

REDEVELOPMENT OF GOVERNORS ISLAND IN NEW YORK CITY: SUSTAINABILITY, UNIQUE TECHNICAL CHALLENGES, AND CONTRACT DELIVERY SYSTEMS

Samuel Scozzari, PE¹

¹STV Incorporated, Construction Management Group, New York City NY, USA

Abstract

This paper discusses the redevelopment of Governors Island in New York City from a military installment to a world-class public space dedicated to education, history, the arts, community, and recreation. Conversion from its use as the United States Coast Guard headquarters for the Northern Hemisphere to public use in an urban environment, accessible only by ferry, brings with it unique challenges in order to execute this process within the realm of sustainable design, construction, and use. A brief history of the island as understood by the Europeans at the time of contact with North American native people through current time is provided to give insight into the condition of the island at the time of redevelopment's first design efforts in 2011. An explanation of the design and construction delivery systems is also outlined, and the Owner's intentions for use are also explained.

KEYWORDS

Governors Island, Sustainable Construction, Fort Jay, Castle Williams, Sam Scozzari

1.INTRODUCTION

Governors Island (GI), situated in the New York Harbor, approximately one-half mile from the South Battery of Manhattan, has been undergoing a redevelopment program since 2010 (design) and 2012 (construction). The Trust for Governors Island (The Trust; or TGI), a non-profit instrumentality of the City of New York, has transformed the 156-acre island from an abandoned military installment (USCG North America headquarters, 1966 to 1996; US Army mid-1700s to 1966) to an artist-, historian-, tourist-, citizen-, and development-friendly sustainable landscape and community containing modernized utilities and access, surrounding an iconic park and public space that will feature four constructed embankment hills (The Hills) at the southwest tip of the Island. The Hills will be contiguous with and part of the park and public space, and will possess breathtaking views of the Statue of Liberty and the Manhattan, Brooklyn, Staten Island, and New Jersey skylines.

The redevelopment is a \$350M capital program that can be defined by a multitude of projects that include infrastructure upgrades, historic building mothballing, and the construction of an iconic park and public space. [0] The public space is undergoing its development in three phases, the current Park open to the public is substantially complete, The Hills, which is currently in construction, and the third phase to redevelop the shore promenade in the design/development process.



Figure 1: Governors Island, located in New York Harbor approximately 1/2-mile south of Manhattan Island's southernmost point



Photograph 1:
Governors Island circa mid-summer 2013, as photographed facing north toward Manhattan

1.1. Infrastructure Work

Infrastructure work includes upgrading of the ferry slips: two in Manhattan (Battery Marine Building, Slips 6 and 7) and two on Governors Island (Soissons Landing, East and West slips); upgrade of a dock landing at the east side of the island (Buttermilk Channel section of the East River, facing Brooklyn); conversion of an existing non-potable water system, fed from the Brooklyn-Battery Tunnel (BBT) sprinkler system, to provide potable water from Red Hook, Brooklyn, via a new submarine crossing installed through the means of Horizontal Directional Drilling (HDD) to a new on-island distribution system; upgrades to new electrical feeders, fed via the BBT to Consolidated Edison (ConEd) switchgear in Brooklyn; and a complete rehabilitation to the island's 2.2-mile long seawall. Since the seawall's work is intertwined with the public space work, their sustainable aspects are partly discussed together.

1.2. Historic Preservation

Historic preservation work includes the envelope stabilization to 32 large homes in the Historic District. These structures were homes to officers and their families since the 1800s through 1996 but are now in a state of disrepair caused by moisture infiltration. The buildings had their roofs replaced and miscellaneous repairs to the building envelope, which will allow future tenants to

upgrade the interior in compliance with the New York City's Landmarks Preservation Commission.

1.3. Public Space and Seawall

This is the portion of the redevelopment that contains the most long-term sustainability. The conversion of military landscapes to a public space for a majority of the island involves the seawall and park. Both had further divisions and phases that are described below:

1.3.1.Governors Island Park Phase I (PPS-I)

Over 150 acres of former military maneuvering areas, offices, services, and dormitories were converted to a series of walking and biking trails, three interactive water features, a playground, *Hammock Grove* with 50 hammocks, and other public space features constructed in a [flower] petal shaped configuration made from fill (significant portions of fill were reclaimed site and roadway demolition debris from the Island) that raises the overall topography to approximately 15 feet above the existing grade.

1.3.2. Phase II – The Hills (PPS-II)

The design and construction of four vegetated, wooded, and/or shrubbed hills, *Grassy*, *Slide*, *Discovery*, and *Outlook Hills*, having approximate elevations of 40, 47, 58, and 80 respectively, is an implementing of sustainable construction, for these hills involve a hybrid of technical concepts and innovations involving the re-use of post-abatement building demolition debris from 5 multi-story buildings demolished in 2013. Inclines for Discovery and Outlook Hills require the use of Mechanically Stabilized Earth Systems (MSES) of a specific grid spacing that allows planting of species selected for vegetation.

1.3.3. Phase III – South Prow

This is currently in the design stage and will include enhancement to the walking experience along the water and possibly some expanded gathering spaces along the shoreline promenade.

1.3.4. Seawall and Outfall Consolidation (Seawall/Outfall)

- 131 outfalls were consolidated into 28 new outfalls with tide gates; the new outfalls are connected to both existing and new drainage systems constructed for the park and public space areas, including the Hills.
- 3550 LF of seawall removed and converted to rip-rap revetment created in lieu of seawall repair/replacement, which returns 15 feet of landfill back to the ocean; seawall stones were re-claimed to construct a vertical climbing scramble for Outlook Hill.
- 3810 LF of seawall was repaired through replacement of stones for the top four courses.
- 2021 LF of seawall was completely replaced with new footing and backing wall to the original water-side stones. The revetment and this portion of the work were modified to reduce impact to the waterside by reclaiming the in-situ seawall foundation and not needing to replace it. In addition, there was less or no turbidity because there was no need for a cofferdam or disturbance to the mudline to conduct this work.
- 1882 LF of seawall was stabilized through repointing efforts, by means of hand-packing and/or power grouting.



Figure 2, current status of redevelopment efforts, Fall 2014:

The areas to the left of and including “Liggett Terrace” are known as “South Island” and were created by landfill efforts circa 1910. Areas titled “The Hills”, “Hammock Grove”, “Play Lawn”, and “Liggett Terrace” are part of the new Park & Public Space. The beige areas above and below the Park are future development zones, yet to be tenanted. Areas to the right of “Liggett Terrace” are the original land mass that was Nutten Island, referred to by TGI as “North Island”, and gray areas within North Island are property of the National Park Service for the Fort Jay and Castle Williams National Monuments. The octagon shape to the right of the island is the Brooklyn-Battery Tunnel vent building, owned and operated by NYS MTA Bridges and Tunnels, with Soissons Ferry Landing above it and Pier 101, typically used on public access days for ferries to/from Brooklyn, below it.

2.BRIEF HISTORY OF GOVERNORS ISLAND

GI was originally known by Native Americans as “Paggank” [1] at the time of European Contact, circa 1500s-1600s. Later it was donned “Noten Eylant”, or as translated to English, “Nutten Island”, by Dutch explorer, Adriaen Block, and then “Governors Island” made official in 1784 by the British when the area was in civil unrest (the American Revolutionary War), and still claimed as a colony by Great Britain (GB). Although as early as 1776, what was to become the United States Army, the Continental Army, comprising of mostly American-born Europeans or separatists in uprising against GB, used the island to fire upon British ships. From the 1780s to 1966, the island was a United States Army post. From 1966 – 1996, the island was the North Atlantic [Ocean] headquarters of the United States Coast Guard. In 1996, the island was transferred to the State of New York, to an agency known as Governors Island Preservation and Education Corporation (GIPEC), later to become TGI when the deed was transferred from New York State to New York City in 2010.

During the US Army period, circa early 1900s, the US Army Corps of Engineers extended the island by the process of adding 4,787,000 CY of fill, adding 103 acres by 1912. This fill was the spoil material from the construction of the Interborough Rapid Transit Company subways at the time. [2] This added landfill is known unofficially as “South Island”, while the original island, which contains the Historic District, original buildings constructed until 1900, and 22 acres belonging to the National Park Service, is known as the “North Island”. [3] [3.1]

2.PUBLIC SPACE DESIGN COMPETITION

GIPEC, as subsidiary of New York State's Empire Development Corporation, determined that the Island's success as a public destination point would depend on an interface of historic preservation, education, the arts, and a unique, world-class public space that would draw tenants and their patrons alongside local New Yorkers and tourists. GIPEC conducted a design competition in Fall 2006.

The five finalists were the following teams: [4]

- Field Operations (New York) / WilkinsonEyre Architects (London)
- Hargreaves Associates (New York) / Michael Maltzan Architecture, Inc. (Los Angeles)
- Ramus Ella Architects (REX) (New York) / Michel Desvigne Paysagistes (MDP) (Paris)
- West 8 urban design and landscape architecture b.v. (Rotterdam) / Rogers Marvel Architects (New York) / Diller Scofidio + Renfro (New York)
- WRT LLC (Philadelphia) / Weiss/Manfredi (New York) / Urban Strategies (Toronto)

By December 2007, the team of West 8 urban design and landscape architecture b.v. (W8), Rogers Marvel Architects (RMA) / Diller Scofidio + Renfro (DSR), Quennell Rothschild, and SMWM, was selected to design the new park. A series of public forums were conducted over the next 20 – 24 months, and by 2009, W8 and their team of co-landscape architects and subconsultants, had commenced with design of the park, to include new hills on the Island. As design of the Park & Public Space (PPS) continued to grow from a master plan to a schematic, and then into preliminary and final design phases (2009 – 2011), it also became evident that other matters of infrastructure were to be addressed to coincide with the growth being planned for GI. These included upgrades to the Seawall, high-voltage power service, the return of potable water through a new source and distribution system, mothballing of historic buildings, rehabilitation to ferry landings at Pier 101, and the rehabilitation to four ferry slips (Soissons Dock on GI, and Slips 6 and 7 at the Battery Marine Building in Lower Manhattan).

By 2011, W8 was in the throes of PPS and Hills designs, and TGI's construction manager, Turner, was soliciting designers for the remainder of the GI capital program, funded by New York City's Economic Development Corporation (EDC).

4. SUSTAINABLE DESIGN, SUSTAINABLE CONSTRUCTION, AND SUSTAINABLE USE

GI offered an interesting suite of opportunities for increased sustainability. The idea of green sustainability had not become a significant part of island-thought until the GIPEC/TGI period. During this period, the need to redevelop the island into its next era brought with it three opportunities to engage in a more sustainable island:

- Design that optimizes the reuse of on-island materials, re-manages the handling of storm runoff by keeping it on-island in contrast to conveying it to the watercourse, a seawall rehabilitation design that allows the ocean to reclaim a significant portion of the landfill "south island" section of GI, and 75,000 new plantings including between 5000 and 10,000 new trees with a planned organic succession.
- Construction that takes advantage of any opportunity to reuse island materials and means of construction that generate minimum turbidity in the watercourse.

- Use that minimizes motor vehicles, encourages bicycles, and when possible, small electric maintenance vehicles, along with composting, oceanic education, and future artistic, educational, and historic preservation related activity.

4.1. SUSTAINABLE DESIGN

4.1.1. FILL MATERIAL FOR PPS

TGI and their designer, W8, realized the need for fill to create the “petals” in PPS-I and the first 40-feet above existing grade of the four “hills” that comprise PPS-II. This was satisfied by reclaiming rubble that was generated from the demolition of existing dormitory buildings on the island, constructed by the USCG in the mid-late 1960s. 8 buildings were abated and demolished between 2008 and 2013, of which a majority were demolished in 2012-2013, including three, 7-story structures and one, 11-story structure, Building 877, imploded on June 9, 2013.

In addition to sustainability that was realized through of reuse of this material, it was an economic benefit to avoid the need for importing material from other clean sources within shipping distance to the island. Importing material also brings with it the environmental risk associated with transport, and the added use of fossil fuels to bring it to GI. Of the approximated 250,000 CY of fill needed to construct PPS, approximately 120,000 was satisfied through the reclaiming of on-island materials. The remaining quantity was planting soil and a specified “general fill”. The general fill was a crushed traprock product barged from a quarry located 82 miles north of GI. The sustainability of the general fill was most defined by its ability to remain stable with no vegetation, dust, or sedimentation migration, evidenced by thousands of feet of silt fence never experiencing any wear or sediment.

Discussion about sustainable efforts with respect to imported fill material will be presented in the *Construction* section.

4.1.2. ADDITIONAL DESIGN MEASURES TO DETERMINE FILL MATERIAL FOR PPS-II (*THE HILLS*)

Designed with 2- and 3-D modeling (Plaxis), each hill had to be checked against the existing and changed conditions surrounding it, such as projects like the new Seawall/Outfall, existing buildings to remain in place, existing 5kV duct banks that connect to structures subject to settlement, the existing Historic District, and the other hills. Design efforts to lighten the hills resulted in a mix of recycled fill from aforementioned building demolition, a 40-foot deep crushed stone (similar to PPS-I), mechanical stabilized earth (MSE) systems for steep slopes that require 50,000 combined tree and shrub plantings, precast stand-alone retaining-walls, lightweight fill or GeoFoam materials, and, also similar to PPS-I, engineered soils for plantings.

4.1.3. PPS STORM RUNOFF AND DRAINAGE

W8, having experience in the Netherlands with the design of sweetwater natural recharging of the water table generated from precipitation otherwise captured in storm runoff systems, instructed their subconsultant to maximize sheet flow and the specification of dry-well styled catch basins, in order to maximize the recharging of the water table with precipitation. Although the water table is naturally brackish, especially with areas of land mass from fill operations (circa 1910), the addition of precipitation to the topography versus expediting it through a storm system to an outfall, is a more preferred storm plan because it reduces watercourse turbidity at the outfalls. Some detention will occur in planting soils, relieving the mechanical irrigation systems at times

of storm events and providing some natural watering to the 75,000 new plantings in the PPS areas.



Photograph 2:
PPS-I silt fence surrounding several lifts of general fill – never experiencing sediment migration

Generally, the reduced flow of the new space, to the downstream system that is located within the perimeter roadway and seawall outfalls, and to allow capacity for future development, was another opportunity to increase sustainability. In addition, more sheet flow and less channelization and piping offered an economic benefit to the Owner, and with the very permeable properties of the general fill, never was inconsistent with park usage in that standing water within areas of lower elevation (i.e., Petal 7) would occur for only a short time and usually concurrent with a rain event that would send park users to seek shelter and not be utilizing these zones during the storm event.

4.1.4. OUTFALL CONSOLIDATION

The Seawall project was divided into two separate designs; outfall consolidation and seawall structure. The drainage system incorporated into the seawall project is within the perimeter roadway around the island. It combines the new PPS drainage system with the existing systems in areas outside of the Park and conveys the runoff to the ocean waters around the island. TGI directed their designer to consolidate 131 outfalls into 28 new outfalls with tide gates, finding favor with New York State Department of Environmental Conservation (DEC) and reducing overall turbid energy during runoff events.

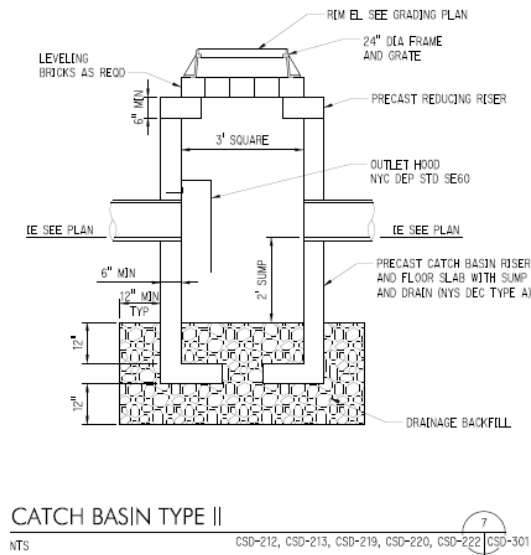


Figure 3, Catch Basin with opening at bottom of the sump: allows recharging of the water table in contrast to runoff discharge to outfalls.

4.1.5. SEAWALL REHABILITATION RETURNS 1.2 ACRES OF LANDFILL TO THE OCEAN

In addition, the seawall design consultant was instructed to provide sustainability with their design in the form of a new revetment section of 3550 LF on the southwest side of the island. This portion (approximately 30%) of the bulkhead is subject to wave action of greater intensity than the other areas (total seawall circumference is approximately 11,600 LF), and by constructing the revetment, minimizes damage from wave action on this section of the promenade, which is planned for redevelopment in PPS Phase III (the “South Prow” – only in conceptual design as of mid-2014 and not discussed here). The design process also created two sustainable by-products from converting this section to rip-rap revetment: 1, 15-feet of island property was returned to sea for the entire length of 3550 LF (approximately 1.2 Acres), and 2, stones removed from the existing seawall in this area were reused as a climb/scramble on the side of Outlook Hill.

A third sustainable by-product of the seawall project, the opportunity to avoid dislodgement of the existing seawall toe stone, became evident during construction and is discussed in more detail in the *Construction* section.

4.1.6. PLANTINGS

The vision for the new plantings of the PPS areas was to create a natural forest. To accomplish this, W8’s subconsultant and co- landscape architect, Mathews Nielson Landscape Architects (MNLA), specified a sophisticated and detailed suite of shrub and tree species that exemplified W8’s intentions for an urban open space that takes park users completely out of touch with a city environment and transports them to a forest setting. Of course, that will fully occur in the future (20 years?), but to avoid the “planned” grid appearance of a human-made forest, the planting scheme was designed with 30% more trees, in the form of bare root plantings, within the populous of PPS-I’s 10,000 trees. Their concept was that of a natural succession, wherein the additional 30% will die, randomly, possibly in the first or second year, and provide a natural compost that will contribute to the ecosystem by contributing nutrients for the remaining



Photograph 3: Seawall conversion from wall to revetment moves the shore 15-feet landward and provides more protection to the shore line by dissipating the energy on the most active side of the island over the incline of rip-rap stone (photo facing southwest).



Figure 4: Rendering of park users enjoying the scramble constructed of reclaimed seawall stones along the side of Outlook Hill, with users depicted also using the switch-back styled path.

trees. Thus, the final product is a natural succession of species that will better resemble a naturally grown forestation of the space. This sustainable design concept is also repeated for PPS-II.

4.2. SUSTAINABLE CONSTRUCTION AND UNIQUE TECHNICAL CHALLENGES

4.2.1. MINIMUM STANDARDS

The CM required that contractors respect TGI's mission of sustainable character to the island, and each subcontractor was contractually required to comply with the Remedial Action Plan (RAP) and State Pollutant Discharge Elimination System (SPDES) permits in force by the DEC. While it appeared that some trades needed to comply with regulations that are specific to GI (earth movers, planters, seawall trades, demolition trades), all trades were required to abide by the basic policies regarding housekeeping and use of motor vehicles on the island. Most regulations doubled as safety regulations, but nonetheless, the outcome being that of a sustainable-focused construction team was that of an overall island awareness that was expected of all that participated in GI's redevelopment effort.

The basic requirements were:

- General housekeeping and trash management
- Subcontractors limited to minimal personal motor vehicles on island, only by GI permit
- Dust, sedimentation, and erosion control (governed by SPDES)

- Best Management Practices regarding materials handling at the water's edge
- Night work only allowed with approval from TGI
- Fees levied on contractors for additional public ferry runs (controlling fossil fuels use)
- Seawall contractor working with tides to minimize turbidity

There were planned techniques along with reaction to several unexpected conditions that furthered the sustaining theme of GI's redevelopment. The following summarizes the most prevalent conditions that dominated construction activities and fostered sustainability during construction:

4.2.2. FILL SPECIFICATIONS AND LACK OF MIGRATION OF SEDIMENT

The specified fill material is a coarse, yet loose material, with superb interlocking qualities, designed for its embankment properties as well as permeability. This couples with the engineered soil layer above it to harmonize retention of moisture with plants, but then release of that moisture upon saturation of the planting material by permeating through the general fill material, which is elevated above existing topography. This elevation, in PPS-I of up to 15 feet, and in PPS-II up to 60 feet over existing grade, provides two key sustainable characteristics of this landscape: 1, some temporary storage of runoff after planting soil saturation and while migrating to the water table, and 2, increase in sustainability of the land mass and features due to their ability to withstand recently higher storm surges and ocean water levels that are now more common in this part of North America

This migration of moisture and runoff into the water table is gradual, to favor the nutrients needed for the plantings. However, the stability of the general fill material, resulting from loose and interlocking traprock aggregate, is so reliable and constant, that fines from the general fill do not migrate. The material "locks-up" through its interlocking properties and the limestone naturally evident in the stone dust of the general fill 'mix', minimizing or eliminating any migration of fines whatsoever. This ability to remain in an un-vegetated stockpile state without generating dust or sediment runoff greatly supported the sustainable intention of the design and the sustainable requirements of the construction (refer to photographs in the prior section, *Sustainable Design*).

4.2.3. FILL FROM OFF-ISLAND SOURCES

The Office of the Mayor has a program that matches [New York] City-funded projects generating clean fill with City-funded projects in need of clean fill. Known as the Office of Environmental Remediation (OER), this program engaged Governors Island for fill quantities that could not be met by on-island resources and matched it with several sites. [5] The process typically involves:

- The generator certifying that material was clean per general DOB, DEC, and DEP regulations
- The receiver determining that the material complied with both The Project's technical specifications and GI's island-wide RAP
- GI's CM and the generator coordinating delivery
- GI's REI staff to verify state of material and confirm quantity shipped

Other off-island sources included clean sand from MetLife Stadium in East Rutherford NJ, and remaining clean sand from a public art piece in Lower Manhattan's financial district. [6]

4.2.4. RUBBLE CRUSHING FOR THE HILLS

After abatement of buildings on GI, the rubble that remained was crushed, on-site, to sizes of 4-inches or less and re-claimed for use as general fill for the construction of the Hills. This material

was mostly masonry, brick, and concrete. Some steel rebar had to be removed from the concrete rubble to reclaim the masonry and concrete material. Some of the material was blended with existing stockpiles of other excavated fill from GI, and some material was suitable as-crushed. This on-island demo-generated rubble accounted for approximately 120,000 CY of the necessary fill needed for Hills construction, as well as a small portion required for PPS-I.

An on-line video recording of the implosion of Building 877, an eleven-story dormitory, can be viewed at the following web address: <https://www.youtube.com/watch?v=8FsgEN666NY> [7]

4.2.5. CONSTRUCTION OF PPS-II (THE HILLS) – OVERALL CHALLENGES

The Hills are a feature that hasn't been attempted in New York City prior to Governors Island's capital program and may very well be the first hills of such magnitude in elevation dedicated to public space (others being highway embankments, sanitation landfills, or mid-channel tunnel portals). These four hills are currently designed based on a soil data from a pre-construction boring program. The area was surcharged for approximately two years prior to the seawall reconstruction and the first 40-feet of embankment placement. The geotechnical designer of record (DOR) also ordered some confirmatory borings and installed testing apparatus months prior to construction in order to set a baseline for the tracking of actual settlement during construction, if any. Of concern were 5kV duct banks, associated maintenance structures, and seawall features within close proximity.

In concept, the weight of the embankment could cause vertical settlement and horizontal deformation in the land mass below and adjacent to the embankment, causing some movement of material in both vertical and horizontal directions. The concern for potential movement would be that vertical settlement is close to an existing duct bank's interface with maintenance structures and switchgear building, and horizontal deformation would have an adverse effect on the newly constructed seawall at an elevation of 6-feet below the existing grade.

Settlement and movement was projected by W8's geotechnical engineer that the settlement would be minimal, but piezometers and inclinometers were installed as a safeguard and to document the data.

The current design calls for a 30-day placement hiatus at Elevation 40 and for every ten feet placement interval after Elevation 40, so that the DOR can determine if subsequent layers should constitute special fill material, lightweight aggregate, or geofoam, to continue construction. As of Fall 2014, Grassy Hill is complete, Slide Hill and Discovery Hill are in hiatus at Elevation 40, and Outlook Hill has not seen significant placement. However, instruments have not detected any significant readings of deformation to date. The expectation is that such readings could occur when fill above Elevation 40 is placed, so the designer is considering the treatments that may be allowed, such as the decision to use lightweight fill or a "geofoam"-type product.

Between hills are some MSE systems coupled with architecturally precast vertical walls that are not acting as active retaining walls, but are cosmetically situated in front of the MSE system.

The hiatus combined with sequencing of portions of Outlook Hill and the Seawall prior to elevating above 40 feet on other hills is a CM challenge that involves 6 or 7 construction packages and two different types of delivery systems, design-bid-build (DBB) and design-build (DB), discussed in the *Construction Contracts, Packaging, and Project Oversight Paradigm* section.

4.2.6. CONSTRUCTION STAGING FOR STORM RUNOFF FROM PPS-I

Construction Staging for Storm Runoff from PPS-I prior to the Seawall/Outfall project had to be managed to favor the earlier funding and award of PPS-I, which means that the PPS-I project drainage system was first connected to the existing unimproved drainage system on the perimeter

of the Island, which was to later be upgraded under the Seawall/Outfall project, funded to commence approximately one year after the PPS-I project was awarded.

To regulate the runoff volume to that of stormwater with low amounts of sediment and minimized energy, Storm Water Pollution Protection Plan (SWPPP) controls were left in place around new and existing storm structures to slow velocity within the system, and to maximize sheet flow/absorption into the new park areas until a point in time that the connections to the existing perimeter system was absolutely necessary. By slowing the velocity and holding back the sediments, only severe storm events (i.e., *Hurricane Sandy*) would have an adverse affect on the watercourse at the existing points of discharge

During the seawall and outfall consolidation project, the closing of the existing outfalls was sequenced with the construction of the new outfalls, and this coincided with the removal of SWPPP devices in the park area, which was open to the public in late May 2014, after Seawall/Outfall had commenced and some new outfalls had been successfully placed into service.

4.2.7. MODIFICATIONS TO SEAWALL DESIGN (AFTER COMMENCEMENT OF CONSTRUCTION)

The original seawall reconstruction design involved the removal of toe stone some four-to-five courses of seawall stone (approximately 6 feet average) below mean high water level. During pre-bid interviews, TGI learned that the subcontractor with the lowest bid had an approach that involved partial cofferdams, dewatering, working at low tides, and working at 100-foot intervals. While this seemed reasonable, there was a potential for turbidity during construction, and if not, then a great deal of potential for needing to dewater in order to construct foundation features “in the dry”.

Upon breaking ground at the revetment, two conditions were discovered that were not previously evident in the contract documents: a massive existing shoal of what appeared to be unreinforced concrete to an unknown depth, and completely sound foundation and lower courses of seawall stone, mostly below the waterline. These foundation features could not be dislodged with conventional construction equipment.

TGI seized the opportunity to avoid disturbance of the lower portion of the existing seawall. Mostly due to the inability to drive cofferdam sheets on the waterside of the seawall blocked by the massive concrete shoal, this fortunately coincided with an extremely sound foundation and first four to five courses of existing seawall stone, which left intact, were deemed suitable by the DOR to remain in place.

With the existing seawall foundation as the new base of both the revetment and new seawall sections, a modified design was incorporated into the project. This new design lowered the overall cost of the seawall project by approximately 3%, and most importantly provided a significant and important reduction in disturbance to the watercourse during reconstruction of the 2-mile long seawall.

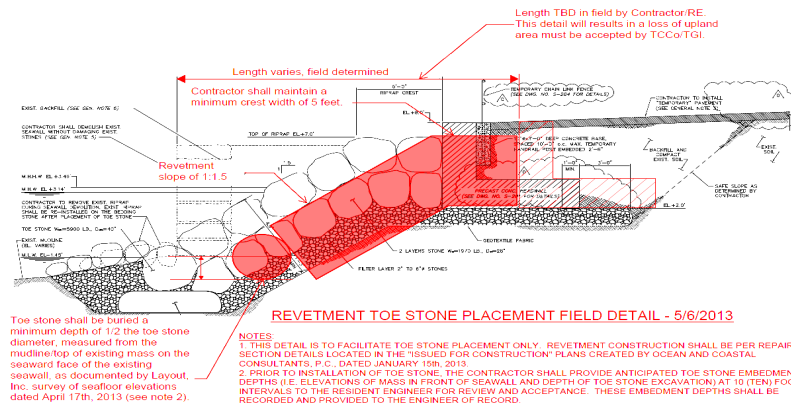


Figure 5 (above), section depicting the new revetment design (red) superimposed over the original contract design: Demolition of existing toe-stone is not needed, and excavation for and placement of a new toe-stone occurred at a higher ground, avoiding the need for cofferdams and reducing the potential for turbidity in the water due to construction activity.

4.3. SUSTAINABLE USE

TGI's intention and mission is to transform GI into a destination with great public open space, as well as educational, not-for-profit, and commercial facilities. [8] The infrastructure is approximately 80% complete as of September 2014, and 64 acres of park and public spaces were open to the public throughout the Summer 2014 season. As of September 2014, construction of the Hills (PPS-II) has commenced and is ongoing.

An example of TGI's extension of sustainable policy is to seek tenants that can abide by the current ferry schedules without requiring added trips, if possible. Other selections may include candidates with the ability to utilize the island's features without gas-powered vehicles and the encouragement of bicycle, pedestrian, and electric vehicle travel throughout the island. [10]

4.3.1. HISTORIC BUILDINGS

Now with the "mothballing" complete, TGI is proceeding with an ambitious infrastructure program to ready the Island for expanded tenancy and activity. As of September 2014, TGI has identified some RFP finalists for tenancy in the Island's historic buildings, which will help achieve the goal of making Governors Island an extraordinary public resource with a vibrant mix of uses and activities. [9] The tenants will be selected consistent with the ideology of the GI, which is to foster sustainable use, as well as education, the arts, and many types of community benefit.

Mothballing efforts have also resulted in reduced consumption of power and fuel to keep climate control in the historic buildings. Tenants may be allowed to improve their spaces, within the constraints of any historic preservation regulations, but newly sealed buildings (new roofs, patched holes, etc.) will decrease power, heating costs, and associated environmental impacts from fossil fuels needed to provide electricity and heat.

4.3.2. VEHICLE-FREE ISLAND

One of the goals of TGI is to continue sustainable use through minimizing the fossil fuel footprint via the limiting the use of gas- and diesel-powered vehicles for tenants and visitors. With the

exception of emergency responders, construction vehicles, and delivery vehicles, which would be greatly reduced after the infrastructure and PPS programs are complete, the GI roadways and traffic schemes favor pedestrians and bicyclists. TGI has a small fleet of electric vehicles for island mobility, with hopes of increasing that census to reduce fuel-powered vehicles. [11]

4.3.3. REDUCED WATER CONSUMPTION FOR WATER FEATURES

The three interactive water features are equipped with recirculation systems that re-use water through a series of ultraviolet treatments during the recirculation process, and far less need to treat the water with harsh chlorination and pool type chemicals. These systems are automated to maximize conservation of power, for sustainability purposes as well as economic benefits. In

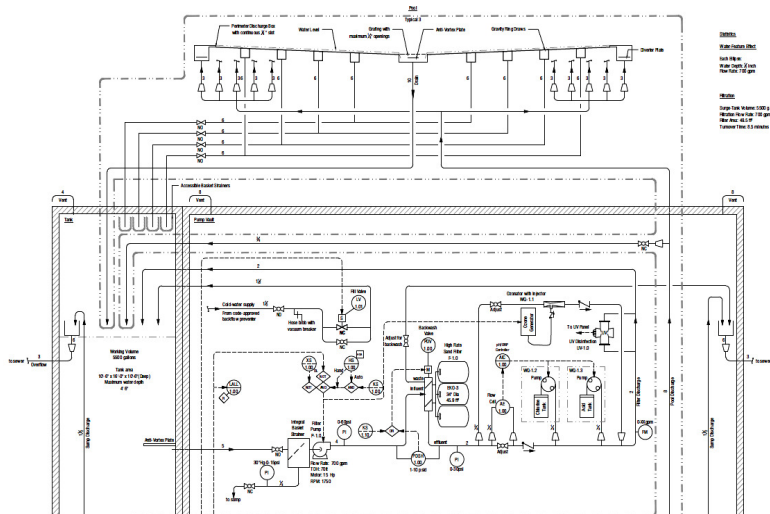


Figure 6, excerpt from the original contract documents for PPS water features: although actual approved and implemented subcontractor submittals differed, the overall design concept of circulating wading pool/fountain was kept intact in the final selection of equipment and vendors/subcontractors. Circulating water is treated and reused versus disposed and replenished, as a matter of sustainability and economy.

addition, the three water features are open to the elements and will naturally recharge and minimize any water-age characteristics during precipitation events in contrast to features that would discharge the water after use.

4.3.4. REDUCED WATER CONSUMPTION FOR IRRIGATION

The irrigation system will be implemented with a controller that senses and measures precipitation in a manner that shuts down the consumption of water during rain events, and resumes spray only if water amounts have not been met for the day. This not only reduces the consumption of potable water, but also prevents a surplus of irrigation water from becoming runoff that would be in excess of natural runoff and thus, reaching the watercourse, causing unnecessary turbidity at the outfalls.

4.3.5. TREE GROWTH AND HEALTH

Tree and forestation succession was a part of the landscape design through the process of planned tree death that contributes to a natural succession aesthetic, and a nutrient purpose for the trees that remain alive. The grounds personnel will monitor the plantings and maximize their life expectancy through care and attention. TGI has added staff qualified to oversee this aspect of the

new public space areas, as well attention to existing trees. As was the case during construction, existing trees will remain attended to with extreme diligence, as will be the grounds.

4.3.6. EARTH MATTER NY

Earth Matter NY, Inc. is a nonprofit organization dedicated to advancing the art, science, and application of composting in and around NYC. They are located on Governors Island and are a tenant of TGI. They have been in existence since Spring 2009, and their mission is to reduce the organic waste misdirected into the garbage stream by encouraging neighbor participation and leadership in composting. [12]

4.3.7. THE HARBOR SCHOOL

The *Urban Assembly New York Harbor School*, also known as the *Harbor School*, is a public high school located on GI. This school attempts to relate every aspect of its curriculum to the water. The school is part of the Urban Assembly of 21 college-prep schools in NYC. The New York City Department of Education classifies the Harbor School as a Career and Technical Education school. [13]

5. CONSTRUCTION CONTRACTS, PACKAGING, AND PROJECT OVERSIGHT PARADIGM

GIPEC had engaged with Turner Construction for Facilities Management services when they became the custodians of GI after the 1996 USCG dismantling of its GI operations. Upon development of a capital program to redevelop GI, Turner's role had morphed into their more well known services of Construction Management. They are tasked with holding contracts for design and construction. [14]

A \$350M capital program [15] was implemented by the City, and with it, the City required TGI to hire the services of a Resident Engineer & Inspection firm to provide design review and monitor the construction work to assure its quality. Through an RFP and selection process, the joint venture of The LiRo Group, Syosset NY, and STV Incorporated, New York NY (LSTV) was selected to provide REI and Design Review Services.

City funding sources for the following categories make up the GI capital program: Battery Marine Building and Ferry Slips (some Federal and NY State funds were combined with City funds); Soissons Ferry Slip and Portions of Upland Drainage (known as "Soissons Combined") (some Federal and NY State funds were combined with City funds); Park and Public Space (includes Phases I and II) (some private donors participated in funding of PPS-II); Potable Water Horizontal Directional Drilling and Island Distribution System; Electrical System Upgrades; Seawall Rehabilitation and Outfall Consolidation; and Historical Building Envelope Stabilization.

Turner divided each project and let smaller "packages" for bid. Some contractors would bid as prime on some packages and as subs to other primes on other packages. Those other primes would do the same in other cases. Many subcontractors would bid and be awarded on more than one package. For example, the PPS-I project was divided into 13 packages, and the DBB portion of PPS-II was divided initially into 15 packages. Each package may need a series of subcontractors in support of the prime subcontractor. This style of management enabled Turner and TGI to leverage pricing through a process known as "leveling", where contractors were invited to bid [16], issued bid sets at 90% complete, and advised that initial bids were subject to further refinement. Upon review of the bids provided at 90%, the CM can remove sections out of certain packages and re-bid them as new packages or add-alternates to the same package, to compare pricing submitted by (typically) up to five or six subcontractors.

This commonplace CM methodology of issuing advance bid documents at 90% complete enabled TGI to streamline schedule, maximize their budget, and for bidders to offer their best pricing through longer lead times for specialty items such as water features, architectural mosaic materials, movable bridge parts for ferry slip upgrades, precast architectural concrete curbs, and plantings. Plantings were and are the most sensitive to time, as plants must be tagged or germinated at the nurseries, procured by a vendor, dug, transported, and planted at certain weather-sensitive times and with an interface of the blending and placement of planting soils, which are subject to some tests taking up to one week for results, and also soils being temperature, time elapsed, and moisture sensitive.

In addition to these schedule constraints caused by staggered funding, use of the island and commitments to programming also contributed to the dictating of project sequencing. These types of schedule constraints explain why portions of the seawall project were constructed prior to The Hills (PPS-II) embankments that are adjacent to the seawall with potential for horizontal deformation of soil that bears against the new revetment headwall. To accommodate this, designs were cognizant of the constraints, and Turner's contract packaging, which often included provisions for materials storage space and staging of resources, also needed to navigate these schedule constraints.

Delivery systems varied from the Design-Bid-Build (DBB) that was employed for most packages when there was a specialty, sole source feature, or unique material to deliver. Examples of this were Design-Build (DB) packages for signage, water features, ballfields, a customized signature park bench, playground items, island furniture, and Outlook Hill.

LSTV was charged with providing services [consistent with REI services typically rendered in the Metro New York City area]. [17] This was carried out by a team that developed procedures drawn from knowledge of leading agencies in the NYC area requiring REI services, and adapting them to each project. Packages were tracked individually, and daily reports (as well as project correspondence) were filed first by project, and then broken down by packages.

Later in the assignment, LSTV was asked to provide some Construction Administration (CA) services for the marine and ferry slips projects, and to review any DB submittals with respect to engineering.

Turner and their subcontractors maintained a census that was commensurate with the projects in construction and the time of year. Core Turner staff fluctuated from 20-30 persons, while contractor personnel peaked at over 200 during peak times in 2012 and 2013. LSTV census peaked at 25 persons in 2013.

Archaeological services and arborist services were provided through each construction project, with fixed amounts to be included with the individual bids, and adjusted as needed by TGI. This was to encourage single sourcing to foster use of consultants with island-wide knowledge, but some exceptions in the arborist field were executed by the Seawall/Outfall subcontractor. Land Survey QA to check each contractor's layout was contracted directly with Turner and not through the REI team. This may have been optimal to avoid any issues with union labor, who also claim land survey services when working with CMs and contractors, as opposed to engineering firms that provide non-union engineering and technical persons as survey personnel.

In addition to the capital program, TGI's maintenance division also contracted with Turner to provide the oversight of the routine day-to-day operation of the island, including, but not limited to, ferry operations, ferry slips, security, sanitation, grounds keeping, overall building maintenance and janitorial services, tenant services for Earth Matter NY, the Harbor School, and the National Park Service, potable water delivery, and snow removal.

6. CONCLUSION, FALL 2014

As of May 2014, GI is open to the public, 7 days per week, from Memorial Day (end of May) through the end of September of every year. Prior to that, GI was only open select weekend days. Island redevelopment, in the form of completion of remaining capital program projects and attraction of new tenants, continues.

PPS-II, *The Hills*, remains under construction, as well as the potable water island distribution project, and the electrical upgrade project. The rehabilitation of Slip 6, part of the Battery Marine Building project scope, will commence in late 2014 with an approximate duration of one year. The Slip 6 project is partly funded by FHWA through the NYS Department of Transportation.

Turner remains CM and continues as Maintenance & Facilities manager for TGI's Operations group. LSTV as REI will remain attentive to any active project until completion or upon release from TGI.

TGI is reviewing applications for tenants and continuing to program the public activities. There are also two dedicated development zones within the South Island area that may be able to accommodate larger scale tenants that comply with GI's charter at some future juncture to be announced. Until that time, they can be used for contractor staging areas.

FDNY, The Harbor School, National Park Service (NPS), and Earth Matter NY occupy their space on island year round, and the ferry transport from Manhattan to GI remains in service for GI employees and the aforementioned that use the island throughout the winter months. NPS offers tours by appointment during winter months, and their effort encompasses two National Monuments on the Island: Fort Jay and Castle Williams.

One recurring theme throughout the discussion of sustainability is how each sustainable endeavor doubled as an economic benefit to the owner. Often a third characteristic of the effort was increased safety, such as in the goal of reducing gas- and diesel- powered vehicles for island mobility. Even unplanned events, such as the existing seawall foundation conditions resulted in a beneficial cost savings of close to \$1M, which was used to fund an overrun with repointing of the existing seawall. This theme of economy is extremely important and beneficial to TGI and proves that sustainable design and construction, when planned, can and may lead to lower construction costs.

TGI has a vision for the island's growth and use that makes sustainability one of its highest priorities, requiring designers to be innovative with respect to using green materials and incorporating environmental engineering throughout their efforts. This provides the public with a very unique and world class destination point in New York City that respects its environmental resources, enhances them, and also attracts local citizens currently in pursuit of recreation in a less-urban setting as well as those visiting New York City in search of amazing views and cultural programming.

The ideas of forested hills, accessible from (including wheelchairs) from a switchback trail or a scramble on one side, and the concept of having a *Liberty Moment*, will be a unique feature for GI and New York City that fosters sustainability and a new option for urban life that is easily accessible and rivals that of excursions that would otherwise take days or weeks. Development of *the Hills* will be unique for several reasons: the construction of embankments in an urban setting primarily dedicated for public space purposes is a pioneering geotechnical and horticultural/arborist effort previously not attempted in New York City, let alone the United States or North America. The 360-degree views of the surrounding



Photograph 4: Park use June 2014

With Phase I of the Park and Public Space now open to the public, park goers now have extended days and hours of use available. The programming themes often include sustainable-themed art, food, and/or entertainment, and while open to tourists, this space still continues to primarily attract New Yorkers, who are now gravitating to waterfront options for recreation, while in contrast, tourists tend to be attracted to (traditional attractions such as) *Times Square*, *Macy's Flagship Store* on 34th Street, museums, *Ellis Island*, *Liberty Island*, and *the Statue of Liberty*.

environs (Manhattan, Brooklyn and the Brooklyn Bridge, Verrazano-Narrows Bridge, New Jersey, New York Harbor) from a 'hilltop' and wooded setting, has a special appeal, and a fantastic presence when experienced. From inspection duties that occur at elevations some 40 feet lower than the proposed summit, this experience is felt, and that is approximately half of the final elevation that the public will experience. This is truly a breakthrough in the use of public space for a unique urban experience.

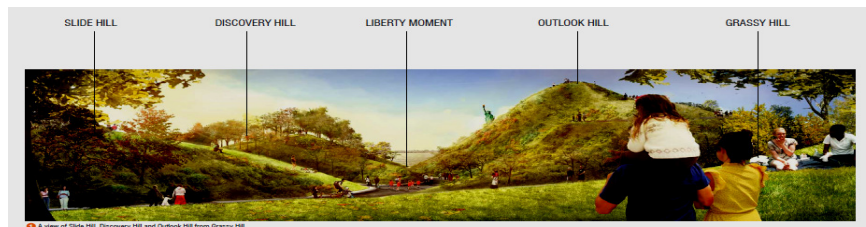


Figure 7: rendering of future park use in the PPS-II section, *The Hills*, facing *Liberty Moment*

REFERENCES

- [0] Knowledge of TGI budgets based on REI assignments and conversations with TGI and Turner personnel 2012-14. The figure of \$350M is approximate.
- [1] Internet article: http://en.wikipedia.org/wiki/Governors_Island referencing the website, "National Register Information System". National Register of Historic Places. National Park Service. 2007-01-23.
- [2] "Governors Island". National Historic Landmark summary listing. National Park Service. 2007-09-11.
- [3] Internet article: http://en.wikipedia.org/wiki/Governors_Island referencing the Internet article: <http://govisland.com/html/history/history.shtml>, "The Trust for Governors Island - History of Governors Island" retrieved June 25, 2012.
- [3.1] Cited Work #3 also refers to Moulton, Joseph White (1824) History of the State of New York including its Aboriginal and Colonial Annals, excerpted in *The New-York Literary Gazette*, 1826.
- [4] Internet article: http://www.govisland.com/html/pr/pr20070117_design_teams.shtml.
- [5] Note regarding the Office of Environmental Remediation (OER) program: as of September 2014, the OER program was not able to provide the PPS-II project with quantity of fill material that can be efficiently delivered and placed, because source quantities are lower than GI's needs due to staging

room for small quantities until the time of efficient placement. Therefore, the ideal source must be able to meet the technical requirements of the geotechnical engineer, the cleanliness requirements of the NYSDEC, and provide enough material for an efficient deliver/placement operation having little or no stockpile needs. The REI team has reported that the CM is currently in pursuit of an OER match for GI and has not eliminated this program as a viable source for the remaining work in PPS-II.

- [6] Discussion with TGI staff circa winter 2014.
- [7] <https://www.youtube.com/watch?v=A3qWP9Icez0> (link to implosion of Building 877).
- [8] Internet article: <http://www.govisland.com/html/about/about.shtml>.
- [9] Ibid + discussions with TGI staff circa 2013.
- [10] Discussions with TGI staff circa 2014.
- [11] Discussions with TGI staff circa 2012-2014.
- [12] Internet article: <https://earthmatter.org/>.
- [13] Internet article: http://en.wikipedia.org/wiki/New_York_Harbor_School.
- [14] Note that some funding circa 2013-14 is from private donors.
- [15] Discussions with TGI staff circa 2013.
- [16] Note: for projects with partial Federal and State-funding, the public notice paradigm of bidding is mandatory and carried out by TGI in contrast to that of invited bidders for City-funded, only, projects. Invited subcontractors for City-only funded projects are pre-qualified by the CM, Turner, and The Trust for Governors Island, per The Trust's charter with the City of New York and statutes that govern non-profit organizations.
- [17] TGI contract language paraphrased.

FIGURES

- 1. Extracted from Internet article: <http://commons.wikimedia.org/wiki/File:Governors-Island-map.svg>.
- 2. Extracted from Internet article: http://www.govisland.com/downloads/pdf/presentation_pdc_2013-04-22.pdf.
- 3. Extracted from 60% design drawings for PPS-I, drawings overseen by West 8, New York, and owned by The Trust for Governors Island.
- 4. Extracted from Internet article: http://www.govisland.com/downloads/pdf/presentation_pdc_2013-04-22.pdf.
- 5. Extracted from LSTV project files owned by The Trust for Governors Island.
- 6. Extracted from 60% design drawings for PPS-I, drawings overseen by West 8, New York, and owned by The Trust for Governors Island.
- 7. Extracted from Internet article: http://www.govisland.com/downloads/pdf/presentation_pdc_2013-04-22.pdf

PHOTOGRAPHS

- 1. LSTV project files.
- 2. Timothy Slauson, LSTV (project files).
- 3. LSTV project files.
- 4. Mark Ginocchio, STV.

Authors

Samuel Scozzari, Samuel Scozzari has been practicing in the Metro NYC area since 1990. He is licensed in the states of New York and Connecticut and is currently employed by STV Incorporated, New York, in their Construction Management Division, specializing in program/project management and construction delivery of multi-faceted, complex, high profile projects. In addition to his role as Chief Resident Engineer at Governors Island, his accomplishments include design certification at Ground Zero, Resident Engineer for both the rehabilitation of the RFK/Triborough Bridge and Replacement of the Third Avenue Bridge in New York City, as well as high-profile bridge and highway projects in Connecticut. He holds a bachelors degree from Rochester Institute of Technology, Rochester NY, and can be contacted at samuel.scozzari@stvinc.com, sscozzari@aol.com, and +01 860.989.7442.

