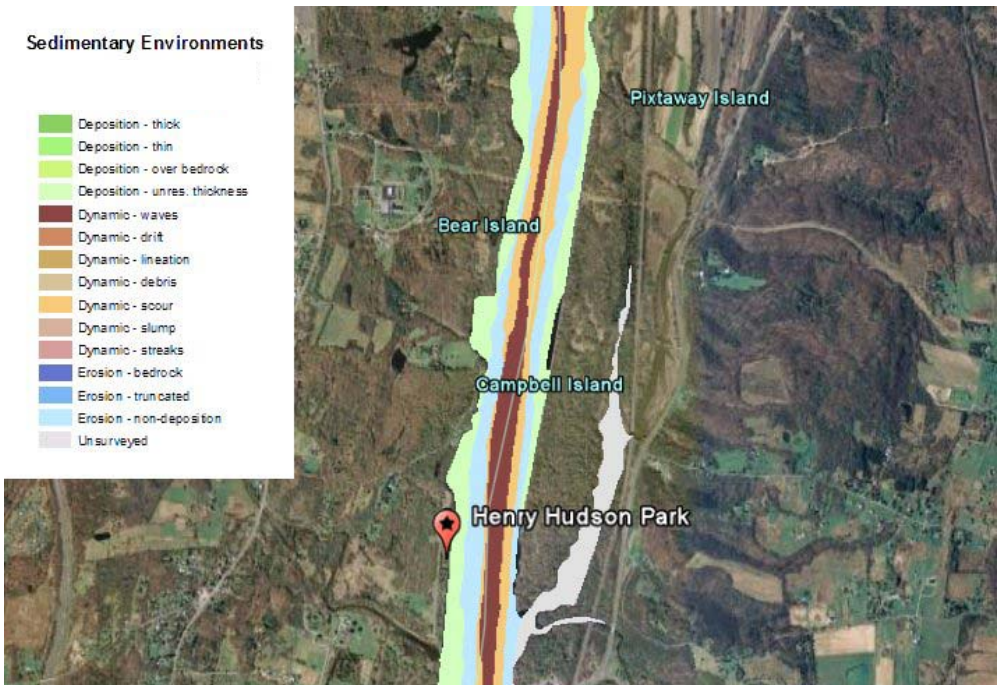


Figure 5- Sedimentary Environments in the Hudson River adjacent to the Henry Hudson Park

Figure 6 shows the character of the river bottom; high backscatter is shown in dark gray and is the rougher and harder bottom such as erosion, sand, or gravel. Low backscatter is shown as light grey which corresponds to the softer, smoother bottom such as mud and silts. The river bottom west of the navigation channel has some high backscatter activity, as well as the area located approximately 27 feet from the edge of the shoreline.

Figure 6- Side scan Sonar in the Hudson River adjacent to the Henry Hudson Park

2.3 SHORELINE HYDRAULICS

The bank height along the shoreline varies between 10 to 13 feet, where it then slopes away at a 1V:15H (7%) slope until it reaches a depth of 32 feet at the navigation channel. The total width of the channel is approximately 1,110 feet. OCC estimated what a typical cross-section of the shoreline channel could look like based on information obtained in previous reports referenced and measurements by Google Earth, which is illustrated in Figure 7.

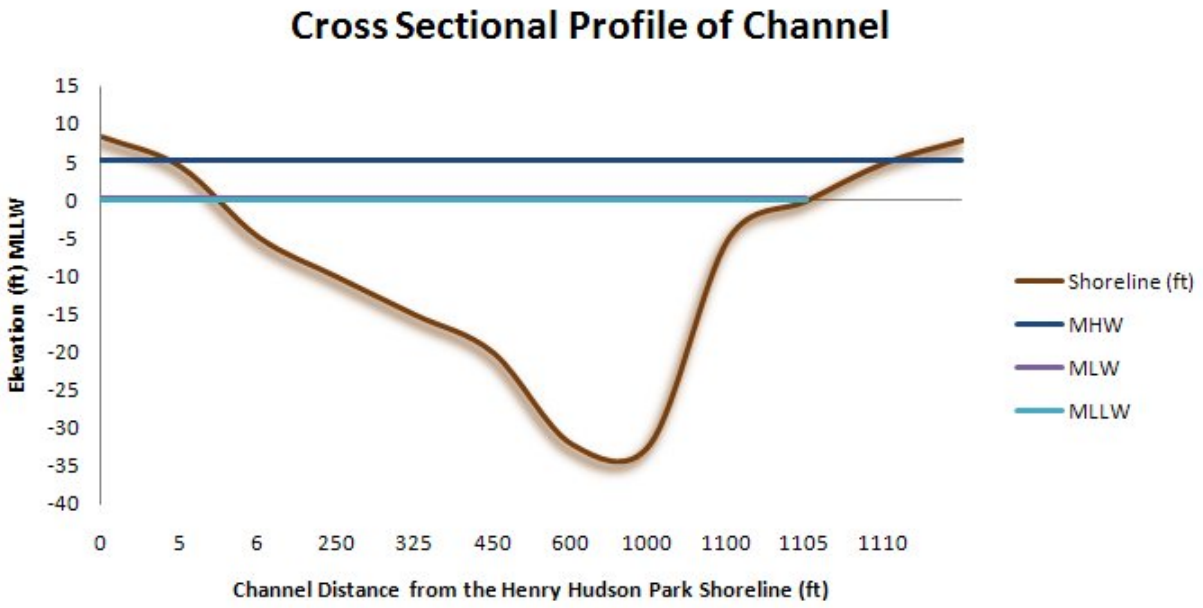
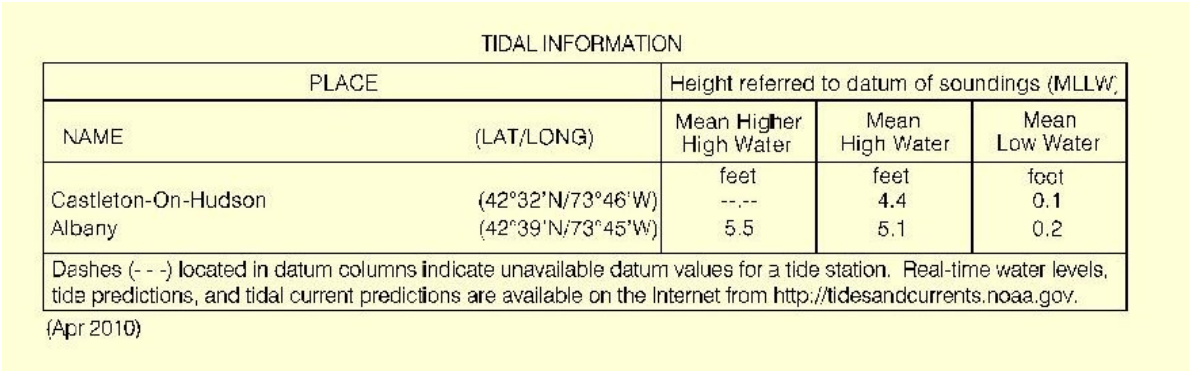


Figure 7- Approximate Cross Sectional Profile of Channel

2.3.1 Tide, Flow and Current

The Hudson River is tidal as far upstream as the Federal Dam near Troy (RM 153.7); water below this location can flow both upstream (negative flow) and downstream (positive flow), depending on the tidal conditions[6]. The tide at Albany (RM 146) has a mean range of about 5.5 feet (Figure 8) and varies considerably throughout the river.

[6] *Salt-Front Movement in the Hudson River Estuary, New York---Simulations by One-Dimensional Flow and Solute Transport Models, USGS*, 1999, New York



TIDAL INFORMATION

PLACE		Height referred to datum of soundings (MLLW)		
NAME	(LAT/LONG)	Mean Higher High Water	Mean High Water	Mean Low Water
		feet	feet	feet
Castleton-On-Hudson	(42°32'N/73°46'W)	--.--	4.4	0.1
Albany	(42°39'N/73°45'W)	5.5	5.1	0.2

Dashes (- - -) located in datum columns indicate unavailable datum values for a tide station. Real-time water levels, tide predictions, and tidal current predictions are available on the Internet from http://tidesandcurrents.noaa.gov.

(Apr 2010)

Figure 8- Tidal Information from NOAA Navigation Chart 12348

In tidal rivers like the Hudson, maximum flood occurs within an hour of high tide, and the flood continues for the first two hours of the falling tide. As the tidal wave in the Hudson approaches the dam at Troy, it becomes more like a standing wave due to the reflection of the tidal wave at the head of the tide.[7]

The hydraulics of the Hudson River at Green Island, NY, located approximately 13 miles north of the site (just before Troy), is also variable. The mean monthly flows (during the period of record from 1946 to 2009) are shown inTable 1- Average and Maximum Monthly Mean Stream flow (CFS) Hudson River at Green Island, NY[8]. Flushing time is estimated to be 126 days. The mean river velocity is 1.2 feet per second with a maximum velocity of 2.2 feet per second.[9]

Month	Average Monthly Mean Stream flow (cfs)	Maximum Monthly Mean Stream flow (cfs)
January	14,200	33,970 (1949)
February	14,200	30,060 (1981)
March	22,400	36,280 (1948)
April	31,000	61,820 (1993)
May	18,800	38,200 (1996)
June	10,700	31,420 (2006)
July	7,200	23,780 (2006)
August	6,220	14,630 (1976)
September	6,560	17,030 (1975)
October	9,510	30,140 (1977)
November	13,800	26,790 (2005)
December	15,800	28,220 (1983)

Table 1- Average and Maximum Monthly Mean Stream flow (CFS) Hudson River at Green Island, NY

[7] *The Hudson River Estuary*, (pg 28)

[8] USGS Station 135800 Hudson River at Green Island, NY

[9] Allen, Gregory; Cook, P.E., Thomas; Taft, Edward. *Hudson River Shoreline Restoration Alternatives Analysis.* 2006.

The average monthly mean values during this period of monitoring ranges from 6,220 to 31,000 cubic feet per second. The freshwater flow in the Hudson estuary follows a typical seasonal pattern, with highest flow during the spring and lowest flow during late summer and early fall. The stream flow is highest during the spring months of March through and May due to snowmelt, ice melt and runoff.

2.3.2 Wave Exposure

Although not subject to ocean swell, the project site is influenced by wind-generated waves and vessel wakes. Wind generated waves were analyzed for Henry Hudson Park using a "restricted fetch analysis" in the "Wind Adjustment and Wave Growth" module of the U.S. Army Corps of Engineers *Automated Coastal Engineering System* (ACES) computer program. This model provides quick and simple estimates for wave growth over open-water and restricted fetches (open areas of water where the wind can blow to propagate waves) in deep and shallow water. Average wind speeds were collected from the NOAA for Albany, New York. Yearly average wind speeds for Albany are 7-10 mph[10], predominantly from the west.[11] The upper level of this wind speed was input into the wave model for a range of fetch lengths and the average wind-generated wave height was estimated at 1 foot. Significant storm events will generate larger waves. Wave heights for specific storm event criteria will need to be determined during the final design process.

In addition to wind-generated waves, waves generated from vessels can be a significant factor in determining proper shoreline stabilization structures. As depicted in the Hudson River from Coxsackie to Troy Navigation Chart 12348, 34th Edition (Figure 9), the Hudson River serves as a main passageway for ships; a great deal of vessels pass by the project site which generate wave energy.

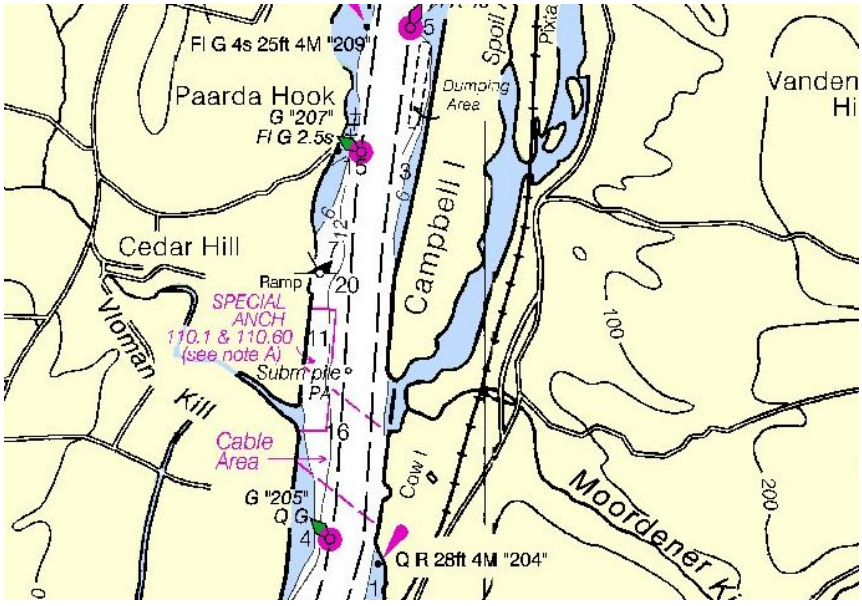


Figure 9- Navigation Chart 12348, 34th Edition, June 2010 (NOAA, 2010)

[10] NOAA, http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html

According to the U.S. Coast Guard, each year an average of 300 vessels travel the Hudson River over the course of winter months (December through to the end of March)[12]. Typical commercial vessels that travel the Hudson River vary from ships to tanker barges (Figure 10).
According to the Title 46 Part 185.304 of the Code of Federal Regulations, "the operator of a vessel should pay special attention in regards to the potential caused by their wake." The operation of a vessel in a negligent manner is a violation of federal law that may carry a monetary penalty. In addition, vessel operators may incur civil liability for the damage caused to other persons or property. Parties alleging the creation of an excessive wake may document their concerns via videotape or pictures. This type of documentation could be the basis for opening a civil penalty case.

Figure 10 - Typical Types of Vessels seen in the Hudson River

Vessel wake is created by the combination of two separate waves acting together, one transverse and one diverging wave. The length, draft, and speed of the vessel determine the magnitude of vessel wakes. To evaluate the impact of wave energy on the shoreline, OCC evaluated a typical vessel which travels the Hudson River to the Port of Albany located north of the site.

Vessel Name	Type	Length (ft)	Loaded Speed	Beam (ft)	Draft (ft)
Alice Oldendorff	Cargo	623	14.2 knots	105	40

Table 2- Typical Vessel Characteristics[13]

The relationship between the speed a vessel travels and resulting wake height is an inverse relationship; a vessel traveling at a slower speed will generate a larger wave height, where as a vessel traveling at a faster speed will generate a smaller wave height. Since there are no federal regulations that address vessel speed limits outside of federal anchorage grounds for our desktop study, a range of speeds were evaluated. A typical container ship cruises at approximately 20 knots, but due to the constraints of river travel, slower speeds were evaluated.

In addition to the size and speed of the vessel, the distance from the shoreline plays an integral role in evaluating resulting wave height; the further away from the shore the vessel travels, the smaller the incident wave will be on the shoreline. The channel is approximately 1000 feet wide and located ap-

[12] *Coast Guard icebreaking commences on the Hudson River*, U.S. Coast Guard, 2011, https://www.piersystem.com/go/doc/802/993607/

[13] CSL International, http://www.cslint.com/pdf_specs/AO-AliceOldendorff.pdf

proximately 500 feet from shoreline. Therefore, OCC evaluated the impact of a vessel traveling 500 feet from shore.

Taking into account the size, draft, speed, and distance from shore for theoretical container ship; a graph showing the resulting wake heights was created (Figure 11).

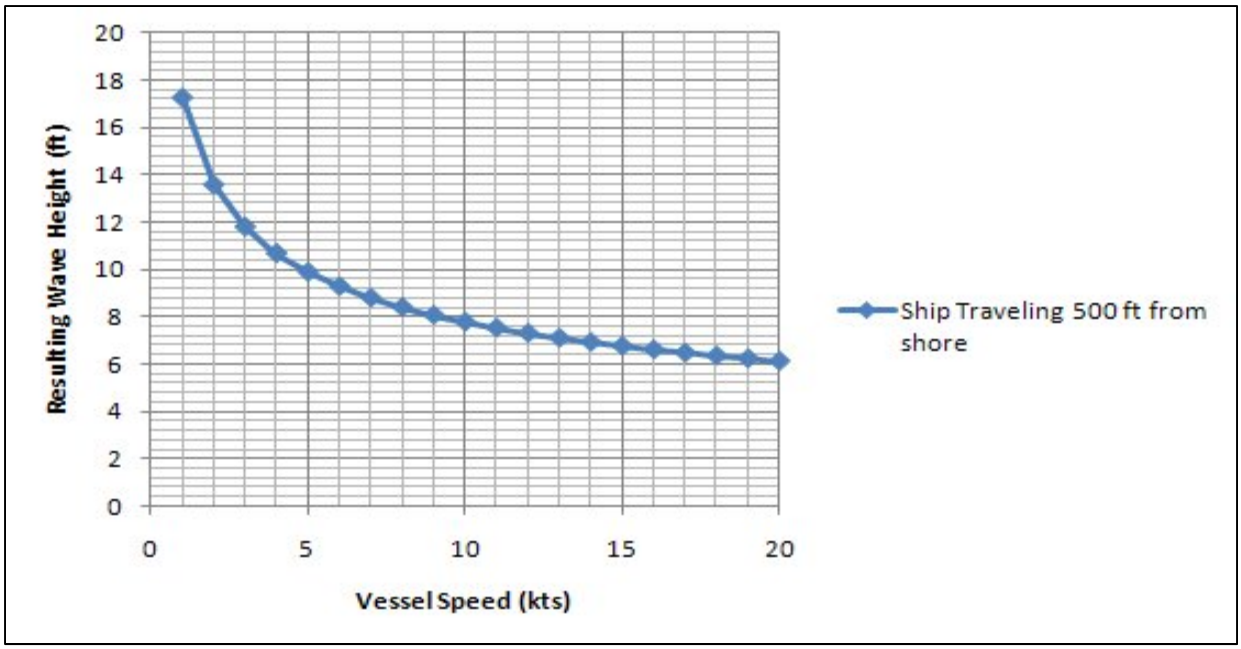


Figure 11- Relationship between vessel speed and resulting wave height.

Large vessel wakes could cause erosion of soft sediments, and shoreline failure may occur. The main mechanism of failure is scour at the base of the shoreline. Scour is the condition in which the flow of water carries soils away, causing undermining of the upland slope and eventual collapse upland.

Drawdown is the phenomenon in which water height is reduced, resulting from a ship passing in a shallow channel. Due to the complex nature of hydraulics resulting from passing ships, theoretical models are imperfect; monitoring and documenting events is the preferred method of understanding how drawdown transports sediment. While it's possible that such a phenomenon could occur at Henry Hudson Park, we do not believe this effect is significant at the HHP site.

With the combination of vessel wake and drawdown affecting the shoreline, it can be seen that large, permeable structures, such as a riprap revetment, are best suited for resisting failure. In studies conducted by Taylor, Hall, and MacDonald published in Journal of Coastal Research, the effects of large ships passing through channels on bank erosion was conducted[4]. The study analyzed the effects of drawdown and vessel wake as it effected sediment transport in the Burlington Channel, Canada. This study is relevant to Henry Hudson Park because the same vessel size and site conditions were studied. The effects of drawdown can be correlated to the soil type and ship activity observed. The study concluded that although modern modeling cannot predict the complicated hydraulic processes for passing vessels, erosion and sediment transport is largely affected by vessel passage.

2.4 ICE

The Hudson River normally gets ice coverage during the winter months between December and March. Tidal currents break up the ice into large flows which move downstream to form a type of ice known as drift ice, as demonstrated in Figure 12.

Figure 12- Ice Coverage along the Hudson River in Castleton (USCG, 2011)

The US Coast Guard stations ice-breakers on the Hudson River to keep the channel open for barge and ship traffic to the Port of Albany (NYSDEC), due to the regular ice coverage along the river during the winter months.

A daily ice report broadcasted by the Coast Guard on January 30, 2011 indicated how the area from Catskill to Albany (within the proximity of the Henry Hudson Park) experienced 8 to 10 inches of ice drifts with 100 percent of coverage; in comparison with other areas along the Hudson River, this portion of the River experienced the most ice coverage and thickness (USCG, 2011).

Table 3 identifies the typical ice conditions for Henry Hudson Park for the winter months of the year which demonstrates that the HHP site scored as "severe" in 3 out of 8 categories. This shows that it does have a large potential for ice conditions.

The information was obtained from annual climate records by NCDC and NOAA and USGS observation sites. The predominate ice type that forms in rivers like the Hudson (where average velocity is 1.2 to 2.2 ft/s) is frazil ice.[14] This form of ice typically begins to appear at air temperatures of about 20°F.

Ice Thickness	12 in	Average
Water Fluctuation	4.98 ft	Severe
Water Temperature	32°F to 44°F[15]	Mild
Air Temperature	13°F to 36°F	Mild
Winter Duration	4 to 5 months	Severe
Snowfall	64 in[16]	Average
Ice Sheet Confinement	Unconfined	Mild
Ice Sheet Integrity	Broken	Severe
Miscellaneous	Drift Ice	

Table 3- Classification of Ice Conditions for the Project Site during the Winter Months

The potential for ice damage to the shoreline structures is minimal during the initial freeze-up period as the discharge is low, allowing ice to gradually form along the banks. This build up of ice can actually protect the shoreline from damages by ice impact. It is during the break-up period (the early spring months of March through May) when the snow and ice melts that potentially causes the most significant damages. This is because the snow melt increases the water level and discharge flow of the river which heightens the potential for flooding, under-ice hydraulic scour, and impact damage. In order to minimize impact damage due to ice break-up, structures need to be designed accordingly. For example, rock for a rock riprap structure should be designed with a median stone diameter of two to three times the maximum ice thickness.

2.5 ENVIRONMENTAL CLIMATE CHANGE

The changes in climate due to temperature, precipitation, and sea level rise will continue to impact the Hudson River; these will primarily be demonstrated by water depth and velocity which results in sedimentation changes (bank failure, local scour, locations of aggradations and degradation). By 2020, the projected sea level rise in the Mid-Hudson Valley and Capital Region is 1 to 4 inches and possibly 4 to 9 inches with the rapid ice-melt scenario.[17] Sea level rise will also cause other concerns such as a higher water table, storm surge, increased salinity, flooding, and erosion.

[14] Tuthill, Andrew, (2008) *Ice Considerations in the Design of River Restoration Structures*. Hanover, New Hampshire, US Army Engineer Research and Development Center.

[15] USGS Station 01359139 Hudson River at Albany, NY

[16] NCDC, http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/snowfall.html

[17] New York State Sea Level Rise Task Force. 2010. *New York State Sea Level Rise Task Force*. http://www.dec.ny.gov/docs/administration_pdf/slrtffinalrep.pdf.

2.6 FLOODPLAIN

The Flood Insurance Rate Map (FIRM) designates the FEMA flood zone according to types of floodplain. The A-Zone is determined by the 100-year Stillwater with added wave heights of less than 3 feet. Henry Hudson Park is located in FEMA flood zone A13; indicating the area has a 1% annual chance of flooding to an elevation of 12.242 feet referenced to NAVD88. This number was the result of applying a datum shift of -0.758 based on the latitude and longitude of the site and NOAA's datum conversion tool. The flooding elevation is shown as 13 feet NGVD29 in FEMA FIRM Panel 3615400021B, dated June 15, 1983.

Figure 13- Previous Flooding at the Site

For perspective, the top elevation along the shoreline at Henry Hudson Park varies between 11.74 and 12.14 ft NAVD88, which is between 3.3 - 3.7 ft above MHW.

3 SHORELINE ALTERNATIVES ASSESSMENT

OCC performed an evaluation of shoreline protection alternatives for the Henry Hudson Park site. The five techniques identified in the "soft engineering" recommendations in the Hudson River Shoreline Restoration Alternatives Analysis were included in our evaluation. These include vegetated geogrids, live crib wall, brush mattress, vegetated rock gabions, and joint planting. Other potential alternatives included in our evaluation include rock riprap and timber bulkhead.

3.1 ELEMENTS OF THE SHORELINE INVENTORY

The following images identify each of the inventory elements for the shoreline. Figure 14 shows an aerial view of the shoreline that corresponds with Table 4. The names used to classify the shoreline segments were obtained from the Town's Henry Hudson Park Master Plan, for the Local Waterfront Revitalization Program; these names were given based on the intended use of the segment. Existing public access to the River is through the boat launch located in Segment B. The second point of access to the River is planned to be in Segment C in the form of a floating fishing platform.

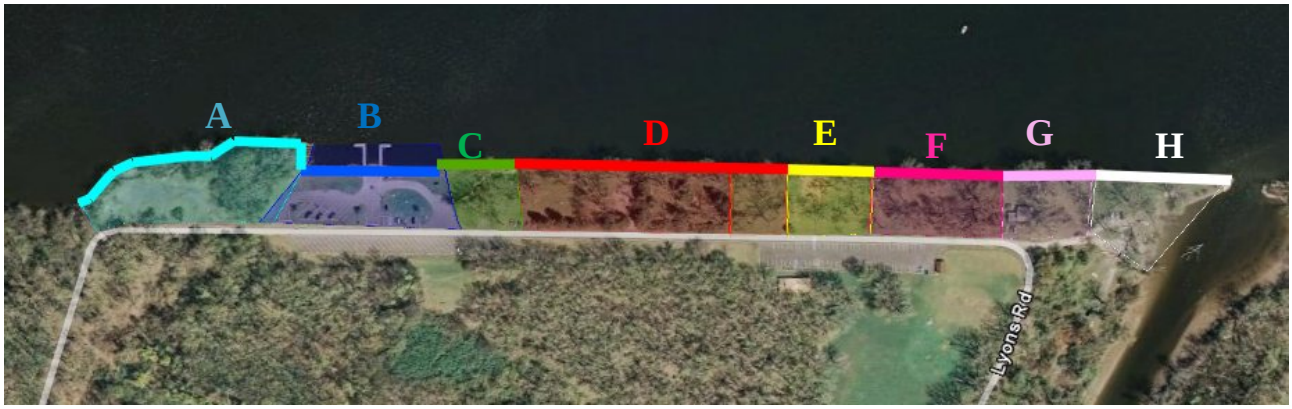


Figure 14 - Shoreline Segment Map

Segment	Approximate (FT)	Existing Area of Shoreline Stabilization (FT^2)
A--Overlook Area	607	NA
B--Boat Launch Area	274	8,220
C--Fishing Platform Area (Park Facilities)[18]	175	2,625
D--Picnic Area(s)	620	9,300
E--Play Area	200	3,000
F--Large Group Picnic Area 1	297	4,455
G--Large Group Picnic Area 2 (Park Facilities) [18]	207	3,105
H--Large Group Picnic Area 3 (Kayak Portage)[18]	300	4,500
TOTAL	**2,680**	**35,205**

Table 4- Shoreline Planning Segments

[18] As classified by the Town's Master Plan for Henry Hudson Park (for the Local Waterfront Revitalization Program).

3.1.1 Segment A - "Overlook Area"

Segment A is the only existing portion of the park which is currently undeveloped---the upland area and waterfront remains relatively untouched. We've broken the segment down into two components for discussion purposes, which separate the Northern Section (A1) from the Southern Section (A2). There are piles of live crib wall in Section A2 which can be seen at low tide (item 2 on *Figure 15*) and the remains of a sunken barge.

Figure 15- Segment A - "Overlook Area

The upland area is planned to be developed with a natural walking trail for the public. Kayakers frequently utilize Section A1 to launch their kayaks as it is somewhat sheltered, therefore it could continue to serve as a good launch area for kayaks. However, to get approval from the regulatory agencies might be difficult since the site is currently natural shoreline. Some options for kayak launch types include utilizing the natural area along the backside of the segment of land, floating dock segment, and concrete access stairs (Figure 16).

Figure 16 - Kayak Launch Types

3.1.2 Segment B - "Boat Launch Area"

Segment B is currently the only portion of the shoreline that provides public access to the water. The area consists of a boat ramp with revetment on both sides with floating docks available in the spring through fall seasons (Figure 17).; in the winter they are taken out of the water and stored on land to protect them from damages due to the harsh winter conditions along the winter.

Figure 17- Segment B -"Boat Launch Area"

3.1.3 Segment C - "Fishing Platform Area"

Segment C is planned to provide a second point of waterfront access to the public by the use of a floating fishing platform to be installed during the summer of 2011. The upland area consists of a gazebo, benches, grass area, and walkway leading to the adjacent parking lot. There is currently a 4 foot fence that runs along the edge of the shoreline for safety reasons to prevent pedestrians from hazards associated with the condition of the existing wall.

Figure 18- Segment C - "Fishing Platform Area"

Consideration needs to be made for the shoreline to accommodate the proposed fishing platform and must have the ability to support the surcharge loads exerted by the concrete abutment (Figure 20) and increased foot traffic in the vicinity.

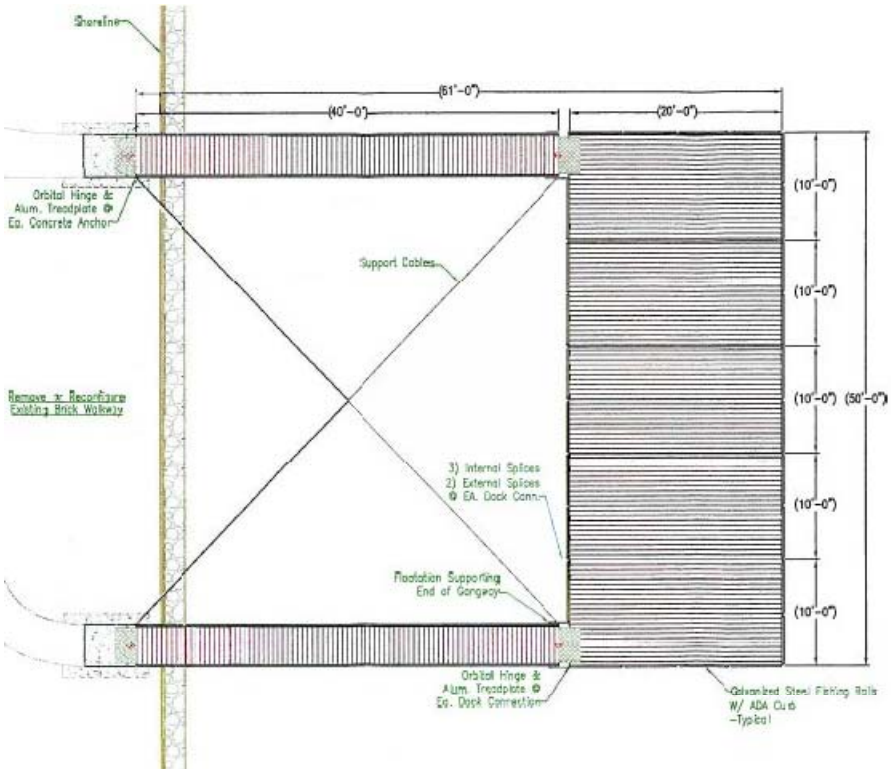


Figure 19- Proposed Fishing Platform Plan View

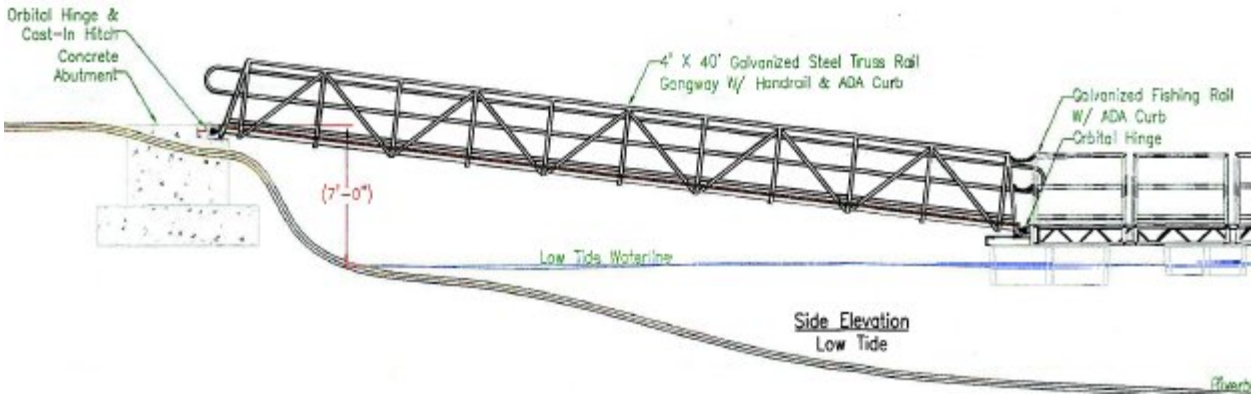


Figure 20- Proposed Platform Elevation View

3.1.4 Segment D - "Picnic Area(s)"

Segment D consists of picnic areas and a volleyball court (Figure 21). It's situated between the fishing platform (Segment C) and the child's play area (Segment E), therefore it is anticipated that there will be a great deal of foot traffic in this segment. There is currently a 4 foot high fence along the edge of the shoreline to restrict public access to the erosion caused by the failing wall.

Figure 21- Segment D - "Picnic Area(s)"

3.1.5 Segment E - "Play Area"

Segment E consists of a playground equipment and grass area adjacent the shoreline (Figure 22). A 4 foot high fence currently restricts pedestrian access to the failing wall along the shoreline.

Figure 22- Segment E - "Play Area"

3.1.6 Segment F - "Large Group Picnic Area 1"

Segment F consists of open grass areas and adjacent parking (Figure 23). This portion of the shoreline is in bad condition---there are two specific areas in which a great deal of upland erosion has occurred. A 4 foot high fence currently restricts public access.

Figure 23- Segment F - "Large Group Picnic Area 1"

3.1.7 Segment G - "Large Group Picnic Area 2"

Segment G, initially proposed as "Park Facilities" is better suited for the Bethlehem Fire Department's floating fire dock, as it provides close access from the road to the shoreline in the case of an emergency. The upland area will be used as a large group picnic area. However since access to the fire dock will be restricted by a security gate and used only during emergencies, it will not interfere with the public's use of the picnic area.

The building which is shown in Figure 24 has been removed and the majority of the upland area of the segment is surrounded by 4 foot high fencing (identified as 2). The northern portion of this shoreline segment is in the worst condition of all the shoreline segments at Henry Hudson Park. Approximately 20 feet of the shoreline in this segment is experiencing severe erosion behind the failed wall (identified as 1).

Figure 24- Segment G - "Large Group Picnic Area 2"

Figure 25 - Typical Types of Fire Rescue Vessels

The layout proposed in the permit application is shown in Figure 26 and generally consists of a floating dock with an anchor block and tie back mooring system. The landing for the gangway and slope need to be considered in the design for the shoreline in this area. The permit application to construct the dock was approved by the Department of the Army regulatory branch in September 2010.

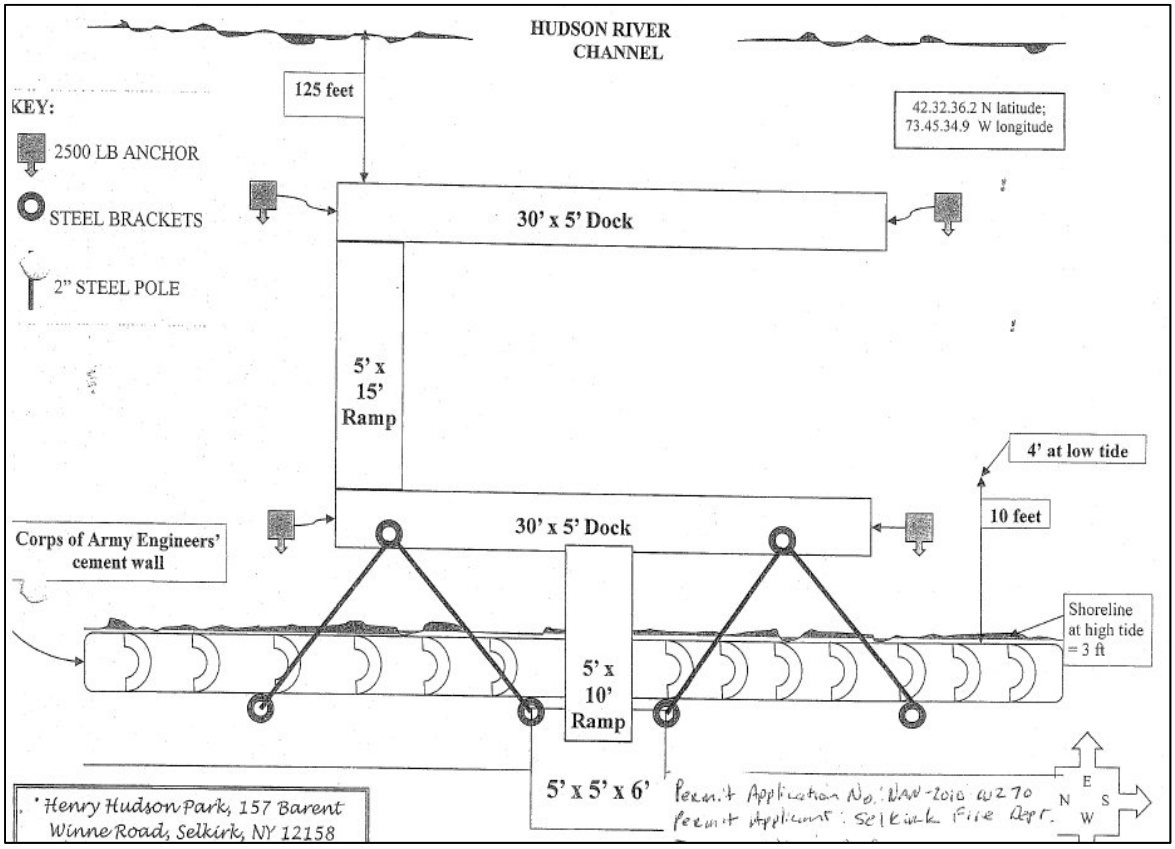


Figure 26- Fire Dock Arrangement as depicted in Permit Application

3.1.8 Segment H - "Large Group Picnic Area 3"

Segment H is the southern-most section of the Park, which has been referred to as the kayak portage area on the Town's Park master plan. However, based on the recommendations in their report it should be changed to "Large Group Picnic Area 3". The shoreline along this section is in better condition then the other areas of the Park's shoreline. This is likely due to reduced scour at the toe of the bulkhead however it would require further studies to determine the cause.

Figure 27 - Segment H - "Large Group Picnic Area 3"

3.2 SHORELINE INTRODUCTION

Historically, shoreline modifications to the Hudson River have included timber and rock cribbing, timber bulkheads, riprap, and concrete. As shown in Figure 28 and Figure 29, for the areas along the Hudson which require protection---hard engineering methods have been implemented for the majority; riprap is the method utilized most often. Figure 28 identifies the shoreline inventory along the Hudson River and Figure 29 shows the specific type of shoreline stabilization method.

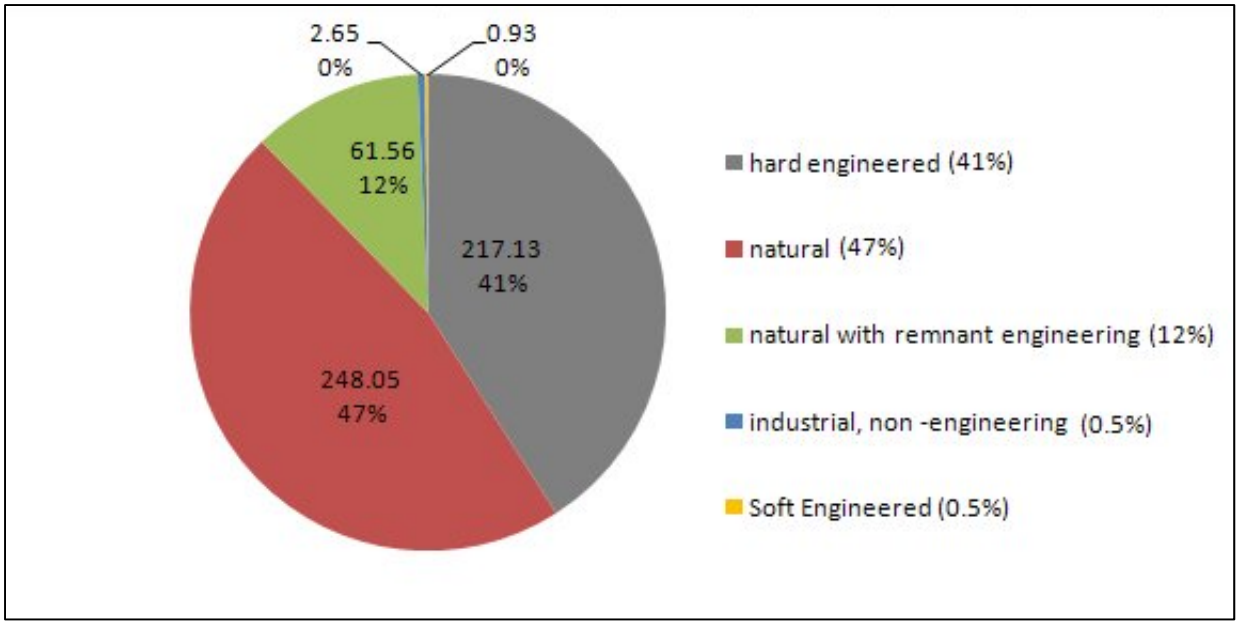


Figure 28- Hudson River Shoreline Inventory (data obtained from NYSDEC)

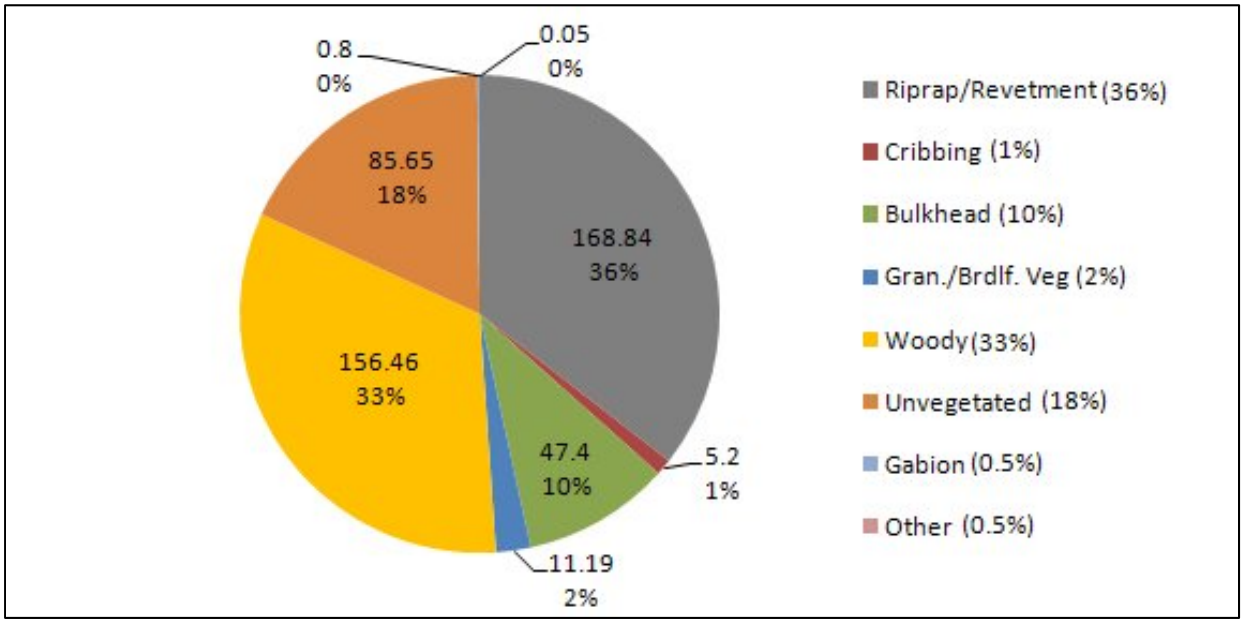


Figure 29- Types of Shoreline Stabilization - Hudson River (data obtained from NYSDEC)

3.3 SHORELINE EROSION FACTORS

There are a number of factors which influence erosion of shorelines ---these factors include geology, wave exposure, river flow, strength and direction of current, ice, vegetation, bank slope, and upland use in the adjacent upland area. Table 5 illustrates the various erosion factors for the site with each segment's performance score with respect to potential for each erosion factor; 1 is the lowest potential for that type of erosion factor and 5 is the highest.

Erosion Factor	Performance	Score
Ground/Soil Conditions	**Summary:** *The first ±5 feet of the top layer of soil along the shoreline is dredged material from the 1860s. The soil is composed of silts and clays which are known to be quite susceptible to erosion when exposed to the river environment. The majority of the shoreline is currently exposed to the river since the timber cribbing has deteriorated and concrete cap failing in most areas, therefore leaving the soils unprotected.*	
	Segment A-HIGH: The northern portion (A1) of this segment is experiencing a great deal of erosion however the southern portion (A2) appears to be ok.	Segment A: 2
	Segment B-LOW: The shoreline is protected by rock riprap however there appears to be slight overtopping and erosion.	Segment B: 1
	Segments C-F-MODERATE/HIGH: The shoreline is currently exposed to the river due to the failed bulkhead, several areas of erosion are evident along the upland area directly adjacent the shoreline.	Segments C-F: 4
	Segment G- HIGH: This section of shoreline is in severe condition and upland erosion is extending ±30 feet inland.	Segment G: 5
	Segment H- LOW/MODERATE: The first 100 feet or so of this segment of shoreline appears to be in fair condition as the concrete cap is still intact as well as the timber bulkhead. However, the remainder of the shoreline is failing and slight erosion is occurring.	Segment H: 2
Groundwater and Drainage	**Summary***: Groundwater table elevations at the site can be affected by precipitation (rain and snow) and snowmelt. As the site experiences a great deal of snow coverage in the winter, all segments are at risk for erosion as a result of groundwater. Surface drainage can also contribute.*	
	All Segments- LOW/MODERATE	All Segments: 2

Erosion Factor	Performance	Score
Wave Energy	**Summary:** *Since the majority of the timber crib wall and concrete cap is deteriorating, the shoreline is experiencing some erosive wave action due to the wave energy generated from winds or vessel wakes.* **Segments A and H**-LOW/MODERATE: the southern portion of Segment A and Segment H appears to have less wave energy affecting the shoreline. **Segment B-G**- MODERATE: due to deteriorating shoreline this area is experiencing a moderate amount of erosion due to wave energy.	Segment A & H: 2 Segment B-G: 3
Tides, Flow & Current	**Summary:** *The force of water flowing in a river can be regarded as the most important process causing erosion. All of the eroded material is carried downstream and deposited in the channel bottom or in point bars located along bends in the waterway.* **All Segments**- MODERATE	All Segments: 3
Ice	**Summary:** *Moving surface ice can cause a variety of issues to shoreline protection at the site; including, piling up of fractured ice fragments on the slope, excessive shearing forces and grounded ice rubble adjacent to the structure that could impede functionality.* **All Segments**- MODERATE/HIGH: All shoreline segments are exposed to ice along the river and break-up debris building up along the structures.	All Segments: 4
Bank Slope/Vegetation	**Summary:** *Typically, steeper banks will experience increased erosion as wave run-up is greater on a steeper slope than on a shallow slope. Higher banks also typically experience greater landward recession than lower banks due to a decrease in overall bank stability. Natural trees, shrubs, willows and grasses with deep roots provide a stabilizing influence and protection from surface erosion. Vegetation has the ability to: reinforce the soil with a root system, remove water from the soil through evapotranspiration, reduce runoff velocity, reduce frost penetration and provide a buttress for large tree roots.* **Segment A**-HIGH: The northern portion (A1) of this segment of shoreline is experiencing a great deal of erosion and appears that the existing trees are what is preventing a more rapid erosion rate.	Segment A:5

Erosion Factor	Performance	Score
Bank Slope/Vegetation (Continued)2	**Segment B-** LOW: This area has a shallow slope due to the rock riprap protection, even though it doesn't have any vegetation.	Segment B:1
	Segments C, F and H-- MODERATE: This portion of the shoreline has a moderate wall height, between 9.4 and 13.2 depending on the depth of the mud line; there is no vegetation present near the shoreline.	Segment C,F,H: 3
	Segments D, E and G--MODERATE: Same wall height as Segment C; however, there are some large trees located immediately adjacent the edge of the shoreline in a few areas which appear like they helping to minimize the amount of erosion occurring. Without them, the situation could be much worse.	Segment D,E,G: 3
Upland Use	**Summary:** *Loading the top of the bank with a heavy structure or placing fill on or over the top of the bank has an adverse impact on bank stability because the driving force of the bank is increased.*	
	Segments A-B- LOW: No surcharge in this area.	Segments A-B: 1
	Segment C- MODERATE: There will be some surcharge load at the points where the walkways join the upland connecting to the future fishing platform.	Segment C: 3
	Segments D-H- LOW/MODERATE: These areas will have some surcharge load where future walkways may be built and at kayak access locations.	Segments D-H: 2

Table 5- Shoreline Erosion Factors at Henry Hudson Park

3.4 SUMMARY OF ALTERNATIVE SHORELINE STABILIZATION EVALUATION PROCESS

3.4.1 Site Constraints and Project Requirements

Some of the items affecting the shoreline stabilization selection that OCC took into consideration in the evaluation include:

- Ground/Soil Conditions - Types of soil present along the upland area of the site and basin.
- Regulatory Requirements - Keeping within any federal, state, and local permitting requirements for boundaries, construction and materials used.
- Erosion Protection - Effectiveness to protect the shoreline from further erosion - geotechnical soils, environmental site conditions, and vessel-induced wake activity.
- Aesthetics/Public Views- How the shoreline looks to users of the Park and also from the river.
- Environmental Impacts - Wildlife habitats and water quality.
- Public Access/Walkway Provisions - Fishing area, mooring considerations, water access, and future walkway provisions.
- Upland and Adjacent Uses - Surcharge loads and space available.
- Construction Considerations - Material availability, installation difficulty, equipment required and accessibility.
- Cost - Materials, labor, installation, and availability.
- Durability and Maintenance - Durability, longevity and amount of maintenance required throughout its design life.
- Tradition - Typical method of shoreline method used along the Hudson River, and surrounding sites.

3.4.2 Evaluation of project requirements against factors affecting the type of shoreline stabilization selected

In order to determine the best form of shoreline protection for the site, each selection factor was evaluated based on the relevancy and importance to the project requirements, site constraints and discussions with the Client and assigned a rating number between (1) and (3); 1 being least important and 3 being the most important.

	Ground/Soil Conditions	Regulatory Requirements	Erosion Protection	Aesthetics/Public Views	Environmental Impact	Public Access /Walkway	Upland and Adjacent Uses	Construction Considerations	Cost	Durability & Maintenance	Tradition
FR	2	3	3	1	2	3	2	2	3	2	1

Table 6- Shoreline Stabilization Method Selection Factors

As shown in Table 6, the factors of most importance are that the structure provides effective erosion protection, is cost effective, and meets regulatory requirements; these factors were given a Factor Rating of 3. Environmental impacts, public access, upland and adjacent uses, construction considerations, and durability and maintenance are the next important factors in the selection process. Aesthetics and tradition, although considered in the evaluation, are not high a priority when compared to others.

3.4.3 Evaluation of shoreline stabilization methods

In our evaluation, OCC wanted to keep to the most practical choices that would be best suited for the project requirements and site conditions; these included rock riprap, joint planting, vegetated geogrid, live crib wall, and timber bulkhead (Figure 30- Shoreline AlternativesFigure 30).

Shoreline Alternatives				
ROCK RIPRAP	**JOINT PLANTING**	**VEGETATED GEOGRID**	**LIVE CRIB WALL**	**TIMBER BULKHEAD**
				
Rock riprap revetment is the placement of layers of appropriately sized rocks (determined by expected wave activity and runoff velocity) atop a smaller layer of stone placed over a layer of geotextile fabric laid atop a 1V:1.5H (maximum) sloped shoreline.	Vegetated riprap is a combination of live stalking and riprap. The riprap prevents wave action from eroding the shore while the roots of the plants bind the earth below. Eventually, the plants hide the rocks, providing shade and habitat for fish and wildlife.	Vegetated geogrid consists of a wall composed of 1-foot "lifts" of compacted soil wrapped in coir fabric or geotextile (typically synthetic) fabric, with plugs, live stakes, or other planting placed between each lift.	Live crib walls (lunker) are box-like interlocking arrangements of untreated log or timber members placed alongside the shoreline. The base layer consists of rock fill 2 to 3 feet below the mudline and 3 to 4 feet of compacted fill material on top with live branch cutting in between. Limited to 7ft or less in height.	Timber bulkhead is a vertical wall which stabilizes the earth behind it through the use of timber piles and walers. Rock protection is also recommended along the toe of the structure to prevent scour.

Figure 30- Shoreline Alternatives

Using a rating between one (1) and four (4), each shoreline stabilization method was ranked for each factor; 4 was assigned to the most suitable factor for the alternative being evaluated and 1 was assigned to the least suitable factor (Table 7).

Alternative	Ground/Soil Conditions	Regulatory Requirements	Erosion Protection	Aesthetics	Environmental Impact	Public Access /Future Walk-way	Upland and Adjacent Uses	Construction Considerations	Cost	Durability & Maintenance	Tradition	TOTAL
Rock Riprap	4	3	4	2	3	3	4	4	4	4	4	39
Joint Planting	4	3	4	3	3	2	3	3	3	3	1	32
Vegetated Geogrid	3	4	1	4	3	2	2	2	2	2	1	26
Live Crib Wall	2	3	2	3	3	3	3	2	2	2	1	26
Timber Bulkhead	1	2	4	2	1	4	4	2	1	2	4	27

Table 7- Initial Rating of Each Wall Selection Factor for Each Shoreline Alternative[19]

Ground/Soil Conditions

Ground and soil conditions play one of the most significant roles in selecting appropriate shoreline protection for the site. At the site, the first 60 inches of top soil consists of dredged silt material, which isn't recommended for use directly behind or in a retaining structure due to its limited lateral earth pressure; therefore timber bulkhead and live crib walls don't score well. Vegetated geogrid scored less then rock riprap or joint planting because of the need for high soil strength required in the design of the structure.

Regulatory Requirements

Of all the options, the bulkhead is going to be the most difficult to get approval for from a regulatory perspective. In general, timber bulkheads and other vertical-faced structures are not favored due to potential for wave reflection, scour, and loss of habitat. Rock riprap, joint planting, and live cribbing score a 3 because although they provide habitat, they are still founded on a "hard" structure. However, the regulatory agencies seem to understand that a hard structure is often required on many sites along the Hudson River.

Erosion Protection

Rock riprap, timber bulkhead, and joint planting are going to be the most effective methods of shoreline stabilization for the site since this portion of the Hudson River is exposed to a number of envi-

[19] Refer to Appendix C for additional information.

ronmental forces, natural and human-induced, which require a structure that can better resist these loads.

Aesthetics/Public Views

Aesthetics is subjective. However, it is believed that most people would prefer to look at manicured plantings as opposed to stone or timber, which may present a "cold" feeling. For this reason, the vegetated shoreline options score higher than the bulkhead and the riprap with combination methods such as joint planting and live crib wall scoring in the middle.

Environmental Impact

The timber bulkhead is likely going to have the most adverse environmental impact of all of the studied structures. It does not provide benefits to the wildlife at the site, requires extensive pile driving and has the potential to increase wave reflection. However, it is widely used as a form of protection of shorelines when needs and conditions warrant.

Public Access

A bulkhead might increase public access area since it is a vertical structure and will take up the least area. If the bulkhead height is not excessive, users are generally close enough to fish and a platform or pier can always be constructed to provide access. Public access over riprap is typically discouraged due t o injury and liability concerns. Other shoreline solutions that include vegetation may preclude public access close to the water once the vegetation grows in.

Upland and Adjacent Uses

There are no structures within the failure plane behind the wall so none of the shoreline stabilization methods evaluated are likely to impact upland and adjacent uses. However, during construction, temporary loads will be exerted directly adjacent the wall which will need to be taken into account. Those methods that include the use of vegetation scored slightly lower than riprap and bulkhead because it is likely that once the vegetation grows in, views to the river from the park could be impacted. This may impact placement and use of benches and picnic tables from which people enjoyed looking at the river view.

Construction Considerations

Rock riprap ranked the highest as it is one of the easiest to construct and utilizes a readily available material. The other methods all require specialized equipment, are not easy to install, and involves more skilled labor to carefully install the plantings. Joint planting is the next highest because it is rock riprap with additional vegetation planting, thus requires a bit more skilled labor in order to effectively plant the trees and brushes.

Cost

Rock riprap is going to be the most cost effective option; both short and long term. Rock is a fairly inexpensive to furnish and install. In addition, riprap, if sized appropriately for the environmental conditions, requires minimal future maintenance costs. The site preparation work for the vegetated options, as well as, special care required for the plantings, increases costs. The bulkhead is the most costly option due to materials and pile driving to install.

Durability and Maintenance

Rock riprap ranks the highest in this category due to durability and least amount of maintenance required. Joint planting follows close behind with the only difference being that the vegetation will re-

quire some upkeep. Other vegetated options will require frequent maintenance to prune or replace plantings that are damaged due to environmental conditions such as wave or ice damage or natural die-off. While a bulkhead will have a long initial design life, it is not without some future maintenance or replacement of timber boards and hardware.

Tradition

Rock riprap and timber bulkhead are the most traditional methods of shoreline stabilization used. Other options are slowly gaining in popularity, if the specific site conditions warrant their use.

3.4.4 Selection of the best shoreline stabilization method

The final step in OCC's evaluation of the proposed shoreline stabilization method involved combining steps 3 and 4; multiplying the selection rated factor (FR) and each wall's rating against it. As shown below in Table 8, rock riprap scored the highest at 74 and joint planting the second highest at 61; therefore rock riprap and/or joint planting would be the best suited for the site based on the site constraints and project requirements.

Alternative	Ground/Soil Conditions	Regulatory Requirements	Erosion Protection	Aesthetics	Environmental Impact	Public Access/Future Walkway	Upland and Adjacent Uses	Construction Considerations	Cost	Durability & Maintenance	Tradition	TOTAL
Rock Riprap	8	9	12	2	6	9	4	8	12	8	4	74
Joint Planting	8	9	12	3	6	6	3	6	9	6	1	61
Vegetated Geogrid	6	12	3	4	6	6	2	4	6	4	1	48
Live Crib Wall	4	9	6	3	6	9	3	4	6	4	1	51
Timber Bulkhead	2	6	12	2	2	12	4	4	3	4	4	53

Table 8- Final Results from Analysis

3.5 SHORELINE RECOMMENDATIONS

It is OCC's recommendation that the full extent of existing concrete cap bulkhead should be replaced with a combination of rock riprap revetment and joint planting. Figure 31 illustrates the proposed alternatives layout along the shoreline. Conceptual drawings of these alternatives are provided in Appendix F. Joint planting is utilized in areas where there is less public access adjacent the shoreline such as the playground area, since the height of the plantings my reduce visibility of the waterway.

For both methods, stabilization would consist of the removal of the remains of the existing concrete cap, re-grading the existing shoreline slope to 1.5H:1V, and placement of riprap on the riverside of the shoreline to minimize disturbance to the existing inland fill material. This will require the shoreline to be cut back ±3 feet landward. This needs to be taken into consideration during the installation of the fishing platform at Segment C and fire dock at Segment G.

Plantings such as willow or cottonwood cuttings will be placed between the stones (joints) of the riprap from the top of the high water elevation to the top of the shoreline at 2' to 3' spacing; this will augment vegetation and help reduce current velocities in the appropriate segments along the shoreline. Planting is best if it is done during the dormancy period of the chosen plant species, late fall to early spring. The live stakes will need to be monitored until they take root which generally takes the first two seasons.

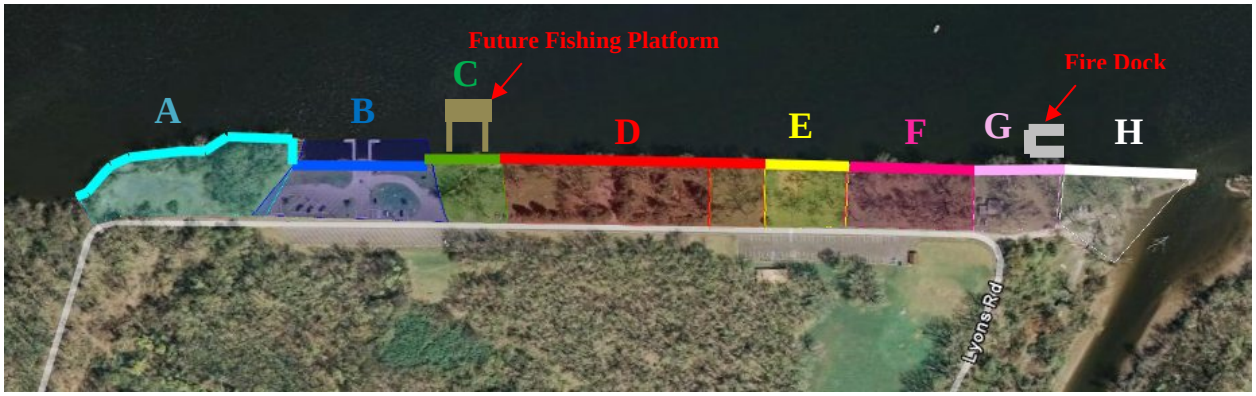


Figure 31- Shoreline Alternative Layout

SEGMENT "A" LEGEND

A1: Northern Section

A2: Southern Section

Figure 32- Segment A Breakdown

Segment ID	Shoreline Recommen-dation	Explanation
A--Overlook Area	Soft Vegeta-tion and re-ducing slope angle of the shoreline	As this area is currently undeveloped, the regulatory agencies are likely going to want to see stabilization methods which provide vegetation and habitat for aquatic life; therefore modifications to the shoreline should be kept minimal in order to increase the chances for approval. **Area A1 (northern section)**: Since area A1 is experiencing the highest amount of erosion and is in close proximity to the road, pedestrian access should be restricted until the shoreline can be stabilized to prevent further erosion. To assist with stabilizing the shoreline the slope should be cut back to a 30 degree angle and vegetation planted (a flatter slope will assist with vegetation growth). Once the shoreline stabilizes, this segment would be an ideal kayak launch area. Types of vegetation used for shoreline stabilization include emergent aquatic plants along the lower waterline (to protect woody shoreline vegetation from wave and current action), proceeding to woody and emergent flood tolerant shrubs and then to flood tolerant, moist soil trees. The vegetation planted also needs to be appropriate for the Hudson River environment. PRIORITY LEVEL: **High** - *This segment is of the highest priority for temporary restriction and stabilization to prevent further erosion.* **Area A2 (southern section)**: This area shows less erosion then that observed at area A1, due to the flatter slopes and sunken barge and doesn't require any modifications to shoreline at this point. In order to remove the barge, the Town would likely need to apply for an Article 15 (protection of waters) permit for excavation/fill/disturbance to the bed of a navigable water, verify there are no special aquatic resources at the site, and coordinate with the NYS Office of Parks, Recreation and Historic Preservation to verify whether there would be any cultural or archaeological significance to the barge. PRIORITY LEVEL: **Low** - *This segment is of lower priority as there is no immediate need to stabilize or an associated use. It is also going to be the hardest area to permit any modifications to the existing shoreline.*

B--Boat Launch Area	no action	Although there are visible signs of some erosion along the top of the riprap we don't recommend changing anything at this point. In the future it might be beneficial to plant some erosion tolerant plantings along the top portion of upland directly adjacent the rock riprap. We recommend that the North end of this segment is used as a temporary kayak launch area, since it is the only suitable portion of the shoreline for kayaks at the moment until the shoreline is stabilized in Segment A.
C--Fishing Platform Area	rock riprap revetment	These areas will be a high traffic area for the public, therefore rock riprap should be provided as opposed to joint planting to allow for a better view of the shoreline. PRIORITY LEVEL: **High** - *These segments are of the highest priority for replacement since they experience the highest pedestrian traffic.*
D--Picnic Area(s)	rock riprap revetment	
E--Play Area	joint planting	This area is better suited for joint planting as it's more intended for kids play upland and view of the waterway won't be as important. The live plantings will also restrict access to the waterway which is better for child safety. PRIORITY LEVEL: **High** - *Since this area is a high traffic area for children, this area is high on the priority list for replacement.*
F--Large Group Picnic Area 1	Rock riprap revetment	This area is better for rock riprap as there will be higher traffic in the area for group picnics that would enjoy views of the waterway. PRIORITY LEVEL: **Medium High** - *Since this area has a large amount of pedestrian traffic it is high on the priority level however not as much as other areas.*
G--Large Group Picnic Area 2	Rock riprap revetment	Since this area provides quick access to the park entrance and doesn't experience as much pedestrian traffic as other areas is better suited for the location of the fire dock. It is also the location that the Town's fire department has obtained permit approval for placement of the fire dock. Due to the presence of the fire dock, this shoreline segment needs to be rock riprap revetment. We recommend caution is practiced during installation of the fire dock and that the upland area is regularly observed for signs of erosion since the initial placement of the dock and surcharge load of the gangway landing adjacent the shoreline will cause additional stress to the shoreline structure. PRIORITY LEVEL: **High** - *This section of shoreline should be high priority for replacement since it is experiencing the most severe erosion then other areas of the site.*

H--Large Group Picnic Area 3	Joint Planting	This area, though designated on the Town's master plan as a kayak area is not the ideal location for kayak launch. Vloman Kill Creek, located alongside the western portion of this segment is more suitable; however there may be some difficulties performing any modifications to this area due to its close proximity to the state wetland boundaries and the nearby sewage outfall does not make it the most desirable kayak launch location. Therefore, this area is better suited as a large group picnic area and can be replaced with Joint Planting. PRIORITY LEVEL: **Medium** - *Since this area doesn't get a great deal of regular pedestrian traffic and the shoreline is in better condition then the other areas of the park it ranks lower on priority compared to the rest of the park.*

Table 9- Recommendations and Explanations

For each shoreline alternative, an Opinion of Probable Cost (OPC) for construction was developed (Table 10); a detailed breakdown of these costs is provided in Appendix D. The OPC was based on material and labor force required for each type of shoreline alternative, and assumes that the existing materials along the shoreline of segments C through H will be reused within the new shoreline design. Costs associated with the disposal of materials along the site of Segment A were also not included in our estimate. All costs assume "clean" material. This assumption should be verified before proceeding with any work.

The OPC was divided into shoreline lengths based on the segments listed above. Concept A consists of installation of concrete barriers at the top of the revetment while Concept B excludes the costs of the concrete barriers and installation. Although it is not required, the addition of concrete barriers to the design helps prevent erosion and migration of upland soils and can provide a curb to delineate an adjacent pathway.

Shoreline Stabilization Method	Segment	Length (LF)	Concept A	Concept B
Rock Riprap Revetment	C	175	$ 205,000	$180,000
	D	620	$ 654,000	$570,000
	G	207	$ 216,000	$188,000
	F	297	$ 323,000	$287,000
	A1	394	$ 352,000	$308,000
Subtotal		**1,693**	**$ 1,750,000**	**$1,533,000**
Riprap Revetment w/ Joint Plantings	E	200	$ 243,000	$216,000
	H	300	$ 347,000	$351,000
	A2	213	$ 324,000	$296,000
Subtotal		**713**	**$ 914,000**	**$863,000**
TOTAL			**$ 2,664,000**	**$2,396,000**

Table 10- Preliminary Opinion of Probable Costs for Henry Hudson Park Shoreline

*OPCs assume 5% general conditions; 10% overhead; 10% profit and 25% contingency

It should be noted that the total prices listed in Table 10 exclude mobilization and demobilization costs; since these costs are dependent on the number of times the contractor mobilizes and demobilizes on site, if the project were to be completed in phases (over a period of time) it could influence the cost. One time mobilization and demobilization costs for this project are estimated to be approximately $44,000.00.

Ideally, all segments of the project area should be rehabilitated together in one phase. This is because depending on the length of time between phases, the ramifications may include additional costs for contractor mobilization and demobilization, contractor availability, and expiration of the regulatory permits. However, due to the condition of the failing bulkhead and regulatory concerns associated with the area in Segment A, we recommend that the construction work for Segments C through H be conducted in a separate phase to the shoreline modifications for Segment A.

Prior to moving forward with the final design, a detailed subsurface investigation is recommended in order to confirm the soils properties at the site. The associated costs are provided in Appendix E.

3.6 RECOMMENDED GEOTECHNICAL EXLORATION AND TESTING FOR FINAL DESIGN

Per the Federal Highway Administration(FHWA)'s recommendations, there should be a minimum of one boring every 200 feet along the shoreline, some in the front of wall in the water and some in the back of the wall on land; hence about 11 borings throughout the site (Figure 33). Potential boring locations are shown in the area of the existing riprap in case any future improvements or an expansion of dock is required. The minimum boring depth should be at least 20 feet below the existing ground surface elevation or mud line.

We also recommend a hydro graphic survey along the shoreline to verify the depths and extent of existing material left by the failing concrete cap and timber cribbing. The estimated cost for the survey is included in Task 1 of our implementation plan (details are shown in Appendix E).

Figure 33- Minimum Number of Borings recommended for the Site

Since the United States Department of Agriculture (USDA) Soil Survey for the site indicated that the existing surface soils for the site are composed of silt clay materials, it is recommended that Standard Penetration Tests (SPT) and "undisturbed" thin wall tube samples be taken at 5 foot intervals; these will be sent to a lab to allow consolidation testing (for settlement analysis) and strength testing (for slope stability). Groundwater table information will be obtained at each boring location. The estimated cost for the geotechnical soil investigation is included in Task 2 of the implementation plan (details are shown in Appendix E).

Although not recommended for use at this site, additional information will be required if the vegetated geogrid method[20] is to be considered:

- Engineering properties of the foundation soils including shear strength and consolidation parameters used to establish settlement and stability potential for the proposed construction. Maximum bearing pressures must be established.

- Engineering properties of the reinforced soil including shear strength parameters, compaction criteria, gradation, and electrochemical limits.

- Engineering properties of the fill or in-situ soil behind the reinforced soil mass, including shear strength parameters and compaction criteria.

- Groundwater or free water conditions and required drainage schemes.

[20] FHWA NHI-10-025, MSE Walls and RSS, November 2009

4 ENVIRONMENTAL AND REGULATORY ASSESSMENT

Waterfront projects are highly regulated at the Federal, State, and Local levels. Regulatory awareness is a key component to successful project planning because obtaining authorization is complicated due to more stringent criteria and regulatory interpretation of governing policies. The undertaking of any waterfront work seaward of the high tide line requires several special permits from a number of regulatory agencies. A detailed list of regulatory permits is provided in Appendix G.

4.1 REGULATORY AGENCIES

Regulatory agencies with authority over shoreline stabilization are the U.S. Army Corps of Engineers (USACOE), New York State Department of Environmental Conservation (NYSDEC), New York State Office of General Services (NYSOGS), New York State Department of State (NYSDOS), and The Town of Bethlehem.

4.1.1 New York State Department of Environmental Conservation

The New York State Department of Environmental Conservation (NYSDEC) has authority under the Uniform Procedures Act of the Environmental Conservation Law to administer permits for disturbance of bed or banks, coastal erosion control, and excavation and fill in navigable waters. The Act provides time frames and procedures for filing and reviewing applications, providing public notice, holding public hearings and reaching final decisions. The Act is intended to ensure a fair, timely, thorough review, eliminate inconsistent procedures, and encourage public participation. The NYSDEC Division of Water maintains regulatory jurisdiction over coastal erosion control structures under ECL Article 34 and for Protection of Waters under ECL Article 15.

Permitting requirements for both “minor” and “major” projects are generally the same. In most cases, the “Joint Application for Permit” and required attachments discussed in Section 4.2 will be sufficient for the types of shoreline stabilization anticipated for the study area. It is anticipated that the proposed project will be considered a "major" project due to the overall length of the Park. Notice of all major projects must be published in both the Environmental Notice Bulletin (ENB) and a designated local newspaper to allow for public review and comment.

New erosion protection structures are generally discouraged by the regulatory agencies. However, a permit may be obtained for the construction, modification or restoration of these structures if the following requirements are met:

- All erosion protection structures must be designed and constructed according to generally accepted engineering principles which have demonstrated success or a likelihood of success in controlling long-term erosion. The protective measures must have a design life of at least 30 years.

- A long-term maintenance program must be prepared for construction, modification or restoration of an erosion protection structure. That program must include specifications for normal maintenance of degradable materials and the periodic replacement of removable materials.

- All materials used in such structures must be durable and capable of withstanding inundation, wave impacts, weathering, and other effects of storm conditions. Individual component materials may have a working life of less than 30 years only when a maintenance program ensures that they will be regularly maintained and replaced as necessary to attain the required 30 years of erosion protection.

- The construction, modification or restoration of erosion protection structures must not be likely to cause any measurable increase in erosion at the development site or other locations; and minimize, and if possible prevent, adverse effects to natural protective features, existing erosion protection structures, and natural resources such as significant fish and wildlife habitats.

A State Environmental Quality Review Act (SEQR) review will also need to be performed. SEQR requires all state and local government agencies to consider environmental impacts equally with social and economic factors during discretionary decision-making. It is anticipated that any proposed project would be considered "Type II" and a "Negative Declaration" would be required rather than an Environmental Impact Statement (EIS). A Negative Declaration indicates that the project is determined not to have significant adverse environmental impacts.

In accordance with Section 401 of the Clean Water Act, applicants for a Federal license or permit for activities (including but not limited to the construction or operation of facilities that may result in any discharge into waters of the United States) are required to apply for and obtain a Water Quality Certification from NYSDEC indicating that the proposed activity will not violate water quality standards. Water Quality Certification is required for placing fill or undertaking activities resulting in a discharge to waters of the United States where a permit is required from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act (see Section 4.1.2 below).

4.1.2 U.S. Army Corps of Engineers

In New York, USACOE issues two types of permits to authorize activities in waters of the United States: Individual Permits or Nationwide Permits. The USACE derives its regulatory authority for issuance of these permits under the following laws which define their responsibilities for coastal activities. *Section 10 of the Rivers and Harbors Act of 1899* and *Section 404 of the Clean Water Act (33 U.S.C. 1344)* define USACOE's responsibilities for coastal activities and grant regulatory authority for issuance of permits.

Section 10 of the Rivers and Harbors Act of 1899 authorizes the USACE to regulate certain structures or work in or affecting navigable waters of the United States. Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide shoreward to the mean high water elevation (MHW).

Section 404 of the Clean Water Act (33 U.S.C. 1344) Section 301 of this Act authorizes the USACE to regulate the discharge of dredged or fill material into waters of the United States. Section 404 of

the Federal Clean Water Act requires a permit for the placement of any fill or dredged material, or any excavation in waters of the United States, including wetlands.

Modifications and repairs to the existing shoreline structures or construction of new structures such as rock riprap revetments or bulkheads will require a permit under Section 10 and Section 404 regulations. There are also a number of "Nationwide Permits" which are general permits for activities such as bank stabilization, maintenance to existing structures, and wetland restoration activities. It is anticipated that the replacement of the existing timber crib structure will be eligible for Nationwide Permit number 3, Maintenance, and number 13, Bank Stabilization.

The USACOE also coordinates compliance with related federal laws including the National Environmental Policy Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, National Flood Insurance Act of 1968 (as amended), Executive Order 11988 on Flood Management, and the Magnuson-Stevens Fishery Conservation and Management Act as amended by the Sustainable Fisheries Act of 1996. It is anticipated that an Essential Fish Habitat (EFH) assessment will be required under the Magnuson-Stevens Fishery Conservation and coordination with the Endangered Species Act will be required to identify potential impacts to short nose sturgeon, a species currently listed as a federal endangered species, or its critical habitat that seasonally occurs in the vicinity of the proposed project.

4.1.3 New York State Department of State Division of Coastal Resources

New York State

The Federal Coastal Zone Management Act (CZMA) requires that each Federal agency activity, including issuing a permit, within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs.

The New York State Department of State (NYSDOS) Division of Coastal Resources is charged with the responsibility to review any proposals against the coastal policies of the New York State Coastal Management Program and the enforceable policies of the local Waterfront Revitalization Program to ensure the project is consistent with the goals of these programs. A consistency determination is made by NYSDOS through review of a Federal Consistency Assessment Form (FCAF). See section 4.2 for additional information.

In 2007, the Town of Bethlehem completed its Waterfront Revitalization Program (WRP) and Master Plan pursuant to New York State's Waterfront Revitalization Program. Any proposed action or project will also be reviewed for consistency with the local WRP polices during the consistency review process.

4.1.4 New York State Office of General Services

Title to the bed of numerous bodies of water is held in trust for the people of the State of New York under the jurisdiction of the New York State Office of General Services (NYSDOS), Bureau of Land Management. Structures, including fill, located in, on, or above state-owned lands under water are

regulated under the Public Lands Law and may require authorization from the state unless the Town of Bethlehem has been historically granted ownership of these lands.

4.1.5 Town of Bethlehem

The town of Bethlehem provides permits pending approval from the Town Board.

4.2 REQUIRED PERMIT FORMS AND APPLICATIONS

Based on the regulatory jurisdiction of the various agencies described above, it is anticipated that the following forms and applications will need to be filed for the proposed shoreline stabilization replacement project. The costs for professional services associated with preparing and submitting the permit application forms and drawings are included in our implantation costs shown in Appendix E.

Joint Application Form:

The "Joint Application for Permit" form is a single form submitted to both the NYSDEC and the USACOE to streamline the application process and covers the various authorizations required from both agencies. The required attachments include a project description, project plans, site photographs, and adjacent property owner information. Although identical information packets are sent to both agencies under this single form, each agency performs an independent review according to their individual policies and procedures. The NYSDEC and USACOE issue separate authorizations.

Environmental Questionnaire:

This form is required by the USACOE to supplement the Joint Application and requests specific information regarding volumes of fill required for shoreline stabilization and a discussion of alternatives to the proposed project.

Environmental Assessment Form:

An Environmental Assessment Form will be required under the State Environmental Quality Review Act (SEQR). The proposed shoreline stabilization project is an "unlisted" action under the SEQR process. As a result, the Short Environmental Assessment Form (EAF) is filed and reviewed by the Lead Agency. It is anticipated that the Lead Agency in this project would be the Town of Bethlehem. The short EAF is used to determine the significance of the proposed actions. If the potential adverse environmental impacts of the project are considered questionable or exceed thresholds, a full EAF form or Environmental Impact Statement (EIS) may be required to be submitted. It is not anticipated that the proposed project will require a full EAF or EIS.

Coastal Assessment Form:

This permit is issued by the NYSDOS. If after an environmental assessment has determined that the project will adversely affect the ecosystem, this form must be submitted to assure compliance with additional certification requirements.

Federal Consistency Assessment Form:

The Federal Consistency Assessment Form (FCAF) is prepared for the NYSDOS to demonstrate and certify that the proposed project is in compliance with New York State's Coastal Management Program. This form requires discussions regarding the impact of the proposed project on coastal waterways and navigable waters and other factors such as public access per the State's Coastal Policies. Along with this process, assessment will be made regarding the policies of the Local Waterfront Revitalization Program.

Application for a Licensed Use of Land Underwater and Application for Easement, Lease, or Permitted Use of Land Underwater:

These applications may be required by the NYSOGS if the Town of Bethlehem does not maintain ownership of the lands underwater immediately under and adjacent to the existing shoreline stabilization structures to be replaced by the proposed project. Town tax maps and deeds should be reviewed to verify the current ownership rights (costs included in Task 3 of the Implementation Plan).

4.3 RECOMMENDATIONS

The regulatory process can be arduous and lengthy. OCC recommends proceeding with the preparation of permit applications and supporting materials as soon as possible after Town Board approval of the proposed shoreline stabilization concepts. The proposed plans which accompany the application materials are typically at a "preliminary", or 35% design level, similar to the concept sketches provided in this report. Final design effort is typically not needed or recommended for permitting and is typically performed after the regulatory agencies have had a chance to provide feedback about the project.

The typical time frame is 6 months from the initial submission of the permit applications to receiving the permits from the regulatory agency. This is due to number of federal, state, or local approvals required as it requires coordinated review among the agencies. Once the permits are issued by the agencies, the permit terms can vary from 1 year to 10 years however for projects involving waterways and wetlands there is usually a 1 or 2 year permit term which covers the construction period.

5 FUNDING - APPLICABLE GRANTS AND LOANS

OCC conducted initial research to determine if there were any Federal, State, and/or private funding opportunities available that were applicable for the Henry Hudson Park project. Several potential funding options may be available that are discussed below and a listed in Appendix H.

5.1 FEDERAL GRANTS

5.1.1 Outdoor Recreation, Acquisition, Development and Planning Grant

The Outdoor Recreation, Acquisition, Development and Planning Grant is a program developed by the Department of the Interior, National Park Service to create parks and open spaces, protect wilderness, wetlands, and refuges, preserve wildlife habitat, and enhance recreational opportunities. Although applications aren't available at the present time, it is a program to consider for funding in the future.

Website: **Phone:** **Email:**	http://www.nps.gov/lwcf (518) 474 - 0443 LWCF_grants@nps.gov	**Address:**	Office of Parks, Recreation and Historic Preservation Agency Building #1, Empire State Plaza Albany NY, 12238

5.2 STATE GRANTS

5.2.1 Greenway Communities Grant Program

The Greenway Communities Council administers this program which provides financial (approximately $5,000 - $10,000) and technical assistance to municipalities' located within the designated Greenway Area who share the Greenway goals and objectives. Since Henry Hudson Park is located in Albany County, it could qualify for funding. A copy of the application is included in Appendix I. Applications are due February 11, May 6, and September 9 of 2011.

Website: **Phone:**	http://www.hudsongreenway.state.ny.us/GrantFunding/ (518) 473-3835	**Address:**	Hudson River Valley Greenway Capital Building Capital Station, Room 254 Albany, NY 12224

5.2.2 Hudson River Greenway Water Trail Grant

This is a grant which helps parks which are part of or wish to become part of the Hudson River Greenway Water Trail. The maximum state grant provided is 50% of the total project cost. A copy of the application is provided in Appendix H. Since Henry Hudson Park is already listed as a designated site, they are eligible to apply.

Website: **Phone:**	http://www.hudsongreenway.state.ny.us/GrantFunding/ (518) 473-3835	**Address:**	Hudson River Valley Greenway Capital Building Capital Station, Room 254 Albany, NY 12224

5.2.3 New York State Parks Program

The Parks application is for projects to preserve, rehabilitate or restore lands, waters or structures for use by all segments of the population for park, recreation or conservation purposed, including such things as playgrounds, courts, rinks, community gardens and facilities for swimming, boating, picnicking, hunting, fishing, camping or other recreational activities. The maximum amount provided by the Grant was $400,000 in 2010. However, it is a potential opportunity for Henry Hudson Park once they become available.

5.2.4 Environmental Protection Fund Local Water Revitalization Program (LWRP)

The Local Waterfront Revitalization Program (LWRP) provides grants to municipalities for planning, design and construction projects that help a community improve their existing waterfronts. LWRPs help municipalities develop a waterfront vision; establish partnerships with community organizations; understand their waterfronts' assets, issues and opportunities; and develop a strategy that will fulfill that vision. As the Town completed their LWRP plan in 2006 they may be eligible for grants.

Website: **Phone:** **Email:**	http://www.nyswaterfronts.com/grantopps_EPF.asp (518) 474-6000 coastal@dos.state.ny.us	**Address:**	Division of Coastal Resources NYS Department of State 99 Washington Avenue, Suite 1010 Albany, NY 12231

5.2.5 Hudson River Valley Quadricentennial Legacy Grant Program

Although the deadline for the 2011 Grant was in December 2010, there may be an opportunity to apply for 2012 funding by December 2011. The Hudson River Valley Quadricentennial Legacy Grant Program is intended to fund local Hudson River Valley projects, programs, and events that preserve and sustain the legacy of the Hudson River Valley Quadricentennial. Total funding of this program is $50,000. The grants will be limited to $2,500 to $5,000 and must be matched dollar for dollar by the recipient.

Website: **Phone:**	http://www.hudsongreenway.state.ny.us/GrantFunding/Quad.aspx (518) 473-3835	**Address:**	Hudson River Greenway Capitol Building Room 254 Albany, NY 12224

5.2.6 DEC Grants Program for the Hudson River Estuary - Environmental Protection Find (EPF)

New York State DEC's Hudson River Estuary Program offers grants to municipalities and non-profit organizations living within the Estuary Watershed Boundaries to help fulfill the Hudson River Estuary Action Agenda and offered in five categories which include: Community Interpretive Centers and Acquisition, Open Space Planning and Acquisition, Community-based Habitat Conservation and Stewardship, Watershed Planning and Implementation, and Hudson River Access.

In 2007, The Town of Bethlehem was awarded with $24,750 towards the Henry Hudson shoreline stabilization study which was under the Hudson River Access category. Although there is currently no funding for this program, there may be a time in the future where some funds may become available for the Town to apply for additional funding for Henry Hudson Park as part of the Hudson River Access category.

Website: **Phone:** **Email:**	http://www.dec.ny.gov/lands/50091.html (845) 256-3016 hrep@gw.dec.state.ny.us	**Address:**	Hudson River Estuary Program NYSDEC Region 3 21 S Putt Corners Rd New Paltz, NY 12561

5.2.7 Hudson River Improvement Fund

The Hudson River Improvement Fund was created by the Hudson River Foundation to support projects that promote the enhancement of public use and enjoyment of the natural, scenic and cultural resources of the Hudson River and its shores - with an emphasis on physical projects that require capital construction, development or improvement. Examples of projects include the development or improvement of facilities that increase public physical or visual access to the Hudson River, including but not limited to docks, boats, piers and shorefront access points.

Website: **Phone:** **Email:**	http://www.hudsonriver.org/hrif/ (212) 483-7667 info@hudsonriver.org	**Address:**	Hudson River Foundation Hudson River Improvement Fund 17 Battery Place, Suite 915 New York, NY 10004

6 RECOMMENDED SHORELINE IMPLEMENTATION PLAN

OCC recommends the following "Phase II" tasks in order to implement the proposed shoreline stabilization plan. The associated costs are provided in Appendix E.

Task 1: Site Surveys: A partial shoreline topographic survey should be conducted to obtain additional information on the existing conditions of the site shoreline so that more accurate existing and proposed cross sections can be developed for permitting and design. We also recommend that a hydrographic survey is conducted to verify the depths adjacent the bulkhead.

Task 2: Geotechnical Program: A geotechnical site investigation should be conducted prior to detail design. As detailed previously in an earlier section, OCC recommend's a geotechnical site investigation be conducted to confirm soil parameters along the shoreline. OCC's scope would include development of a soil boring program and solicitation of quotes, coordination with the geotechnical firm to obtain the borings and laboratory analysis information as required, and oversight of their work. Upon receipt of the results, OCC will review the soils data to apply it towards the detailed design. In areas of excavation, an environmental consultant should provide and review a soil testing program to confirm that the material is clean and suitable for intended uses.

Task 3: Regulatory Permitting: Formal applications to the regulatory agencies should be made for the proposed shoreline alternative and submitted. Alongside the application, preliminary plans need to be submitted to provide the regulatory agencies with enough information to satisfy their requirements. This task would include follow-up with agencies to address requests for additional information and answer questions.

Task 4: Grant Application Assistance: If the Town identifies a grant opportunity that the proposed project is eligible for, OCC can assist in the preparation of the application(s) and follow up with the agencies.

Task 5: Detail Design: Once the regulatory agencies have provided initial, positive comments about the proposal, detail design of the shoreline alternative(s) will commence. It is anticipated that the shoreline alternatives will include two types of shoreline alternatives: rock riprap revetment and joint planting.

Task 6: Bidding Services: A list of potential contractors will be prepared, along with specifications and design detail drawings from the previous task. OCC will organize and attend a pre-bid meeting with the contractors to discuss the scope of the project and distribute the bid packages accordingly. If any questions arise during the bid duration, OCC will prepare and submit any addendums as necessary. Once all bids are received, OCC will conduct a bid analysis and provide the Town with recommendations.

Task 7: Construction Assistance: OCC will attend a project kick-off meeting and provide periodic on-site construction review, review of shop drawings, requests for information and review / recommend contractor payment requests. Deliverables may include weekly resident engineer field reports and status updates. OCC will prepare and submit the required permit close-out documents to the regulatory agencies upon project completion. Phasing of shoreline segments will be incorporated into planning and construction.

7 LIST OF ADDITIONAL REFERENCES & SOURCES

Report or Document Title	Date and Author	Location
Navigation Chart 12348	NOAA, 2011	http://www.charts.noaa.gov/OnLineViewer/12348.shtml
Elevations on Station Datum, Albany, Hudson River, NY	NOAA, 2011	www.tidesandcurrents.noaa.gov
Hudson River Shoreline Restoration Alternatives Analysis	Allen, Gregory; Cook, P.E., Thomas; Taft, Edward, 2006	Hard Copy Provided by the Town of Bethlehem
Investigation into Ship Induced Hydrodynamics and Scour in Confined Shipping Channels, *Journal of Coastal Research.* Special Issue 50	D. TAYLOR, K. HALL, N. MACDONALD, 2007	
Custom Soil Resource Report for Albany County, New York	USDA, 2011	
The EDR Radius Map Report with GeoCheck for Lyons Road Property.	Environmental Data Resources Inc., 2009	Provided by the Town of Bethlehem
Average Wind Data	NOAA, 2011	http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html
Coast Guard icebreaking commences on the Hudson River	U.S. Coast Guard, January 2011	https://www.piersystem.com/go/doc/802/993607/
Hudson River Information	NYSDEC, 2011	http://www.dec.ny.gov/lands
New York State Sea Level Rise Task Force	NYSDEC, 2010	
Retrieved from Ice Flight	USCG, 2010	http://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20110130/ICE%20FLIGHT%2030JAN11.pdf?id=b92d5ffa016c5d5c990cacb64f83954eed6060ee
Daily Ice Broadcast	USCG, 2011	http://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20110130/30%20JAN%2011%20Ice%20Report_2.pdf?id=012e63fa2c57330a791fc3bee225a51ecae7c7d5
Salt-Front Movement in the Hudson River Estuary, New York---Simulations by One-Dimensional Flow and Solute Transport Models	USGS, 1999	
	Hudson River Valley Greenway	http://www.hudsongreenway.state.ny.us/Trailsandscenicbyways/watertrail.aspx
Flood Insurance Rate Map (FIRM) Item No. 3615400023B	FEMA	http://www.msc.fema.gov/
Ecological Profile of the Hudson River National Estuarine Research Reserve	Yozzo, D., Anderson, J., Cianciola, M., Nieder, W., Miller, D., Ciparis, S., et al., 2005	

Table 11- List of Additional References and Sources

APPENDICES

APPENDIX A: HENRY HUDSON PARK SITE VISIT - JAN 2011

Ocean and Coastal Consultants Engineering, P.C. (OCC), in accordance with our Scope of Services for the Shoreline Stabilization Study for Henry Hudson Park, has completed Task 1, Site Review and Data Collection. On January 11, 2011, two (2) OCC engineers performed an above-water inspection to assess the existing condition of the shoreline of the Park. The inspection was performed in one (1) day utilizing DGPS survey equipment and camera to locate important features such as the existing boat docks, wetlands, and shoreline structures during the visit for use in developing an existing condition plan in Geographic Information Systems (GIS) format. The following is a summary of site observations.

Observations:

Although there was a large amount of snow coverage, OCC documented what could be observed with photographs and GPS points. Photographs and GIS databases will be submitted to the Town with the final report deliverable.

The shoreline is adjacent to the Hudson River which was filled with moving ice particles at the time of the site visit. The shoreline structures observed consisted of a boat ramp, riprap revetment, and timber bulkhead with a concrete cap.

OCC staff walked the site from north to south, starting from just before the boat ramp. The floating docks adjacent the boat ramp was removed for winter storage and the ramp was covered by snow so its condition couldn't be documented (Photograph A34).

The approximately 248 linear feet of riprap revetment along both sides of the boat ramp appeared to be intact (Photograph A35). However this condition needs to be confirmed when the snow melts. The remainder of the shoreline, consisting of 1,812 linear feet of timber bulkhead with a concrete cap varied from fair to severely poor conditions.

The majority of the shoreline's concrete cap has detached (Photograph A36) and is falling into the river. There were a few areas with severe erosion; the first was observed approximately 1,055 feet from the boat ramp (Photograph A37), causing the uprooting of a large tree. The second was approximately 1,460 feet from the boat ramp which is currently enclosed behind additional fencing. This area was the most extreme, eroding approximately 30 feet inland (Photograph A38). After the fenced-in area, the shoreline appears to improve in condition for 137 feet (Photograph A39) where the concrete cap and bulkhead remains intact (Photograph A40). The cap is detached again for the remaining 313 feet of the shoreline (Photograph A41).

Concerns:

The extent of the bulkhead failure could not be observed due to snow coverage. However, it is likely that the entire shoreline with existing bulkhead will need to be redeveloped. Pedestrian access should be blocked at the areas with severe erosion as it is encroaching past the existing fence and could cause injury.

Photograph A34 - Boat Ramp and Dock Attachment

Photograph A35 - Rip Rap Revetment

Photograph A36 - Detached Concrete Cap

Photograph A37 - First area of severe erosion and uprooting of tree

Photograph A38 - Second area of severe erosion, approx. 30' inland

Photograph A39 - Concrete Cap intact

Photograph A40 - Timber Bulkhead

Photograph A41 - Detachment of Concrete Cap

APPENDIX B: HENRY HUDSON PARK SITE VISIT - APR 2011

Ocean and Coastal Consultants Engineering, P.C. (OCC) revisited Task 1, Site Review and Data Collection to verify the condition of the shoreline without snow coverage. On April 12, 2011, one of OCC's Senior Engineers performed an above-water inspection to assess the existing condition of the shoreline at segment A and photograph the remainder of the park. The inspection was performed in one (1) day and the following is a summary of site observations.

Observations:

OCC walked the site starting from the South end at Villamore Creek and ending at Segment A. Photographs of each of the shoreline segments were taken to verify our earlier assumptions and included in the report.

The sandy soil at the north side of Segment A (Photographs B42 through B47) is actively eroding and poses a threat to failure of the embankment which will threaten the adjacent road. Initial recommendations suggest that the slope be graded and plantings installed to help stabilize the area. The remainder of the shoreline at Segment A appears stable due to the flatter slope and heavy vegetation. OCC also noted the presence of a sunken timber barge.

Concerns:

Due to the erosion of the shoreline at the north side of Segment A, pedestrian traffic should be restricted until the slope can be properly stabilized. It might be difficult to obtain regulatory permits to modify the existing slope from its natural condition.

B.1 SEGMENT "A" - OVERLOOK AREA

Photograph B43

Photograph B42

Photograph B45

Photograph B44

Photograph B 46

Photograph B47

B.2 SEGMENT "B" - BOAT RAMP AREA

Photograph B49

Photograph B48

Photograph B51

Photograph B50

Photograph B52

Photograph B53

C.3 SEGMENT "C" - FUTURE FISHING PLATFORM AREA

Photograph B55

Photograph B54

Photograph B57

Photograph B56

B.4 SEGMENT "D" - PICNIC AREA

Photograph B59

Photograph B58

Photograph B61

Photograph B60

Photograph B62

Photograph B63

B.5 SEGMENT "E" - PLAYGROUND AREA

Photograph B65

Photograph B64

Photograph B66

Photograph B67

B.6 SEGMENT "F" - LARGE GROUP PICNIC AREA 1

Photograph B68

Photograph B69

Photograph B71

Photograph B70

Photograph B72

Photograph B73

B.6 SEGMENT "G" - LARGE GROUP PICNIC AREA 2 & FIRE DOCK

Photograph B74

Photograph B75

Photograph B77

Photograph B76

Photograph B78

Photograph B79

B.7 SEGMENT "H" - LARGE GROUP PICNIC AREA 3

Photograph B81

Photograph B80

Photograph B83

Photograph B82

Photograph B84

Photograph B85

B.8 VILLAMORE CREEK

Photograph B87

Photograph B86

Photograph B89

Photograph B88

Photograph B90

Photograph B91

APPENDIX C: SHORELINE ALTERNATIVES

C.1 ROCK RIPRAP REVETMENT

Rock riprap revetment is the placement of layers of appropriately sized rocks (determined by expected wave activity and runoff velocity) atop a smaller layer of stone placed over a layer of geotextile fabric laid atop a 1.5H: 1V (maximum) sloped shoreline. Prior to construction, the existing ground should be graded to the appropriate slope and fill material added as needed to achieve uniform grade. Riprap is recommended in areas of concentrated flows where the velocities are too high for vegetation to protect the soil.

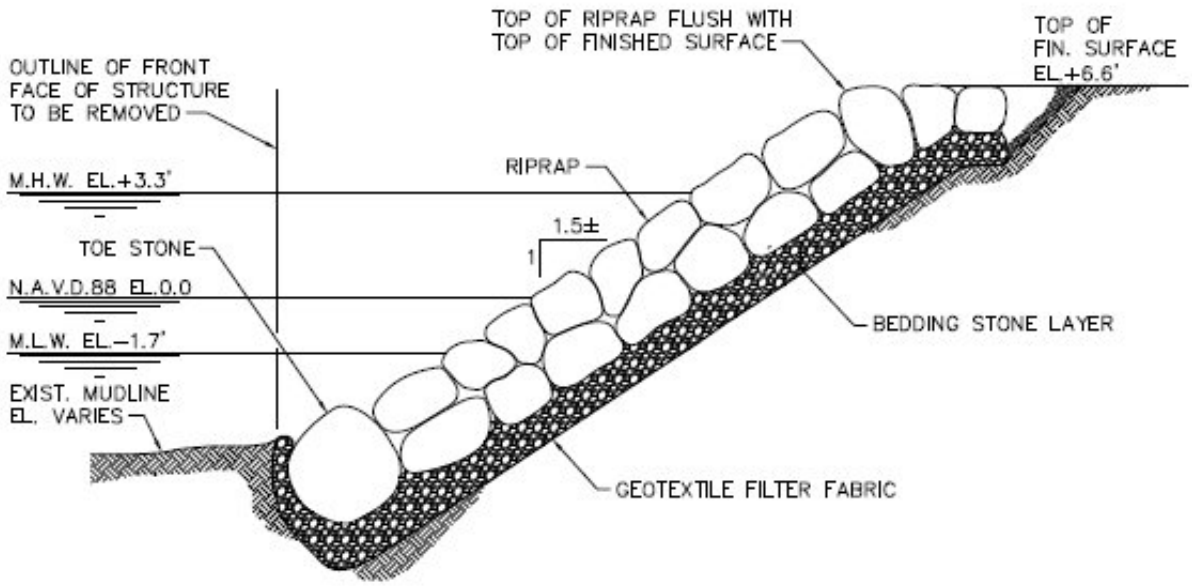


Figure 92- Rock RipRap

Factors	Advantages	Disadvantages
Ground/Soil Conditions	Provides flexibility which allows it to settle into underlying soils and can experience minor damage such as shifting stones and still continue to function.	
Regulatory Requirements	Acceptable form of shoreline protection by the NYSDEC and USACOE	Must apply for a permit to construct. Encroachment typically must be limited to the toe of the existing structure to be replaced, otherwise there may be difficulty in permitting. This may result in a landward encroachment for proper height and slope.
Erosion Protection	Provides immediate protection with little to no establishment period. Experiences less wave run-up and overtopping then smooth-faced structures. Provides a greater form of erosion protection of the slope.	

Aesthetics		Not the most aesthetically pleasing method of protection to some people.
Environmental Impact	Beneficial for the wildlife in the area as the flow through riprap is heterogeneous, providing zones of sheltered microhabitats.	
Public Access/Walkway Provision	Able to accommodate an elevated walkway in the future. While not a promoted use, people are usually able to climb on rocks to reach water.	Safety of climbers could be a concern.
Upland & Adjacent Uses		May reduce water space in front of the shoreline..
Construction	Construction is not complicated.	The placement of the stone material typically requires heavy equipment unless hand laid which are higher labor costs.
Cost	Typically one of the most economical forms of shore protection.	
Durability & Maintenance	Durable, easily maintained, long-lasting structures	Can catch floating debris.
Tradition	Traditionally used along the Hudson River and along the boat ramp area of the site.	

Table C1 - Rock Riprap Advantages and Disadvantages

C.2 VEGETATED RIPRAP (JOINT PLANTING)

Vegetated riprap is a combination of live staking and riprap. The riprap prevents wave action from eroding the shore while the roots of the plants bind the earth below. Eventually, the plants hide the rocks, providing shade and habitat for fish and wildlife. This method of shoreline protection would work well at the Henry Hudson park shoreline as it provides the best of both worlds; stone riprap for greater protection and vegetation for a more natural shoreline protection approach.

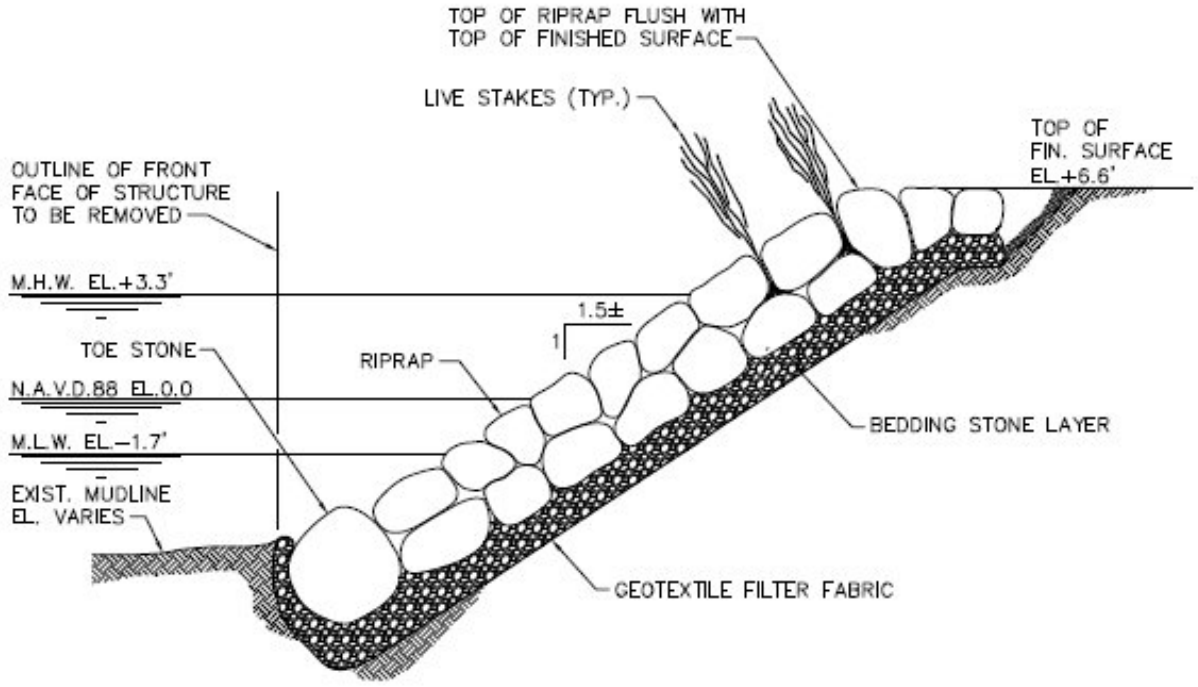


Figure C2- Joint Planting

The shoreline area is prepared at a 2 to 1 or 1.5 to 1 (horizontal to vertical) slope and covered with a filter fabric or jute mesh. Rocks are mechanically or hand placed across the full height of the bank. The live stakes are cut long enough to be driven into the soil below the rocks and placed randomly between the rocks (2 to 4 stakes per square yard), perpendicular to the slope with the growing tips facing upward.

Factors	Advantages	Disadvantages

Ground/Soil Conditions	Provides flexibility which allows it to settle into underlying soils and can experience minor damage and still continue to function. Suitable for dredged material which are the soil conditions at the site.	
Regulatory Requirements	Acceptable form of shoreline protection by the NYSDEC.	Similar to regular riprap, must apply for a permit to construct. Encroachment typically must be limited to the toe of the existing structure to be replaced, otherwise there may be difficulty in permitting. This may result in a landward encroachment for proper height and slope.
Erosion Protection	Immediate protection provided by the rock riprap which enables vegetation to grow and provide increased protection against erosion once roots are established.	
Aesthetics	Aesthetically pleasing for pedestrians as it provides color, texture and other attributes for a natural, landscape appearance.	May impact River views from the Park as the plants mature.
Environmental Impact	Provides habitat for wildlife in the area.	
Public Access/Walkway provisions		Access to climb down on rocks will be prohibited by the plantings.
Upland & Adjacent Uses		May reduce water space in front of the shoreline.
Construction		The vegetation is likely to be damaged by any debris or ice during the winter season.
Cost	Still one of the most cost effective and durable shoreline methods	Requires more skillful labor to prepare, care for and install the plantings.
Durability & Maintenance		Requires periodic maintenance until the vegetation becomes well established. After that, the plants may require regular pruning. Plants are subject to environmental impacts and natural die-off and may need to be replaced.
Tradition	Used along portions of the Hudson River.	

Table C2- Joint Planting Advantages and Disadvantages

C.3 VEGETATED GEOGRID

Vegetated geogrid consists of a wall composed of 1-foot "lifts" of compacted soil wrapped in coir fabric or geotextile (typically synthetic) fabric, with plugs, live stakes, or other planting placed between each lift.

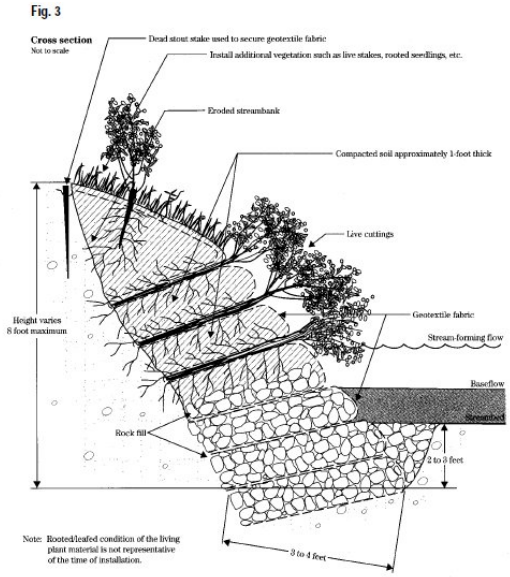


Figure C3- Vegetated Geogrid

Factors	Advantages	Disadvantages
Ground/Soil Conditions		Requires proper soil conditions not known to be available on site.
Regulatory Requirements	May be reviewed more favorably by agencies as a "softer" stabilization method.	
Erosion Protection	Great resistance to shear stress, while providing vegetative growth.	
Aesthetics	Pleasing look as its made up of natural looking materials and vegetation.	May impact River views from the Park as the plants mature.
Environmental Impact	Creates habitat.	
Public Access/Walkway Provisions		Plantings, when mature, may impede access.
Upland & Adjacent Uses		May limit fishing activities.
Construction		Requires extensive excavation and soil conditioning.
Cost		
Durability & Maintenance		Requires periodic maintenance until vegetation becomes well established. After that, may require regular pruning. Plants are subject to environmental impacts and natural die-off and may need to be replaced.
Tradition		Not routinely constructed in this area of the Hudson River.

Table 12 - Vegetated Geogrid Advantages and Disadvantages

C.4 TIMBER BULKHEAD

Timber bulkhead is a vertical wall which stabilizes the earth through the use of timber piles and walers. Bulkheads can be cantilever or tie-back anchored. Cantilevered bulkheads require deeper pile embedment for support and an anchored bulkhead gains support through the use of a tie-back anchor into the soil behind the wall. Rock protection is often recommended along the toe of the structure to prevent scour.

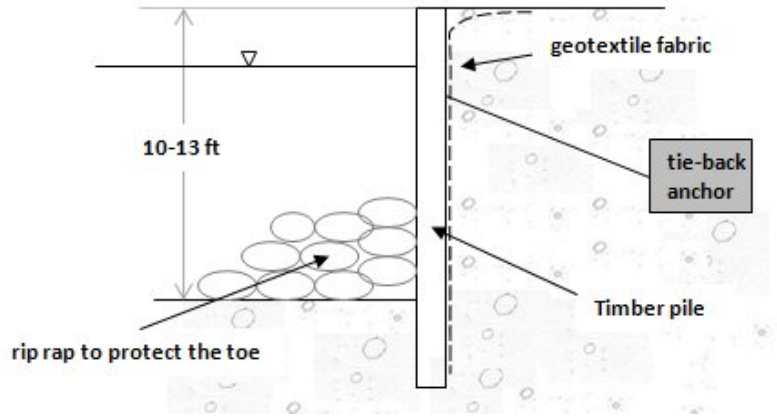


Figure C4- Timber Bulkhead

Factors	Advantages	Disadvantages
Ground/Soil Conditions		Due to the poor quality of soils materials at the site, adequate material would need to be brought in to be used as fill behind the wall or an extensive anchoring system installed.
Regulatory Requirements		Not one of the regulatory agencies most preferred.
Erosion Protection	Typically provides good erosion protection behind the wall.	Potential for scour at the seaward base of the wall.
Aesthetics	Aesthetically pleasing to most people.	
Environmental Impact		No benefit to wildlife. Pile driving in the River can be viewed as an adverse impact.
Public Access/Walkway Provisions	Ease of recreational access. Allows for walkway or boardwalk/access pier close to the water's edge.	
Upland & Adjacent Uses	Provides the maximum water space area in front of the shoreline.	
Construction		More expensive then other methods of stabilization due to materials and equipment required. Requires pile driving equipment.
Cost		
Durability & Maintenance		Long initial design life with routine maintenance such as replacing timber boards and hardware.
Tradition	Historically used along the Hudson River.	

Table 13- Timber Bulkhead Advantages and Disadvantages

C. 5 LIVE CRIB WALL

Live crib walls (lunker) are box-like interlocking arrangements of untreated log or timber members placed alongside the shoreline. The base layer consists of rock fill 2 to 3 feet below the mud line and 3 to 4 feet of compacted fill material on top with live branch cutting in between. Limited to 7 feet or less in height.

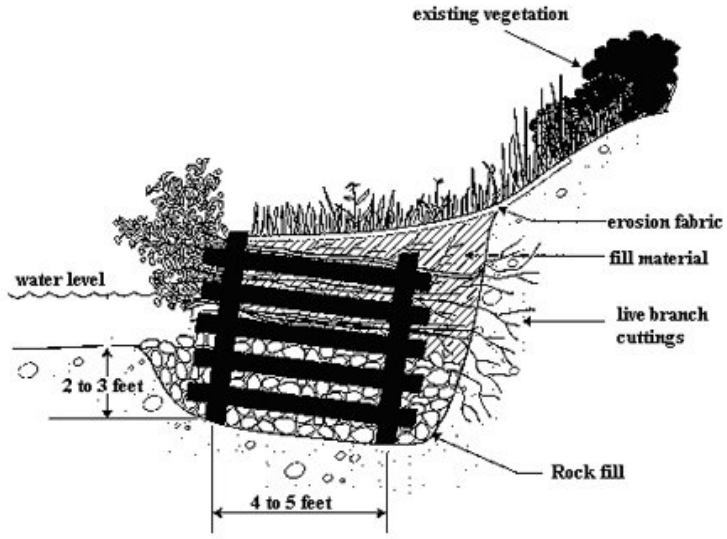


Figure C5- Live Crib Wall

Factors	Advantages	Disadvantages
Ground/Soil Conditions		Ground conditions are not ideal for this method of shoreline due to the poor quality of soils.
Regulatory Requirements	Typically reviewed favorably as a "softer" stabilization method.	
Erosion Protection		Does not dissipate wave energy well.
Aesthetics		May not be as pleasing as other methods.
Environmental Impact	Vegetation may provide habitat to wildlife.	
Public Access/Walkway Provisions		May prohibit access or a walkway close to the water's edge.
Upland & Adjacent Uses		May impact views once vegetation matures.
Construction		More expensive then other methods of stabilization.
Cost		
Durability & Maintenance		Requires periodic maintenance until the vegetation becomes well established. After that, the plants may require regular pruning. Plants are subject to environmental impacts and natural die-off and may need to be replaced.
Tradition		Not traditionally used in the Hudson or large rivers like the Hudson.

Table 14- Live Crib Wall Advantages and Disadvantages

APPENDIX D: DETAILED OPINION OF PROBABLE COSTS

Segment ID (in order of priority)	Assumptions		Cost
C - Fishing Platform Area	SEGMENT TOTAL		$ 113,000.00
	GENERAL CONDITIONS	5%	$ 6,000.00
	OVERHEAD	10%	$ 12,000.00
	PROFIT	10%	$ 14,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 36,000.00
	TOTAL OPC		**$ 180,000.00**
D - Picnic Area(s)	SEGMENT TOTAL		$ 359,000.00
	GENERAL CONDITIONS	5%	$ 18,000.00
	OVERHEAD	10%	$ 38,000.00
	PROFIT	10%	$ 42,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 114,000.00
	TOTAL OPC		**$ 570,000.00**
G - Large Group Picnic Area 1	SEGMENT TOTAL		$ 119,000.00
	GENERAL CONDITIONS	5%	$ 6,000.00
	OVERHEAD	10%	$ 13,000.00
	PROFIT	10%	$ 14,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 38,000.00
	TOTAL OPC		**$ 188,000.00**
E - Play Area	SEGMENT TOTAL		$ 136,000.00
	GENERAL CONDITIONS	5%	$ 7,000.00
	OVERHEAD	10%	$ 15,000.00
	PROFIT	10%	$ 16,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 44,000.00
	TOTAL OPC		**$ 216,000.00**

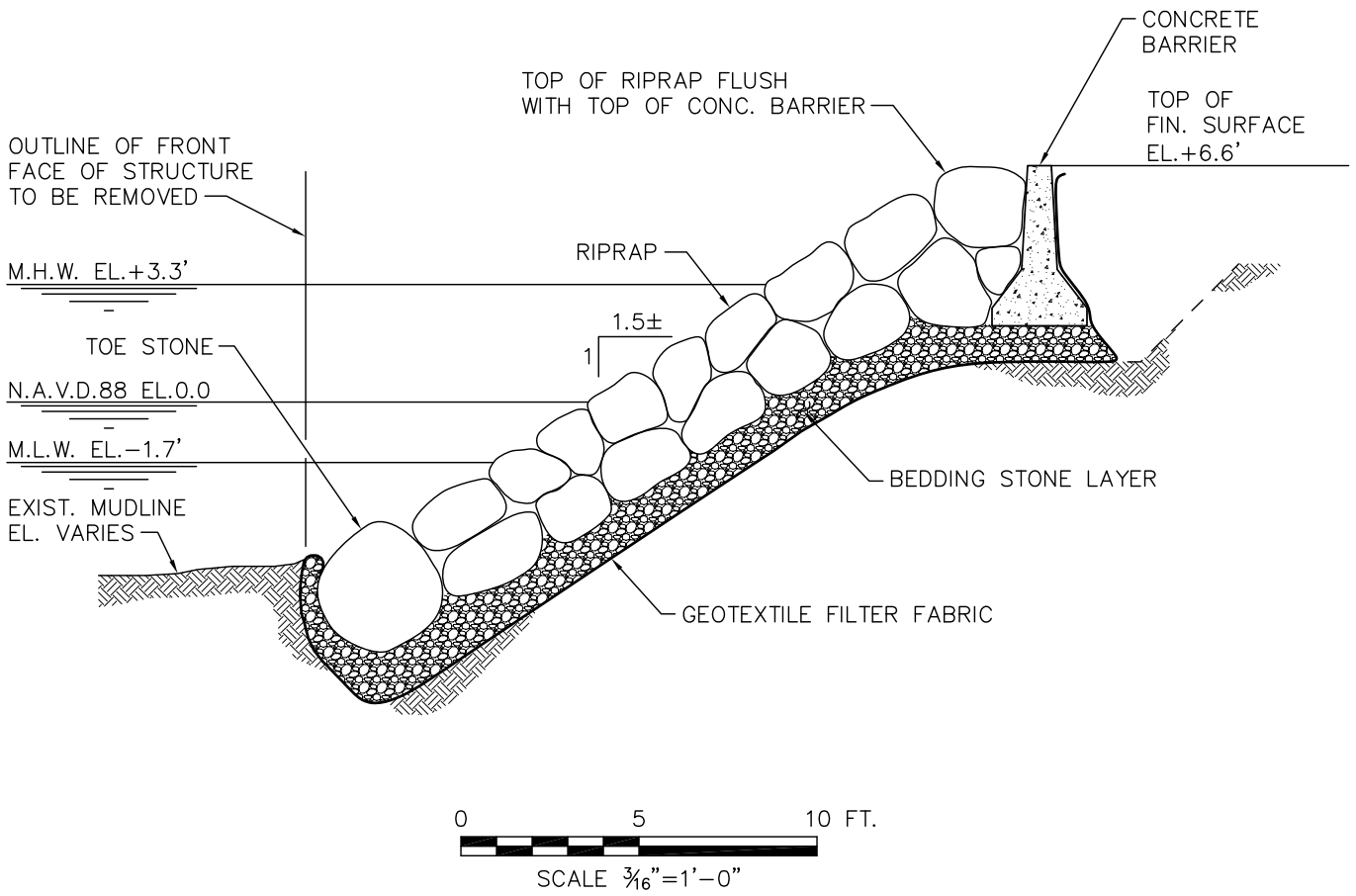
Segment ID (in order of priority)	Assumptions		Cost
F - Large Group Picnic Area 2	SEGMENT TOTAL		$ 181,000.00
	GENERAL CONDITIONS	5%	$ 10,000.00
	OVERHEAD	10%	$ 19,000.00
	PROFIT	10%	$ 21,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 58,000.00
	TOTAL OPC		**$ 287,000.00**
H - Large Group Picnic Area 3	SEGMENT TOTAL		$ 207,000.00
	GENERAL CONDITIONS	5%	$ 11,000.00
	OVERHEAD	10%	$ 22,000.00
	PROFIT	10%	$ 24,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 66,000.00
	TOTAL OPC		**$ 328,000.00**
A1 - Northern Section of Over-look Area	SEGMENT TOTAL		$ 222,000.00
	GENERAL CONDITIONS	5%	$ 12,000.00
	OVERHEAD	10%	$ 24,000.00
	PROFIT	10%	$ 26,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 71,000.00
	TOTAL OPC		**$ 352,000.00**
A2 - Southern Section of Over-look Area	SEGMENT TOTAL		$ 204,000.00
	GENERAL CONDITIONS	5%	$ 11,000.00
	OVERHEAD	10%	$ 22,000.00
	PROFIT	10%	$ 24,000.00
	SALES TAX	0%	$ -
	INFLATION	0%	$ -
	CONTINGENCY	25%	$ 65,000.00
	TOTAL OPC		**$ 324,000.00**
GRAND TOTAL			**$2,445,000.00**

APPENDIX E: ESTIMATED IMPLEMENTATION COSTS

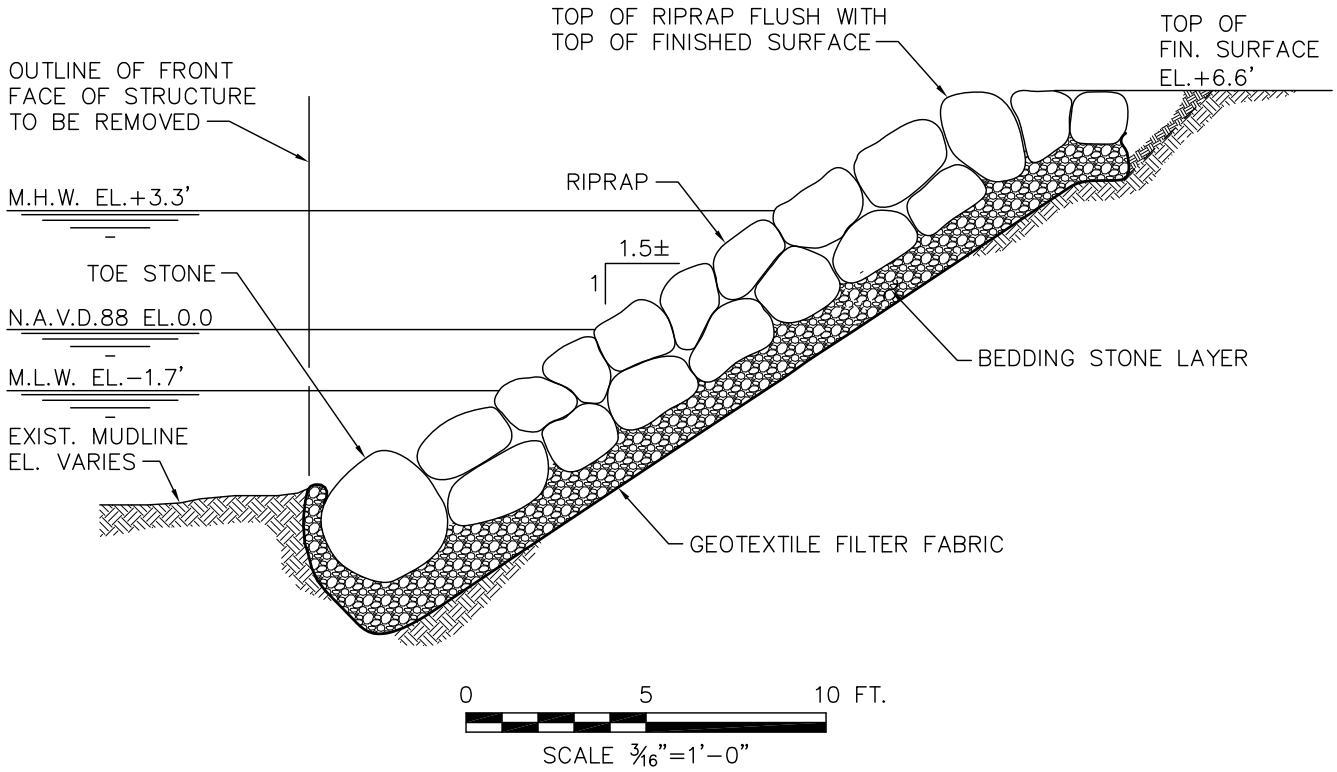
No.	Task	Estimated Cost (2011 $)	Comments
1	Site Surveys	$9,300	Includes estimated cost for topographic and hydrographic surveys.
2	Geotechnical Program	$14,700	Recommended; includes estimated cost for site investigation. Does not include environmental testing.
3	Regulatory Permitting	$11,700	Includes professional fees for consultancy services. Permit fees for applications are not included in cost.
4	Grant Application Assistance	$5,400	Professional fees for consultancy services.
5	Detail Design	$21,700	Professional fees for consultancy services associated with the detailed engineering design of the revetment and joint planting.
6	Bidding Services	$9,900	Professional fees for consultancy services.
7	Construction Assistance	$28,050	Professional fees for consultancy services, based on assumption of 1 site visit per week for 3 month duration.
8	Construction Costs[21]	$2,445,000	Cost based on total site rehabilitation; does not include mobilization costs.
GRAND TOTAL		**$2,545,750**	

[21] Taken from Appendix D

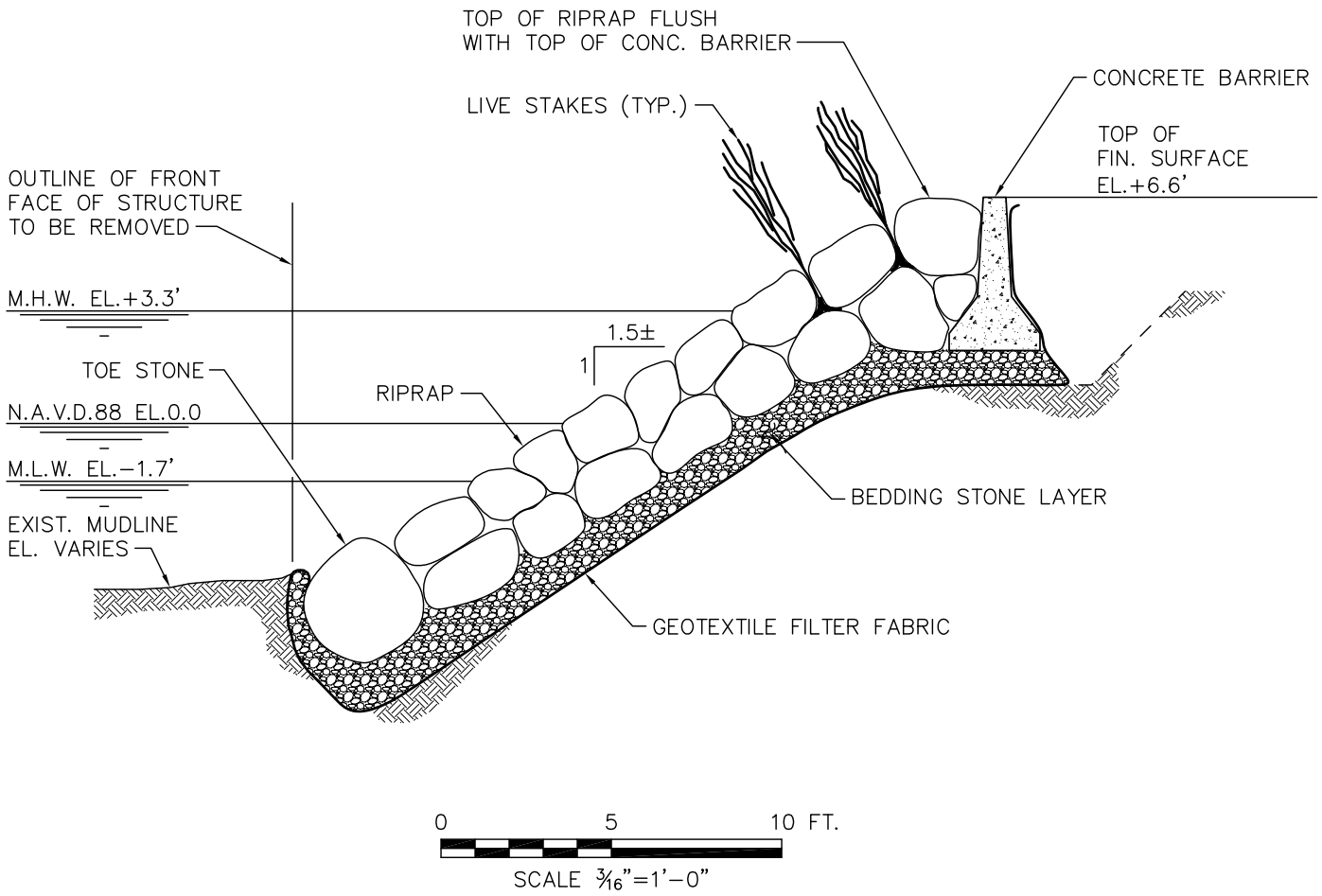
APPENDIX F: CONCEPT DRAWINGS



OCEAN AND COASTAL CONSULTANTS	DESIGNED BY: ZAMA DRAWN BY: HHRA CHECKED BY: AZSL	HENRY HUDSON PARK STUDY TYPICAL RIPRAP REVETMENT CONCEPT A	SCALE 3/16"=1'-0" DATE 02/24/11 REVISION 0 SKETCH NO. SK-1



OCEAN AND COASTAL CONSULTANTS	DESIGNED BY: ZAMA DRAWN BY: HHRA CHECKED BY: AZSL	HENRY HUDSON PARK STUDY	SCALE 3/16"=1'-0" DATE 02/24/11	REVISION 0
		TYPICAL RIPRAP REVETMENT CONCEPT B	SKETCH NO. SK-2	



OCEAN AND COASTAL CONSULTANTS	DESIGNED BY: ZAMA DRAWN BY: HHRA CHECKED BY: AZSL	HENRY HUDSON PARK STUDY	SCALE 3/16"=1'-0" DATE 02/24/11	REVISION 0
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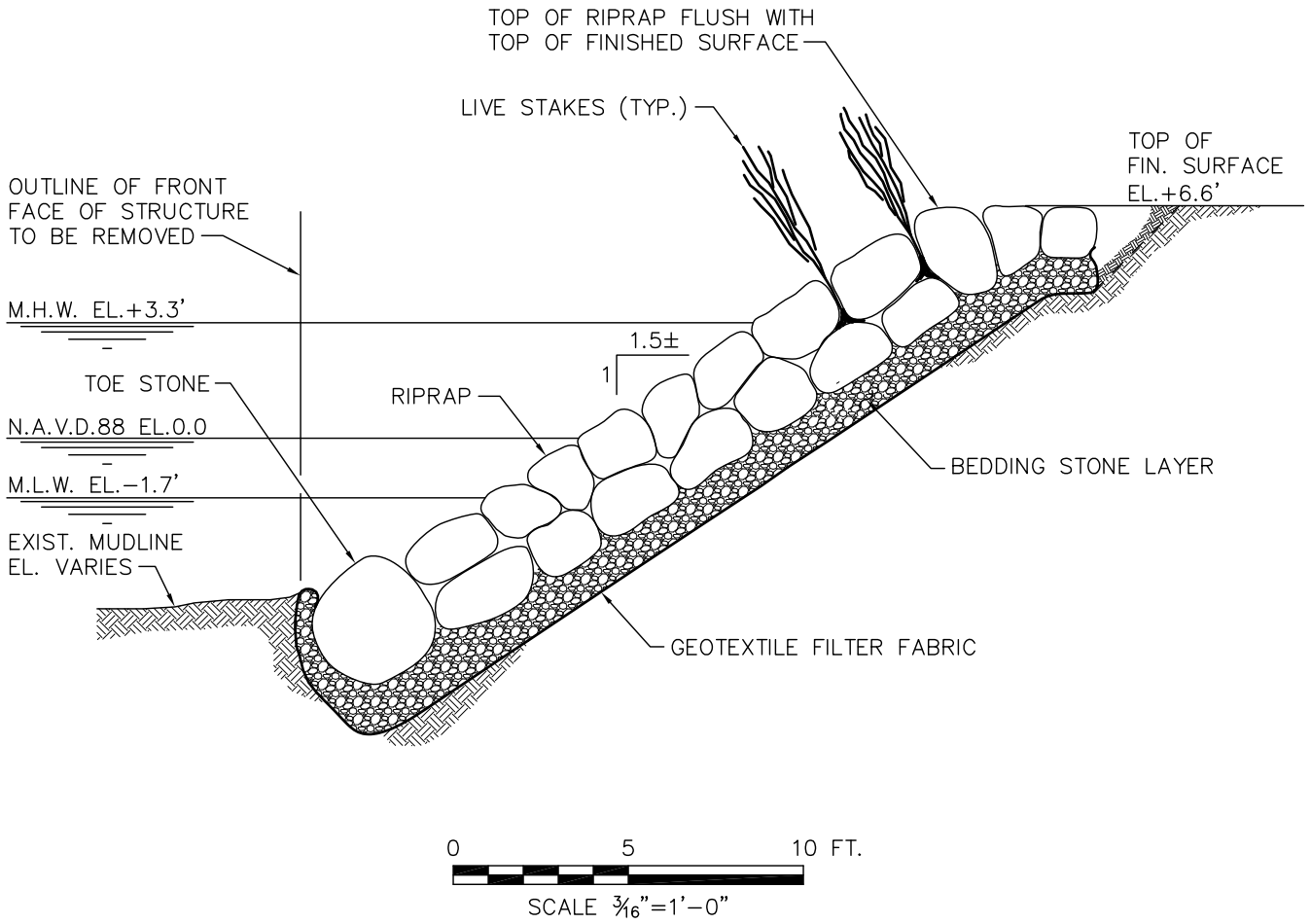

OCEAN AND COASTAL CONSULTANTS

DESIGNED BY: ZAMA	HENRY HUDSON PARK STUDY	SCALE 3/16"=1'-0"	REVISION 0
DRAWN BY: HHRA		DATE 02/24/11	
CHECKED BY: AZSL	TYPICAL RIPRAP REVETMENT WITH JOINT PLANTS – CONCEPT B	SKETCH NO. SK-4	

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APPENDIX G: REGULATORY PERMIT CHECKLIST

No.	Permit(s) Required	Agency	Contact Information	Possible Issues/Areas of Concern
1	Freshwater Wetlands Permit (Under Joint Permit Application)	New York State Dept. of Environmental Conservation (NYSDEC) *Region 4*	Div. of Env, Permits 625 Broadway Albany, NY 12233 *Andy Marguchio* *Tel: 518-357-2069*	Water quality certification Rare plants/animals screening - contact DEC directly
2	Protection of Waters Permit (Under Joint Permit Application)			
3	Water Quality Permit (Under Joint Permit Application)			
4	Short Environmental Assessment			
5	Joint Permit Application w/NYSDEC for Freshwater Wetlands Permit	US Army Corp of Engineers (USACE) *New York District - Region 4*	Albany Field Office 1 Bond Street Troy, NY 12180 518-270-0589	
6	Federal Coastal Consistency Assessment Form	New York State Dept. of State (NYSDOS)	Office of Coastal, Local Government & Community Sustainability One Commerce Plaza 99 Washington Avenue, Suite 1010Albany, NY 12231	
7	Application for Easement, Lease, or Permitted Use of Land Underwater	New York State Office of General Services (NYSOGS)	OGS Bureau of land Management Corning Tower, 26th Floor Empire State Plaza Albany, NY 12242 Tel: 518-474-2198	
8	Grading, Erosion, and Sediment Control Permit	Town of Bethlehem	*Paul Penman* *Tel: 518-439-4955 ex. 1135*	

Table 15- Regulatory Permit Checklist

APPENDIX H: AVAILABLE GRANTS & FUNDS CHECKLIST

Source Type	Funding Source	Program Name	Amount Provided	Use	Deadline
Federal Grants					
National Park Service	Land & Water Conservation Fund	Outdoor Recreation, Acquisition, Development & Planning	Provides Matching Grant Money - $150 to $5,450,000; average of $68,178	Final Design & Construction of bulkhead	Applications not available
National Park Service	National Park Service	Open Space Land Acquisition Development Grant Program	Max development grant: $400,000; up to 50% reimbursement	Final Design & Construction of bulkhead	12PM on July 1
National Park Service	National Park Service	The Greenway Conservancy for the Hudson River Valley	In 2009, awards were from $1,500 - $18,000	Final Design & Construction of bulkhead	Applications not available
EPA	Watershed Academy	Land & Water Conservation Fund (LWCF)	50/50 matching	Planning, design, feasibility studies, and construction projects.	Applications not available
State Grants					
NYS	Hudson River Valley Greenway	Greenway Communities Grant Program	$5,000 - $10,000	Development of land use plans and programs	11Feb, 6May, 9Sept
NYS	Hudson River Valley Greenway	Hudson River Valley Greenway Water Trail Grant Program	From $10,000 - $35,000	Development of kayak launch	11Feb, 6May, 9Sept
NYSOPRHP	Environmental Protection Fund	Parks Program	$12,000 - $600,000 in 2009; $400,000 max cap in 2010	Rehabilitation of bulkhead (design & construction)	Applications not available
NYSOPRHP	Environmental Protection Fund	Heritage Areas Program	$12,000 - $600,000 in 2009; $400,000 max cap in 2010	Rehabilitation of bulkhead (design & construction)	Applications not available
NYS Dept. of Environmental Conservation (DEC)		The Hudson River Estuary Program	$14,000 - $100,000	Final Design & Construction of Bulkhead, Fire Dock & Kayak Launch	Applications not available
NYS	Hudson River Foundation	Hudson River Improvement Fund	<$10,000	Final Design & Construction of Bulkhead, Fire Dock & Kayak Launch	Applications not available

Table 16- Available Grants & Funds Checklist

APPENDIX I: GRANT APPLICATIONS

HUDSON RIVER VALLEY GREENWAY

Barnabas McHenry, Chairman, Greenway Council
Sara Griffen, Acting Chair, Greenway Conservancy
Mark A. Castiglione, Acting Executive Director

Guidelines & Application for the Greenway Communities Grant Program

A. Background:

The Hudson River Valley Greenway Communities Council was established by New York State through the Greenway Act of 1991. Since then, the Greenway Council has been committed to the preservation, enhancement and development of the world-renowned scenic, natural, historic, cultural and recreational resources of the Hudson River Valley, that is also consistent with economic development goals and the tradition of municipal home rule.

In order to assist with realizing these goals, the Greenway Communities Council administers the "Greenway Communities Program." This program provides financial (approximately $5,000-$10,000) and technical assistance to municipalities located within the designated Greenway Area who share the Greenway goals and objectives. Communities can undertake a variety of projects as a Greenway Community under this program. The following is a general list of projects that may be funded or provided technical assistance and is intended to provide only general guidance for applicants:

- Community Planning (Comprehensive plans, zoning and subdivision ordinances, site plans.)
- Economic Development (Enhance tourism, agriculture protection plans and implementation techniques, main street and waterfront revitalization plans and implementation techniques)
- Natural Resource Protection (Natural resource inventories and management plans, critical environmental area designations, natural resource protection ordinances)
- Cultural Resource Protection (Cultural resource inventories, historic preservation plans/ordinances)
- Scenic Resource Protection (Viewshed analysis, scenic impact review guidelines, scenic road protection, development of scenic easement programs)
- Open Space Protection (Open space inventories, comprehensive open space, recreation and trails plans, development of conservation easement programs, transfer of development rights ordinances)

B. The First Step: Becoming a Greenway Community:

The first step in becoming a Greenway Community and becoming eligible for this grant program is the passage of a resolution by the local governing body which states the community's agreement, in general terms, with the five "Greenway Criteria", as stated in the Greenway Act. A sample resolution is available for municipalities interested in becoming a Greenway Community. The five Greenway criteria include:

- Regional Planning
- Economic Development
- Public Access
- Natural & Cultural Resource Protection
- Heritage & Environmental Education

C. Grant Program General Guidelines:

- Projects must be located in the designated Greenway Area, which includes the municipalities located within the following counties: Albany, Columbia, Dutchess, Orange, Putnam, Rensselaer, Rockland Saratoga, Ulster and Westchester; municipalities in Greene County outside of the Catskill Park; and the Hudson River waterfront in the Bronx and New York counties.

- Municipalities must pass a local resolution to become a Greenway Community, as indicated above.

- Maximum State grant = 50% of the total project cost.

- Local match may be provided as in-kind services or other non-monetary contributions.

- Mileage is not reimbursable but may be used for local match.

- A work program for each phase of funding, with projected costs and an estimated timeline for completion, must be submitted and approved by the Greenway Council Board prior to the awarding of any grant funding. If a project involves the development of a plan or similar product, final disbursement of funding will not be made until the plan is completed in final form and adopted by the governing body of the relevant municipality.

- **Intermunicipal collaboration** projects that involve two or more municipalities will be considered for funding in excess of $10,000.

Greenway Communities Grant Application

PART A – APPLICANT INFORMATION

1. Lead Applicant Community:
   County/City/Town/Village of: _____
   Federal ID#: _____
   Co-Applicant:
   County/City/Town/Village of: _____
   Federal ID#: _____

   Co-Applicant:
   County/City/Town/Village of: _____
   Federal ID#: _____
   Co-Applicant:
   County/City/Town/Village of: _____
   Federal ID#: _____

2. Chief Elected Official & Lead Contact Person Information

   Chief Elected Official: (Supervisor/Mayor/County Executive)
   _____
   Mailing Address: _____
   _____
   Phone: _____ Fax: _____
   Email: _____

   Lead Contact Person (if different):
   _____
   Mailing Address: _____
   _____
   Phone: _____ Fax: _____
   Email: _____

PART B – GENERAL PROJECT INFORMATION

1. Project Name: _____
2. Project Location: County/Counties: _____
   City/Town/Village(s): _____
   Site Address: _____
3. Project Costs: Total Cost: $_____; Greenway Funds Requested: $_____
   Local Match: $_____; Other Funding: $_____

3. Applicant's Interest in Property (e.g. own, lease, easement, etc.): _____
4. Park Projects: Amount of municipal "money in lieu of parkland" fund $_____
   (See NY Town Law § 277 (4) (c) or parallel provisions in Village Law § 7-730 (4) or City Law § 33 (4) (c).)
   Amount from the fund that will be contributed to this project: $_____

5. SEQRA Status: Is the proposed project a Type 1, Type 2 or Unlisted Action? _____
   Has there been a Determination of Significance? _____
   If so, what is the determination? _____

PART C – PROJECT DESCRIPTION & CONSISTENCY WITH GREENWAY GOALS

1. Project Description:

   (a) With no more than 100 words, describe the project, its purpose and location, the need and what will result when the project is complete. You may provide this descriptive information in an attachment. Feel free also to attach photographs, maps, renderings, etc.

   (b) Is your project a plan or planning document? If "yes", include a proposed timetable for implementation (after completion of the document or plan), a description of the implementation steps, and whether funding sources for the implementation have been identified or secured. (100 words or less)

2. Consistency with Greenway Criteria: Briefly describe how the proposed project is consistent with the five Greenway criteria, as listed below, and "check" the applicable categories. Additionally, in the space below or through an attachment, please describe in fifty (50) words or less how these criteria will be met by the completion of this project.

   ☐ Natural and Cultural Resource Protection – Protect, preserve, and enhance natural resources, including natural communities, open spaces, cultural and historic resources, scenic roads and scenic areas.

   ☐ Regional Planning – Applicants working together to develop mutually beneficial regional strategies for natural and cultural resource protection, economic development, public access and heritage and environmental education.

   ☐ Economic Development – Encourage economic development compatible with the preservation and enhancement of natural and cultural resources including agriculture, tourism, and the revitalization of established community centers and waterfronts.

   ☐ Public Access – Promote increased public access to the Hudson River through the creation of riverside parks and the development of the Hudson River Valley Greenway Trail System.

   ☐ Heritage and Environmental Education – Promote awareness among residents and visitors about the Valley's natural, cultural, scenic and historic resources.

3. Intermunicipal collaborative effort (If applicable): Briefly describe how the proposed project is consistent with the Greenway goals of regional planning and intermunicipal collaborative efforts.

PART D – WORK PROGRAM, TIME LINE & BUDGET SUMMARY

1. **Work Program & Time Line:** Briefly list the proposed work program, by task, phase, or milestone and the timeline associated with the project. At a minimum, provide a start date and completion date for each project milestone (e.g. public input period, draft document completed, etc.). Additionally, provide the associated cost of each task and/or phase. You may provide this information through an attachment.

2. **Budget Summary:** Please identify the proposed expenditures of the project according to the following:

In-kind services (salaries, wages, travel/mileage):

Salaries: _____
Wages: _____
Mileage: _____
Other (please specify): _____
_____
TOTAL: _____
Land Acquisition: _____
Construction: _____

Equipment/ Supplies/ Materials (Please specify):

_____
_____
_____
_____

Contractual/Professional Services: _____

PART E - APPROVED MUNICIPAL RESOLUTIONS & CERTIFICATION

1. Greenway Community Resolution: Please attach a copy of the approved, municipal resolution indicating the community's intent to become a Greenway Community.

2. Grant Request Resolution: Please attach an approved municipal resolution requesting the proposed grant funding.

3. Elected Official Certification: Please read and sign the following:
"I hereby affirm under penalty of perjury that information provided on this form and attached statements and exhibits is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal law."

Applicant Name:_____ Title:_____

Signature:_____ Date:_____

Outdoor Recreation_Acquisition, Development and Planning

RECOVERY

Land and Water Conservation Fund Grants
Number: 15.916
Agency: Department of the Interior
Office: National Park Service

PROGRAM INFORMATION

Authorization (040):

16 U.S.C. 1-4 et seq.; Land and Water Conservation Fund Act of 1965, Public Law 88-578, 78 Stat. 897, as amended; Public Law 90-401, 82 Stat. 354; Public Law 91-485, 84 Stat. 1084; Public Law 91-308, 84 Stat. 410; Public Law 92-347, 86 Stat. 460; Public Law 93-81, 87 Stat. 178; Public Law 94-422, 90 Stat. 1313; Public Law 95-42, 91 Stat. 210; Public Law 100-203, 101 Stat. 1330.

Objectives (050):

To provide financial assistance to the States and their political subdivisions for the preparation of Statewide Comprehensive Outdoor Recreation Plans (SCORPs) and acquisition and development of outdoor recreation areas and facilities for the general public, to meet current and future needs.

Types of Assistance (060):

PROJECT GRANTS

Uses and Use Restrictions (070):

Land acquisition and development grants may be used for a wide range of outdoor recreation projects, such as picnic areas, inner city parks, campgrounds, tennis courts, boat launching ramps, bike trails, swimming pools, playing fields, and support facilities such as roads, water supply, etc. Facilities must be open to the general public and not limited to special groups. Development of basic rather than elaborate facilities is favored. Fund monies are not available for the operation and maintenance of facilities. Grants are also available to States only for revising and updating existing SCORPs preparation of new plans and for statewide surveys, technical studies, data collection and analysis and other planning purposes which are clearly related to SCORP refinement and improvement. Every site acquired or developed with assistance under this program must remain available and accessible for public outdoor recreation use in perpetuity.

Eligibility Requirements (080)

Applicant Eligibility (081):
For planning grants, only the State agency formally designated by the Governor or State law as responsible for the preparation and maintenance of the Statewide Comprehensive Outdoor Recreation Plan is eligible to apply. (Treated as States in this regard are the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, the Northern Mariana Islands, and Guam.) For acquisition and development grants, the above designated agency may apply for assistance for itself, or on behalf of other State agencies or political subdivisions, such as cities, counties, and park districts. Additionally, Indian tribes which are organized to govern themselves and perform the function of a general purpose unit of government qualify for assistance under the program. Individuals nonprofit organizations, and private organizations are not eligible.

Beneficiary Eligibility (082):
The general public. For planning grants, same as Applicant Eligibility.

Credentials/Documentation (083):
The State Liaison Officer (SLO), appointed by the Governor or designated in State legislation to administer the program in the State or Territory, must furnish assurance that the project is in accord with the SCORP; i.e., that it meets high priority recreation needs shown in the action program portion of the plan. The State's apportionment balance of fund monies must be adequate for the project, and the sponsoring agency must permanently dedicate the project to public outdoor recreation and assume responsibility for operation and maintenance. SCORPs must cite the State's legal authority to participate in the Land and Water Conservation Fund program. Costs will be determined in accordance with OMB Circular A-102 (43 CFR Part 12, Subpart C), "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments." and OMB Circular A-87, Cost Principles for State, Local and Indian Tribal Governments. OMB Circular No. A-87 applies to this program.

Application and Award Process (090)

Preapplication Coordination (091):
The SLO has the prerogative for initial determination of project eligibility, priority need, and order of fund assistance within the State. All project proposals are submitted to the National Park Service by the SLO. Environmental impact information is not required for this program. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.

Application Procedures (092):
OMB Circular No. A-102 applies to this program. This program is excluded from coverage under OMB Circular No. A-110. States and Territories must have a current SCORP approved by NPS to be eligible to submit grant applications. Proposals selected by the State to forward to NPS must be accompanied by the standard federal application forms required by 43 CFR Part 12, Subpart C, "Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments." Proposal budgets must comport with OMB Circulars A-87 and A-102. Basic environmental information or evaluation is required and will be assessed by the National Park Service to determine whether an environmental impact statement is needed. This program is eligible for coverage under E.O. 12372, "Intergovernmental Review of Federal Programs." An applicant should consult the office or official designated as the single point of contact in his or her State for more information on the process the State requires to be followed in applying for assistance, if the State has selected the program for review.

Award Procedure (093):
Proposals are reviewed by the NPS field office, where final action may be taken. All grants are made to the State lead agency and if applicable passed through to the project sponsor, whether State or local government.

Deadlines (094):

Not Applicable.

Range of Approval/Disapproval Time (095):
Approximately 30-60 days for acquisition and development projects; 60 days for planning projects.

Appeals (096):
State may appeal to the Secretary of the Interior.

Renewals (097):
Project agreements may be amended to change the scope, funding amount, or duration. Must be approved by the National Park Service.

Assistance Consideration (100)

Formula and Matching Requirements (101):
This program has no statutory formula.
Matching Requirements: The Land and Water Conservation Fund Act specifies that not more than 50 percent of the project cost may be federally financed. Generally, match must be derived from State, local, or private sources, but under certain conditions, all or part of the project sponsor's matching share may be from certain other Federal assistance programs, such as, Title I Community Development, Appalachia and all other Regional Commissions. Otherwise, no other Federal funds may be applied to the project cost. Distribution of funds among States and Territories is as follows: forty percent of the first $225 million; thirty percent of the next $275 million; and twenty percent of all additional appropriations is apportioned equally among the States. The remaining appropriation is apportioned on the basis of need.
This program has MOE requirements, see funding agency for further details. This program has maintenance effort (MOE) requirements, see funding agency for details.

Length and Time Phasing of Assistance (102):
Funds are available for obligation during the fiscal year in which appropriated and for the two following fiscal years. The assistance period for individual projects varies and may be extended. Complex projects may be broken down into stages, with one being initially approved and the remainder qualified for activation at a later date. Except for project preparation costs, all costs must be incurred within the project period. Planning projects may not be phased. See the following for information on how assistance is awarded/released: Funds are available for obligation during the fiscal year in which appropriated and for the two following fiscal years.

Post Assistance Requirements (110)

Reports (111):
Program reports are not applicable. Cash reports are not applicable. State inspection reports are submitted every 5 years on completed projects stating whether the properties acquired and/or developed with fund assistance are used in accordance with the agreement. For planning projects, end products are specified in the application for assistance. Financial reports are required with billings, which should be at least annually. Consolidated performance reports are required which should be at least annually.

Audits (112):
This program is excluded from coverage under OMB Circular No. A-133. In accordance with the provisions of OMB Circular No. A-133 (Revised, June 27, 2003), "Audits of States, Local Governments, and Nonprofit Organizations," nonfederal entities that expend financial assistance of $500,000 or more in Federal awards will have a single or a program-specific audit conducted for that year. Nonfederal entities that expend less than $500,000 a year in Federal awards are exempt from Federal audit requirements for that year, except as noted in Circular No. A-133.

Records (113):
Maintain records to facilitate audit, including records that fully disclose the amount and disposition of assistance; the total cost of the project; and the amount and nature of that portion of the cost supplied by other sources.

Financial Information (120)

Account Identification (121):
14-5035-0-2-303.

Obligations (122):
(Project Grants) FY 09 $27,160,947; FY 10 est $38,082,618; FY 11 est $47,200,000

Range and Average of Financial Assistance (123):
$150 to $5,450,000; $68,178.

Program Accomplishments (130):
Fiscal Year 2010: No Current Data Available Fiscal Year 2011: No Current Data Available Fiscal Year 2012: No Current Data Available

Regulations, Guidelines, and Literature (140):
Regulation: 36 CFR Part 59, FR 51 No. 186, September 25, 1986 (amended June 15, 1987). The Federal Financial Assistance Manual for the Land and Water Conservation Fund State Assistance Program (vol. 69, effective 10/1/2008) is available at www.nps.gov/lwcf/ ... Program brochure available from the Department of the Interior, National Park Service, MS-2225, 1849 C Street, Washington, DC 20240, free.

Information Contacts (150)

Regional or Local Office (151) :
See Regional Agency Offices. http:/www.nps.gov/ncrc/programs/lwcf/contact_list.html.

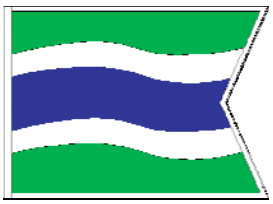
Headquarters Office (152):
Chief State and Local Assistance Programs Division,National Park Service, (2225), Department of the Interior, 1849 C Street, NW., Washington, District of Columbia 20240 Email: LWCF_grants@nps.gov Phone: (202)354-6900 Fax: (202)371-5179

Website Address (153):
http://www.nps.gov/lwcf.

Related Programs (160):
15.918 Disposal of Federal Surplus Real Property for Parks, Recreation, and Historic Monuments

Examples of Funded Projects (170):
Fiscal Year 2010: No Current Data Available Fiscal Year 2011: No Current Data Available Fiscal Year 2012: No Current Data Available

Criteria for Selecting Proposals (180):
At the Federal level each project must be in accord with a State Comprehensive Outdoor Recreation Plan. Beyond this, the selection of projects is made by the State Liaison Officer of each State who is responsible for the administration of the 15.916 program in his State.



Guidelines & Application for the Hudson River Valley Greenway Water Trail Grant Program

A. Background:

The Hudson River Valley Greenway was established by New York State through the Greenway Act of 1991. The Greenway is committed to the preservation, enhancement and development of the world-renowned scenic, natural, historic, cultural and recreational resources of the Hudson River Valley that is also consistent with economic development goals and the tradition of municipal home rule.

In order to assist with realizing these goals, the Greenway is charged with completing a Hudson River Valley Greenway Trail System. One component of that system is the "Hudson River Greenway Water Trail Program." This program provides financial and technical assistance to site owners to help complete the Hudson River Water Trail. The Greenway Council has been designated the management entity for this program.

Launch and campsite owners located along the Hudson River and Champlain Canal and within the designated Greenway Area and who are, or wish to become, a part of the water trail system are eligible to participate in the program. Site owners can undertake a variety of projects under this program. The following is a general list of projects that may be funded or provided technical assistance and is intended to provide only general guidance for applicants:

- Standardized on-site interpretive kiosks, including information about local businesses and cultural attractions, hotels, bed and breakfasts, and campgrounds.
- Standardized site identification flags.
- Additional parking and restroom facilities at some boat launches.
- Potable water.
- Creation of new launches or campsites.

B. The First Step: Becoming a Designated Greenway Water Trail Site:

The first step in becoming a Greenway Water Trail Site and becoming eligible for this grant program is for the landowner to submit a letter of request to become a designated Water Trail Site. A Greenway staff member will meet with the local landowner for a site visit. Following the site visit the local landowner submits a trail designation application, and SEQR forms. Technical assistance from the Greenway is available in filling out these forms. The request is then forwarded to the Greenway Board for approval.

C. Grant Program General Guidelines:

- Projects must be located along the Hudson River and in the designated Greenway Area, which includes the riverfront municipalities located within the following counties: Albany, Columbia, Dutchess, Orange, Putnam, Rensselaer, Rockland, Saratoga, Ulster, Westchester, and Washington; municipalities in Greene County outside of the Catskill Park and the Hudson River waterfront in the Bronx and New York counties.
- Maximum State grant = 50% of the total project cost.
- Capital and some associated costs **only** are eligible for reimbursement under this program.
- Local match may be provided as in-kind services or other non-monetary contributions.
- Mileage is not reimbursable but may be used for local match.
- A work program for each phase of funding, with projected costs and an estimated timeline for completion, must be submitted and approved by the Greenway prior to the awarding of any grant funding. If a project involves the development of a plan or similar product, final disbursement of funding will not be made until the plan is completed in final form and adopted by the governing body of the relevant municipality.
- Greenway Communities and Greenway Compact Communities will receive a higher ranking.

Hudson River Valley Greenway Water Trail Grant Program

PART A – APPLICANT INFORMATION

1. Lead Applicant:_____ Co-Applicant 1: _____

   Federal ID#: _____ Federal ID#: _____

   Co-Applicant 2:_____ Co-Applicant 3: _____

   Federal ID#: _____ Federal ID#: _____

2. Lead Elected Official & Contact Person Information

   Lead Elected Official:

   _____

   Mailing Address:

   _____

   _____

   Phone:_____ Fax:_____

   E-Mail:_____

   Lead Contact Person (if different):

   _____

   Mailing Address:

   _____

   _____

   Phone:_____ Fax:_____

   E-Mail:_____

PART B – GENERAL PROJECT INFORMATION

1. Project Name:_____

   Project Location: Site Address:_____

   City/Town/Village(s): _____

   County/Counties:_____

2. Project Costs: Total Cost:_____; Greenway Funds Requested: _____

   Local Match:_____; Other Funding: _____

4. Applicant's Interest in Property (e.g. own, lease, easement, etc.): _____

5. SEQRA Status: Is the proposed project a Type 1, Type 2 or Unlisted Action?_____

   Has a Determination of Significance been established?_____

   If so, what was the determination?_____

PART C – PROJECT DESCRIPTION & CONSISTENCY WITH GREENWAY GOALS

1. Project Description: Briefly describe (100 words or less) the project, purpose and location, the need for the project and what will result when the project is completed. You may provide this descriptive information through an attachment. Photographs, maps, and renderings will help your project stand out.

2. Consistency with Greenway Criteria: Briefly describe how the proposed project is consistent with the five Greenway criteria, as listed below, and "check" the applicable categories:

   ☐ Natural and Cultural Resource Protection – Protect, preserve, and enhance natural resources, including natural communities, open spaces, cultural and historic resources, scenic roads and scenic areas.

   ☐ Regional Planning – Applicants working together to develop mutually beneficial regional strategies for natural and cultural resource protection, economic development, public access and heritage and environmental education.

   ☐ Economic Development – Encourage economic development compatible with the preservation and enhancement of natural and cultural resources including agriculture, tourism, and the revitalization of established community centers and waterfronts.

   ☐ Public Access – Promote increased public access to the Hudson River through the creation of riverside parks and the development of the Hudson River Valley Greenway Trail System.

   ☐ Heritage and Environmental Education – Promote awareness among residents and visitors about the Valley's natural, cultural, scenic and historic resources.

3. Intermunicipal collaborative effort (If applicable): Briefly describe how the proposed project is consistent with the Greenway goals of regional planning and intermunicipal collaborative efforts.

PART D – WORK PROGRAM, TIMELINE & BUDGET SUMMARY

1. **Work Program & Timeline:** Complete the information requested below and briefly list the proposed work program, by task, phase, or milestone and the timeline associated with the project. At a minimum, provide a start date and completion date for each project milestone (e.g. public input period, draft document completed, etc.). You may provide this information in an attachment.

   Project Start Date: _____ Expected Project Completion Date: _____

Description	Start Date	Completion Date
Phase/Task 1:_____	_____	_____
Phase/Task 2:_____	_____	_____
Phase/Task 3:_____	_____	_____
Phase/Task 4:_____	_____	_____

2. **Budget Summary:** Please identify the proposed Capital and certain costs associated with the project:
   You may provide this information through an attachment.

	Greenway Request	**Applicant Match***	**Total Project Cost**
Pre-Development Costs:** (max 15% of construction costs)	$_____	$_____	$_____
Administration Costs: (max 10% total grant)	$_____	$_____	$_____
Construction/Rehabilitation Costs:	$_____	$_____	$_____
Total Costs:	$_____	$_____	$_____

***Applicant Match:** Must equal or exceed total Greenway Request, please set forth in detail below

****Pre-Development Costs:** Such costs may include: expenses incurred in project planning and design; expenses incurred in obtaining required permits and approvals; expenses incurred in obtaining required insurance.

Local Match Documentation:

In-kind services (salaries, wages, travel/mileage):

Salaries (please give # of hours and rate of pay):

Rate of Pay: $_____/_____ Hours _____ $_____

Hourly Wages (please give # of hours and rate of pay):

Rate of Pay: $_____/_____ Hours _____ $_____

Mileage: $_____

Other (specify): _____ $_____

_____ $_____

TOTAL IN-KIND SERVICES: $_____

Land Acquisition: $_____

Construction: $_____

Equipment/ Supplies/ Materials (Please specify):

_____ $_____

_____ $_____

_____ $_____

_____ $_____

Total Equipment/Supplies/Materials: $_____

Contractual/Professional Services (Please specify):

_____ $_____

_____ $_____

_____ $_____

_____ $_____

Total Contractual/Professional Services: $_____

Total Local Match: **$_____**

Current Balance in your municipal "money in lieu of parkland" fund: $_____
(See NY Town Law § 277 (4) (c) or parallel provisions in Village Law § 7-730 (4) or City Law § 33 (4) (c).)

Amount from the fund that will be contributed to this project: $_____

PART E - APPROVED MUNICIPAL/NOT-FOR-PROFIT RESOLUTIONS & CERTIFICATION

1. Grant Request Resolution: Please attach an approved municipal/not-for-profit resolution requesting the proposed grant funding.

2. Elected Official Certification: Please read and sign the following:
   "I hereby affirm under penalty of perjury that information provided on this form and attached statements and exhibits is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to Section 210.45 of the Penal law."

   Print Name:_____ Title:_____

   Authorized Signature:_____ Date:_____

Watershed Restoration and Enhancement Agreement Authority

Wyden Amendment
Number: 10.693
Agency: Department of Agriculture
Office: Forest Service

PROGRAM INFORMATION

Authorization (040):

Public Law 105-277, Section 323 as amended by Public Law 109-54 Section 434. This program has been permanently authorized, Public Law 111-11.

Objectives (050):

To enter into domestic cooperative agreements with willing participants for the protection, restoration, and enhancement of fish and wildlife habitat and other resources on public or private land and for the reduction of risk from natural disaster where public safety is threatened that benefit these resources within the watershed.

Types of Assistance (060):

Cooperative Agreements

Uses and Use Restrictions (070):

Projects that protect, enhance, or restore resources within a watershed and provide tangible benefits to achieving Forest Service goals and objectives are allowable under Wyden. Project types are not limited to actual projects on the ground; for example, stream gabion installation, check dam construction, fish habitat restoration, or culvert cleaning. Watershed analysis studies, habitat surveys and wildlife species monitoring, depending on the benefit to resources within the watershed, are also permissible under Wyden. Any project carried out under Wyden authority must comply with all applicable Federal, State and local laws and regulations, policies and permit requirements; for example, National Environmental Policy Act, Clean Water Act, and Endangered Species Act. Must be within a watershed for the stated program objectives.

Eligibility Requirements (080)

Applicant Eligibility (081):
n/a.

Beneficiary Eligibility (082):
n/a.

Credentials/Documentation (083):
No Credentials or documentation are required. This program is excluded from coverage under OMB Circular No. A-87.

Application and Award Process (090)

Preapplication Coordination (091):

Any project carried out under Wyden authority must comply with all applicable Federal, State and local laws and regulations, policies and permit requirements; for example, National Environmental Policy Act, Clean Water Act, and Endangered Species Act. The standard application forms SF 424s as furnished by the federal agency and required by OMB A-102, as implemented by 7 CFR Part 3016 and 7 CFR Part 3019, must be used for this program. An environmental impact assessment is required for this program. This program is excluded from coverage under E.O. 12372.

Application Procedures (092):
OMB Circular No. A-102 applies to this program. OMB Circular No. A-110 applies to this program. The Forest Service and cooperator mutually agree to prjects that are appropriate.

Award Procedure (093):
Established by Forest headquarters, Regional or Washington Office.

Deadlines (094):
Not Applicable.

Range of Approval/Disapproval Time (095):
Not Applicable.

Appeals (096):
Not Applicable.

Renewals (097):
From 30 to 60 days. Submit written request and completed SF-424 application and SF-424A (as applicable) to amend amount or length of commitment; other requirements may be established by the affected Forest headquarters, Regional or Washington Office.

Assistance Consideration (100)

Formula and Matching Requirements (101):
This program has no statutory formula.
Matching requirements are not applicable to this program.
MOE requirements are not applicable to this program.

Length and Time Phasing of Assistance (102):
As specified on the cooperative agreement, but not to exceed 5 years. Invoices may be submitted no more frequently than monthly. See the following for information on how assistance is awarded/released: As specified on the cooperative agreement.

Post Assistance Requirements (110)

Reports (111):
No program reports are required. Recipients will complete and submit SF-425s to report expenditures and cash on hand, as applicable. Reports due at least annually and no more than quarterly. As specified in the award document, progress reporting is required to monitor progress against award objectives. Recipients will complete and submit SF-425s to report expenditures and cash on hand, as applicable. The recipient and other parties to the agreement are expected to conduct monitoring activities.

Audits (112):
In accordance with the provisions of OMB Circular No. A-133 (Revised, June 27, 2003), "Audits of States, Local Governments, and Non-Profit Organizations," nonfederal entities that expend financial assistance of $500,000 or

more in Federal awards will have a single or a program-specific audit conducted for that year. Nonfederal entities that expend less than $500,000 a year in Federal awards are exempt from Federal audit requirements for that year, except as noted in Circular No. A-133. Not Applicable.

Records (113):
Nll related data, information, records and accounts shall be retained for a period of 3 years beyond the data of submission of final financial reports and/or final payment.

Financial Information (120)

Account Identification (121):
12-1106-0-1-302 - 12/14-5232-0-1-302.

Obligations (122):
(Salaries) FY 09 $6,000,000; FY 10 est $6,000,000; FY 11 est $6,000,000

Range and Average of Financial Assistance (123):
Varies by type of project and funding available.

Program Accomplishments (130):
Not Applicable.

Regulations, Guidelines, and Literature (140):
OMB Circulars, as applicable to the type of recipient and 48 CFR 31.2 for Private Landowners.

Information Contacts (150)

Regional or Local Office (151) :
See Regional Agency Offices. Varies by type of project and funding available.

Headquarters Office (152):
Ronald Dunlap, 201 14th Street NW, Room 3SE, Washington, District of Columbia 20024 Email: rdunlap@fs.fed.us Phone: (202) 205-1790.

Website Address (153):
No Data Available

Related Programs (160):
Not Applicable.

Examples of Funded Projects (170):
Fiscal Year 2010: No Current Data Available Fiscal Year 2011: No Current Data Available Fiscal Year 2012: No Current Data Available

Criteria for Selecting Proposals (180):
Cooperative agreements are negotiated on the basis of project objectives to be achieved, with emphasis on restoration, protection, and enhancement of fish and wildlife habitat, and other resources on public and private land, the reduction of risk from natural disaster where public safety is threatened, or a combination thereof or both that benefit these resources within the watershed; availability of funding.