LANGAN

Memorandum

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Date: 22 May 2013

Re: Geotechnical Engineering Memorandum
Seawalls Reconstruction Program
Southpoint Open Space Park
Roosevelt Island, New York
Langan Project No. 100332701

FOREWORD

This memorandum discusses our geotechnical engineering evaluation of the proposed seawalls and shoreline reconstruction at Southpoint Open Space Park (SOSP) on Roosevelt Island, New York. The purpose of the study was to interpret subsurface conditions from historic subsurface explorations and provide geotechnical design parameters for the seawalls and shoreline construction program.

Assuming your concurrence, the geotechnical-related conclusions and recommendations of this report will be developed further, in combination with our other survey, engineering and design studies, and will form the basis of our ongoing design of the proposed seawalls and shoreline reconstruction.

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INTRODUCTION

This report presents the results of a geotechnical engineering evaluation of the proposed seawalls and shoreline reconstruction at Southpoint Open Space Park (SOSP) on Roosevelt Island. The purpose of the study was to interpret subsurface conditions from historic subsurface explorations and provide geotechnical design parameters for the construction program. The following sections include a description of the site, proposed construction, site history, subsurface investigation, subsurface conditions encountered, and an evaluation of those conditions with respect to the geotechnical-related aspects of the project.

REPORT DATUM

The elevations and dimensions given in this report are approximate and are based on the historic boring and survey plans. Unless noted otherwise, the elevations given in this report are referenced to the datum set forth in the above-referenced drawings, which refer to Belmont Island Datum.

SITE DESCRIPTION

Roosevelt Island is located along the East River between Manhattan and Queens. The island is approximately 2 miles long by 800 feet wide and has an approximately 4-miles-long shoreline. SOSP is located at the south end of the island (see Figure 1) and encompasses an area of approximately 8.5 acres and includes 1,800 feet of shoreline. As shown in Figure 1, along the shoreline there are 1,600 linear feet of stone or concrete retaining walls (seawalls), which have deteriorated over time.

The existing grades at the project waterfront vary from elevation (el) 8 to more than el 15 as per topographic surveys performed by Langan in 2007 and in 2013. The higher elevations are more noticeable along the east shore and are the result of excess fill placement consisting of soil, rock-fill, crushed rock, and demolition debris.

Off the eastern shore of the island there are remnants of timber piles, which once supported a pier. The pier formerly extended approximately 20 feet into the river and almost 200 feet along

the shoreline. The deck of the pier no longer exists, and the timber piles that had supported the deck are badly rotted and remain standing in the river.

The remnants of the Strecker Laboratory and Smallpox Hospital (a.k.a. "Renwick Ruin") buildings are situated within the project site. These buildings are City Landmarks and are to remain. Besides these buildings, there were several other buildings which were demolished and their foundations are believed to have been buried by the stockpiles of soil and/or demolition debris in the area north of the Smallpox Hospital.

The 53rd Street subway tunnel runs underground through the area between the City Landmarks and is approximately 70 feet below grade within the gneiss bedrock. The emergency exit and air vents for the subway tunnel are situated in the area between the Strecker Laboratory and the Smallpox Hospital.

Existing Seawalls

There are approximately 1,600 feet long stone or concrete retaining walls along the 1,800 feet long SOSP shoreline. Most of these walls were constructed more than 100 years ago, have deteriorated over time and are in very poor condition. The walls extend vertically from approximately el 0 and el 1 (mean low water) to el 11. In some areas due to loss of coping stone over the years, the top of walls are approximately at el 9 or lower. The backfill behind the walls were originally at el 10 to el 11 but in the 1970s through the 1990s excess fill materials were placed along the shoreline (especially the east shoreline) and created current grades several feet higher. In the southern part of each shoreline (in the vicinity of the Renwick Ruin), there is no seawall and the southernmost 100 feet long sections of each shoreline are currently protected by high and stable rip-rap slopes.

Voids, missing stone and displaced sections can be seen in different parts of the existing walls. The rip-rap protection in front of the seawalls is approximately at low water elevations. An engineering study done by Gibbs and Hill in 1981 indicates that these walls are not stable and need to be rebuilt.

On the west shore, there appear to have been several failures over the years, and the seawall consists of a succession of different masonry construction types, ranging from cut granite to large concrete blocks interspersed with eroded gaps. Over the years, the damaged sections were replaced with either concrete walls or gabion walls. Due to existing rip-rap at the base of the walls and water, it is not clear on what materials these walls bear. However, a small section of the historic wall appears to be supported on a rock outcrop.

The wall on the east shore is in somewhat in better condition and consists largely of rough-stone masonry; however, there have been localized failures on this shore also. One of the failed sections at the north end was replaced with a concrete wall. The walls are also threatened by loss of individual stones due to wave forces and by foundation erosion, all of which are ongoing in various places. The excess fill placed along the walls also overstress the walls.

Public access to the shorelines, for the purposes of recreation, is not practical until structural integrity is restored. Furthermore, loss of park area is beginning to occur as erosion penetrates beyond the wall breaches.

SITE HISTORY

A review of the old aerial photos of the island indicates that the southern end of the island was filled between the 1960s and the early 1970s. The aerial photograph taken in 1951 indicates that the southern tip of the island originally extended only approximately 50 feet south of Smallpox Hospital. The 1976 aerial photo shows that the southern end of the island had expanded to the current limit. During the 1960s and the early 1970s, when the island subway station was built, the southern end of the island was filled with excavated rock spoil from the subway tunnel. This portion of the island has since become the FDR Four Freedoms Park (FFP). Also, soil, rocky fill and demolition debris were stockpiled on the SOSP site and in particular along the eastern waterfront.

PROPOSED CONSTRUCTION

Approximately 1,800 lineal feet SOSP shoreline is currently protected by 1,600 lineal feet of stone and concrete seawalls, and 200 lineal feet of rip-rap slopes. The existing historic seawalls are in very poor conditions and need to be rebuilt or repaired.

We understand that the existing rip-rap slopes (on both shores either side of the Renwick Ruin) will be preserved as rip-rap protected slopes. The existing rip-rap slopes will need to be replenished.

The existing stone seawalls and gabion walls along the west shoreline are in poor condition and will be replaced with concrete walls. The existing stone seawalls along the east shoreline will either be replaced with concrete walls, or where allowed and practical, will be preserved in kind.. Based upon the needs of the SOSP site, it was determined that the top of wall elevations will range from el 10.5 to el 11.5 where the walls will be continuous with the existing concrete seawalls on either side of the Goldwater Hospital (future Cornell/Technion campus) site.

SUBSURFACE EXPLORATIONS

Two subsurface explorations were performed in 1993 and 2013 at the project site. These explorations included borings, test pits and environmental sampling. Environmental exploration details are not part of this memorandum and are discussed under a separate report.

2013 Subsurface Exploration

A field exploration consisting of 7 test pit excavations was conducted on 11 March 2013. The locations these test pits are shown in Fig-2 and their logs are provided in Appendix A. The test pits were excavated by Mike's Exterior Contracting Corporation using a Deere rubber track backhoe. The depth of the test pits ranges from 3.5 feet to 11.0 feet below grade. The excavation operations were performed under our full-time engineering observation. Environmental samples were taken in 3 of the test pits by our field engineer and transported to the laboratory for further analysis.

1993 Subsurface Exploration

A subsurface exploration was performed at the site in 1993 under full-time observation of Langan. The exploration consisted of drilling 22 land borings (B-1 through B-22), drilling 6 marine borings (MB-1 through MB-6) , excavating 16 geotechnical test pits (TP-1 through TP-16, and excavating 20 environmental test pits throughout SOSP and south tip of the island.

The results of the 1993 subsurface exploration was compiled and evaluated in a Langan report entitled "*Geotechnical & Seawall Conceptual Studies" (*dated 7 April 1993), which was prepared for what was then called the "South Tip" project (13-acre site) on behalf of the RIOC. The report also contains historic aerial photos, location plan, logs of borings and test pits and subsurface profiles.

Land borings B-1 through B-5 and B-22, marine borings MB-4 through MB-6 and test pits TP-1 through TP-3 were performed along the west shoreline of SOSP. Land borings B-14 through B-18, marine borings MB-1 through MB-3 and test pits TP-15 and TP-16 were performed along the east shoreline of SOSP.

The locations of relevant borings and test pits are shown in Fig-2. The logs of available and relevant land borings, marine borings and test pits are provided in Appendices B, C and D, respectively.

Land Borings

The land borings were drilled using truck-mounted drill rigs by Warren George, Inc of Jersey City, New Jersey. The depths of the borings ranged from 18 feet to 51 feet. Soil samples were taken continuously from the existing ground surface to 7 feet below grade, and at 5 feet intervals thereafter. Standard Penetration Tests (SPT) were conducted at the depths where the soil samples were taken. Typically, 8 feet of rock cores were taken for verification where bedrock was believed to have been encountered. Soil and rock samples were classified and logged in the field by our engineer, and then transported to our laboratory for further identification.

Marine Borings

The 6 marine borings were drilled by Warren George, Inc along the shorelines for the study of restoration/rebuilding of the existing pier and final design of water edge treatment. The marine borings are not discussed herein, and are discussed in detail in the above-referenced report. The logs are included in an Appendix to this report as they may be useful in proving data-points for depth to mud-line and depth to bedrock at some distance outboard of the seawalls.

Test Pits

The test pits were excavated using a CAT EL240 track-mounted backhoe by Venosa Construction of Staten Island, New York. Generally, test pits were excavated 18 feet to 20 feet below existing grade or to the top of bedrock. Representative soil/rock fill samples were taken at each test pit location. These samples were classified in the field by our engineer and transported to our laboratory for further identification.

Environmental Test Pits

A separate field investigation was also performed in 1993 and consisted of test pits excavations to evaluate the stockpiles of on-site fill. Limited environmental sampling and testing was also performed in the course of our 2013 test pit excavations. The results and implications of these environmental test pits will be discussed in a separate memorandum.

SUBSURFACE CONDITIONS

Two subsurface profiles W-W and E-E were developed based on the relevant borings and test pits. The profiles W-W and E-E depict the general conditions along the west shoreline and the east shoreline, respectively and are provided in Fig-3.

The site contains several stockpiles, which are described separately below. Subsurface explorations indicate that subsurface materials consist of a 7 feet to 30 feet thick fill layer underlain by natural soils (river mud and sand) overlying bedrock, which is encountered between el 6 and el -30 (generally dipping downward from the north towards the south).

Natural soils are absent in some areas where fill overlies directly the bedrock. A generalized description of each subsurface stratum is given below:

Fill

A layer of miscellaneous fill was encountered in all borings and test pits and its thickness and contents varied across the site. In the area north of the Smallpox Hospital, the fill typically consists of dark brown silty sand with rock fragments, shot rock, pieces of concrete, brick fragments and wood. Presence of shot rock fill created difficulties during drilling. The thickness of the fill is up to 25 feet along the perimeter of the island. The Standard Penetration Resistance (N-values) values of the fill materials varied 3 blows/ft to split-spoon refusal, indicative of heterogeneous materials. The fill materials are classified as Building Code Class 7 (uncontrolled fill).

River Mud

A layer of organic soils (former river mud) was encountered beneath the fill layer in some borings, typically drilled very close to the shore. These soft soils are described typically as black to dark gray, organic silt or organic silty sand with organic/petroleum odor. A peat layer was also encountered in boring B-4, where the organic layer was approximately 10-foot-thick. These soft soils are believed to be the old river bed (river mud) and are highly compressible and are expected to be present beneath the areas reclaimed from the river along the shore. The soft, compressible organic soils are classified as Building Code Class 6 material.

Sand

In some borings, approximately 3 feet to 5 feet thick sandy soils were encountered beneath the fill or beneath the river mud. These sandy soils are classified as Building Code Class 3 material.

Rock

Rock was encountered in most of the borings and was cored for confirmation. It was difficult to distinguish rock fill from the upper fractured rock zone in some boings. For borings along the shoreline, REC (rock core recovery) values range from 33%to 100% and RQD (Rock Quality

Designation) values range from 0% to 98%. The rock strata are classified as Building Code Class 1c and 1b materials.

The top of the rock is generally higher in the center of the island and slopes down very quickly along the perimeter of the island. Based on the borings along the shoreline (which were drilled inland), the top of rock varies approximately from el 2 to el -20 (or 10 feet to 30 feet below surface). The top of rock is expected to be deeper along the shores. It should be noted that there is no boring drilled along the proposed seawall alignment. Thus, significant variations in top rock contours should be expected.

Existing Stockpiles

As discussed earlier, excess soil and rock with crushed rock and demolition debris exist along the east waterfront, and in isolated areas along the west waterfront. This fill was placed during the demolition of the previously existing buildings over the years. In the east shore area, the fill consist of soil and rock fragments with 1 foot by 2 feet concrete slab and pieces of bricks. As the fill is stockpiled to approximately el 15 and is in close proximity to the seawall, it should be removed off-site as part of the construction program.

DISCUSSION

We researched available construction data of the seawalls that were built on the island. We have also reviewed design and construction drawings for the seawalls that were recently constructed north of the project site. In addition, we have reviewed our files for previous seawall work on the Island (FFP, Octagon Park, Lighthouse Park). We also met with the contractor, Civetta Cousin Construction Company, who has performed seawall construction work at Roosevelt Island.

Several types of walls (i.e. geogrid reinforced concrete panel, sheetpile, gabion and concrete walls) were evaluated as replacement walls. From a durability and practicality point of view, cast-in-place concrete walls appear to be generally the preferred solution where replacement walls are needed. Our evaluations indicate the following conceptual design alternatives can be used for the proposed shoreline restoration:

1. Replacement walls (concrete)

2. Adaptive preservation of stone wall (design alternate for east-side only)

3. Rip-rap slope protection (southerly limits only)

The adaptive preservation alternative listed above is subject to subject to certain regulatory conditions, as explained below, for which approval is beyond the control of RIOC and Langan. Therefore it is considered for the east shoreline stone walls as a design alternate only.

Completely demolition and rebuilding the existing stone seawalls would be labor- intensive with considerable tide-dependent and weather-dependent construction, and the construction cost could be as much as twice the cost of building a new concrete seawall. We exclude this option as being not economically feasible.

Design Alternate - Preservation of the East-Shore Stone Seawalls

Subject to regulatory approval and a significant design effort to address deterioration, breaches and protection, it might be possible to economically preserve the east-shore stone seawalls. In the course of previous repair and grant funding discussions with RIOC, Langan had previously determined that the only feasible way to achieve their preservation would be the construction of a substantial rip-rap revetment rising to within a few feet of the wall top surface and extending laterally to "*fill*" the riverbed.

Such a measure would be highly unusual and would require special approval of state and federal marine permitting agencies. Therefore, while it may be technically feasible to preserve the east-shore stone seawalls, this design alternate can only proceed if the regulatory agencies concur and also if RIOC so directs.

Environmental Issues

The historic stockpiling conditions on the east shoreline of the site may be key issues in the implementation timeframe and cost of this project. The elevations of the stockpiles are in places retaining by the rusting seawall railings where these railings exist, and in other places rise as much as 5 feet higher than the top of seawall. The proposed construction (excavation,

earthwork etc) needs to be properly coordinated with RIOC's environmental engineer and with any available environmental remediation/disposal grant funding due to the nature of this historic fill. Environmental issues pertaining to work conditions will be discussed under a separate memorandum.

Other

The SOSP seawalls are in a more exposed part of the Island and will experience the extremes of wind, wave and ice of the East River's harsh environment. The walls are furthermore vulnerable washout of fill from foundation levels and related settlement due to wave action. It should also be anticipated that a walkway, with either impervious (concrete/asphalt) or pervious (gravel) paving, will eventually run adjacent to the wall railing, and key to pavement durability will be a stable subgrade.

A critical cost issue will be dewatering, as the foundation construction zone will be at or just below the low end of the normal tide range. Permitting efforts may therefore explore temporary measures which would facilitate isolated coffer dams for economic dewatering methods.

RECOMMENDATIONS

The east and west shorelines are each approximately 900 feet in length. On both shores, approximately 100 feet long southernmost shoreline sections (either side of the Renwick Ruin) are rip-rap protected slopes without vertical seawalls. As previously agreed with RIOC, it would be more economical to preserve these short shoreline strips as rip-rap protected slopes up to the SOSP elevations with a continuous concrete curb-supported railing in lieu of walls at the top of the rip-rap revetments.

The remaining approximately 1,600 feet long existing seawalls on both shores, will require reconstruction (including possible partial preservation). The attached Figure 1 shows the zones where vertical seawall and rip-rap slope protection are appropriate.

Along the 800-feet-long east shoreline, we believe that preservation of the existing stone seawalls is feasible and beneficial as a design alternate, provided that the regulatory agencies allow placement of a high rip-rap revetment along the shore. However, the excess fill surcharging the seawalls should be removed to return the stress conditions to the original levels.

Along the 800 feet long west shoreline, the existing seawalls are in poor condition and need to be replaced. Each remediation approach is discussed separately below.

West Shoreline

Preservation of the existing highly deteriorated seawalls is not practical. Thus, these walls need to be replaced with new walls. Per our evaluation, cast-in-place (CIP) concrete walls were selected to generally replace the existing walls.

Cast-in-Place Concrete Wall

This is the simple but robust type of seawall that has been the traditional standard on the Island. The wall is wide at the base, and therefore dewatering for both the foundation preparation and formwork is the principle challenge.

The proposed concrete wall is a cast-in-place wall, which may be a gravity-type unreinforced concrete wall as shown on Fig-4. This type of concrete wall has been used in other parts of the island. The wall retains the soil behind it by its own weight. A similar alternative, which we will evaluate further in our design, is an L-shaped reinforced concrete retaining wall. Both wall types will have wide footings for stability and to reduce wash-out potential.

Properly placed rip-rap is necessary along the toe of the wall for scour protection. Granular backfill should be provided to minimize the unbalance of hydrostatic pressure. The anticipated construction procedures are as follows:

1. Excavate existing grades including on-site soil/rock stockpiles to el 11 within a width of at least 20 feet behind the existing seawall.

2. Excavate and demolish the existing stone wall as necessary for the construction of the new wall and its foundation. Provide safe slopes for the excavation sides not steeper than 1H:1V. Excavate at least 3 feet below the adjacent rip-rap slope or 1 foot below mean sea level, whichever occurs first.

3. Implement adequate subgrade improvement measures as needed. The practical and suitable improvement procedures will be determined later upon further discussion with contractors and the design team as discussed in the "*Foundation of Proposed Seawalls*" section below.

4. Construct the foundation of the proposed concrete wall over the properly improved subgrade and construct the proposed concrete wall.

5. Place the backfill materials as shown on Figure 4. Provide at least 1-ft-wide crushed stone drainage layer immediately behind the wall and place select granular fill as backfill in the remaining areas. Place the backfill materials in layers not exceeding 12 inches and compact to 95% of its maximum dry density.

6. The top of the backfill behind the wall within the influence zone (1H:1V theoretical line drawn upward from the base of the wall) should not exceed the top elevation of the wall.

7. Reshape existing rip-rap and place additional rip-rap in front of the new wall as necessary. The rip-rap should extend upwards to cover the normal tidal range,

8. Prepare subgrade for the future waterfront walkway.

East Shoreline

At this time, based upon RIOC input received to date and the uncomplicated nature of regulatory permitting, the preferred primary design method under consideration on the east-side is for a CIP concrete seawall, similar for the west shore-line.

However, if the marine permit regulatory agencies (NYS DEC and USACE) so require for historic/cultural reasons, it appears that the only worthwhile method of preserving the stone wall on the east shoreline is to construct a substantial rip-rap revetment rising to stabilize and to shield the wall. Note also that where the wall has been breached or is noticeably leaning or otherwise severely deteriorated, the stone masonry will have to be rebuilt. On a net basis, our preliminary thinking is that east-side stone wall preservation and partial re-construction could yield considerable cost savings over a gravity wall, especially if partially FEMA funded. However, as the rip-rap placement also displaces the aquatic environment of the river shore, whether regulatory marine permitting could be successfully processed is not clear. Furthermore, at the time of this study, the requested pre-application meeting with the DEC and USACE had yet to be scheduled.

It should be noted that the evaluation of the structural integrity of the existing stone walls is not part of this report, but is addressed by Langan under a separate report. Under the "*preservation*" alternate, where breached, the walls will be repaired in-kind. If preservation is not practical or not allowed, the remediation approach (construction of new concrete seawalls), as described above for the west shoreline, will be implemented for the east shoreline.

Coastal Storm Forces Analysis

It should be noted that the park walks are currently at or slightly below the mapped 100-year 'base flood' for the East River coastal storms (nor'easter or hurricanes), and a few feet below the new FEMA advisory levels which were issued following the Hurricane Sandy storm. Coastal storm analyses, intended to predict storm loading on the walls, posts and railings such that these elements are designed to prevent damage by waves, are being performed by Langan under a separate report.

Rip-Rap Revetment

This alternative involves re-shaping the rip-rap protection along the water edge as shown in Fig-1 and Fig-5. The anticipated construction procedures are as follows:

1. Excavate existing grade including on-site soil/rock stockpiles to elevations consistent

with surface drainage of the existing SOSP asphalt pathway.

2. Reshape existing rip-rap to a slope of minimum 1.6 horizontal to 1.0 vertical incline, removing any concrete debris/chunks, and place additional rip-rap as necessary.

3. Construct a continuous reinforced concrete beam (flush-curb) along the alignment of the future promenade and extending to meet the FFP walls.

Foundations of Proposed Seawalls

Based on the borings and test pits performed on the landside of the shoreline, the site is underlain by uncontrolled fill materials and river mud overlying bedrock. However, the actual conditions, and variations on conditions, directly beneath the existing seawall locations are not fully determinate due to the restrictions imposed by the existence of the stone walls themselves. It is not clear what material the existing seawalls are supported on, but it is expected that these walls could have been supported on fill materials (soil fill or rock fill) placed over either river mud or rock. In some areas, some wall sections could have been supported directly on rock as evidenced by visual observation of a section of the east shoreline wall.

Anticipated Bearing Materials

The proposed seawalls are expected to bear either on the existing fill materials (soil fill or rock fill) or on the existing stone wall footings supported on existing fill materials. River mud or rock might be present beneath the fill materials.

The existing fill materials and soft river mud, in their present conditions, are not considered suitable for foundation bearing as per the NYC Building Code. However, NYC Building Code allows foundations of light buildings bear on uncontrolled fill free of deleterious materials (wood, garbage, metals etc) provided that extensive explorations (test pits at each column and 1 boring for each 2,500 sq-ft footprint) are performed. NYC Building Code does also allow foundations to bearing on uncontrolled fill, which are artificially treated (compacted, cemented or pre-consolidated). It should be noted that the NYC Building Code does not specifically address the requirements or restrictions for seawalls or other types of retaining structures.

We understand that the proposed construction will not raise the existing surface elevations, which have been in place at least since 1980s. Additionally, the excess fill placed along the shorelines, will be removed and the grades will be brought down to approximately el 11. Therefore, the proposed construction (proposed seawalls or repair) would not have significant effect on the river mud, if present, since the effective stresses would not be increased. The additional rip-rap revetment to be placed on the river side could cause settlement but would not affect the performance of the rip-rap revetment. Therefore, the only concern remaining is the miscellaneous nature of the uncontrolled fill, which contains demolition debris, shot rock and voids associated with nesting.

The excess fill materials were placed along the shore at least 20 to 30 years ago and the existing seawalls were constructed even earlier than that. The proposed seawalls would not be tall (greater than 12 ft in height), would apply less than 1 tsf pressure on subgrade and would not be heavier than the existing seawalls. Considering the age of the existing seawalls, the historic fill and re-grading of the surface, we believe that the subgrade for the proposed seawalls can be surficially improved to reduce the risk for settlement and washouts and to allow construction of the proposed seawalls.

Subgrade Improvement for Proposed Wall Foundations

Adequate and practical subgrade improvement measures should be to reduce risk of settlements and to prevent migration of fines and washouts. Subgrades consisting of bedrock do not require any improvement and proposed concrete seawalls can be supported directly on bedrock.

The improvement measures for soil/fill and rock fill subgrades would depend on the nature of the actual subgrade material (soil, fill or rock fill) and the actual detailing of the walls. These measures could include filling voids with low slump concrete, placement of sealer concrete, construction of cut-off walls, placement of crushed stone layer wrapped in geogrids and geofabric, lowering the foundations, etc. The actual cost-effective and practical improvement methods would be determined and detailed upon further discussion with the experienced contractors and the design team.

Lateral Pressures

Earth retaining seawalls exposed to wave action are proposed along the shorelines. We considered various types of walls and have generally recommended that traditional concrete seawalls be constructed. Adequate drainage should be provided to drain any surface water perching behind the walls.

Therefore, all walls should be backfilled with compacted free-draining granular soils. Drainage layers, weepholes and select granular backfill should be provided for walls retaining soils. All backfill placements behind the walls should comply with the "*Backfilling and Compaction*" section requirements outlined below.

The walls will be partially below tidal level and therefore should be designed to resist lateral earth pressures, unbalanced water pressures, seismic loads, surcharge loads, including those from the future promenade. The design lateral earth pressures can be calculated using the parameters in the following table:

Parameters	Value
unit weight of water	62.4 pcf
unit weight of backfill	120 pcf
internal friction angle of the backfill	30 degrees
active earth pressure coefficient active equivalent fluid unit weight	0.33 40 pcf
at-rest earth pressure coefficient at-rest equivalent fluid unit weight	0.50 60 pcf
passive earth pressure coefficient passive equivalent fluid unit weight	3.0 360 pcf (apply a safety a safety factor of 2 for passive resistance)
base friction coefficient	0.35 for concrete soil/fill 0.50 for concrete on rock or rock fill

Hardscape Promenade and Landscape Areas

The proposed ferry landing pad area will consist of hardscape promenade and landscaping area, which are underlain by thick fill materials containing shot rock fill overlying thin natural soils over rock. The proposed landing pad will require significant cuts of the existing soils to reach design

grades and this would result reduction of the existing overburden pressure. The hardscape promenade and landscape areas at and adjacent to the landing pad will be subject to minimal traffic consisting of maintenance and very occasional emergency or event vehicles. Therefore, there will be very little vehicle live load in this area.

Subgrade Preparation for Slabs and Pavements

The proposed design elevations will require excavations of the materials covering the site. The proposed surficial materials (slabs, pavements, tiles etc) will be within the existing fill materials and can be supported on the existing on-site soils provided that the subgrades are properly improved and prepared as described herein.

Large pieces such as shot rock fill and construction rubbles at the subgrade level should be removed during design excavations. Subgrades should be proofrolled using a heavy roller after completion of the design excavations. Proofrolling should be performed in accordance with "*Proofrolling*" section below prior to placement of the bedding materials. Upon completion of proofrolling, a geotextile or geogrid layer should be installed over the proofrolled surface prior to placement of bedding materials. A minimum 9-inch thick layer of ¾-inch clean crushed stone should be placed over the properly improved subgrade to serve as a bedding and capillary break layer under the proposed surface cover materials (slabs, pavement or tiles).

Landscape

For landscape areas, topsoil may need to be imported. The on-site fill consist significant rock pieces and debris, and can be used as drainage layer underneath the top soil layer. A bedding layer consisting of 9-inch thick, ¾ inch crushed stone and a layer of biaxial geogrid should be installed over the on-site soils to reduce migration of the surface soils into the voids within the existing fill with large pieces. Geogrids such as Tensar Biaxial SS or Tensar TriAx or equivalent can be considered.

Utilities (if any)

The subgrade for proposed utilities bearing on soil and fill materials should be improved by surface compaction using a vibratory compactor having a static weight not less than 0.5 tons. Surface compaction should be performed after excavation of the utility trenches. Appropriate bedding materials should be placed over the subgrades of utilities and pavement.

At a minimum, a 6-inch-thick crushed stone bedding layer should be placed immediately below the utility pipes. Specific requirements of the individual utility companies should also be addressed. Requirements for fill and compaction are discussed in the "Backfilling and Compaction" section below.

Proofrolling

Proofrolling of the soil subgrades, where required, should be performed after completion of the design cuts, removal of the existing foundations, slabs and pavements. Proofrolling can be achieved by a minimum of 6 overlapping passes of a heavy vibratory drum compactor having a static drum weight of at least 5 tons. Any areas exhibiting evidence of poor subgrade, such as rutting or weaving beneath the compactor, or contain deleterious materials, should be removed to competent material and replaced with compacted structural fill. Requirements for compacted fill and its placement should be in accordance with the "Backfilling and Compaction" section below. Proofrolling should not be performed near the existing below-grade structures (e.g. below-grade walls, utilities, utility tunnel etc).

Backfilling and Compaction

Structural fill should be used in areas to receive slabs and pavements, and above the utilities. Non-structural fill can be used in landscape areas. Fill material and placement and compaction details are discussed below.

Fill Materials

All fill materials (structural or non-structural) to be used within the site should be free of organic, frozen, hazardous items and other deleterious materials. All structural fill materials should

consist of clean, well-graded granular soils having no more than 15% by weight passing the No. 200 sieve and a maximum particle size no greater than 4 inches. Non-structural fill should have no pieces larger than the lift thickness or 9 inches, whichever is smaller. Non-deleterious and non-hazardous on-site materials can be re-used if they meet the above criteria.

Reuse of Existing On-site Fill

The proposed excavations will also generate some amount of excavated materials. Most of the on-site fill and existing stockpiles consist of sandy soils, rock fill, rock fragments, crushed stone and construction debris, which are non-deleterious and compactable, although not ideal for compaction. Clean granular site soils such as rock fragments and sandy soils can also be used as backfill for grading or behind the retaining walls.

Some of the excavated materials are expected to meet the material criteria for structural fill given above. However, some on-site soils are expected to have a higher percentage of fine soil particles and/or larger pieces and will not meet the gradation criteria outlined above for structural fill. In that case, the fines content criteria for structural fill can be increased up to 30% and the maximum particle size can be increased to 8 inches. It should be noted that an increase in the amount of fine soil particles will result in increased sensitivity to moisture and weather and will require more intensive and controlled compaction efforts.

On-site soils can be reused as structural fill if appropriate measures are taken to maintain the gradation within reasonable limits. These measures include, but not limited to, screening, removal of large pieces and deleterious materials, aeration, covering or mixing with granular soils. Segregated on-site rock and soil fill may be reused for backfilling behind seawalls.

Based upon casual site inspection, it appears reasonable that surplus excavated soils could be spread out to raise grades modestly in adjacent areas. However, care should be taken that no additional surcharge is imposed on the field-stone seawalls, which are in poor condition.

Crushed stone can be used as a drainage layer behind the seawall. Rock and soil fill can be selectively used for backfilling different areas of the seawall after large pieces of construction

rubble have been removed. For the wall design discussed in the next section, some imported granular material fill may be required to supplement the on-site segregated reusable material.

Compaction

All fill should be placed in loose lifts not exceeding 12 inches in thickness and each lift should be compacted to a minimum of 95% of its maximum dry density as determined by the Modified Proctor Test in accordance with ASTM D1557. The compaction criteria can be reduced to 90% of its maximum dry density as determined by ASTM D1557 for non-structural fill placed in landscape areas.

The water content of the fill should be maintained within a few percentages of the optimum water content to achieve the desired compaction. Compaction of all fills should be verified by means of field density tests. If its use is allowed, crushed and screened recycled concrete fill should be compacted with a minimum 6 passes of a 1-ton static weight vibratory roller until firm and unyielding.

Seismicity

The bearing strata underlying the proposed walls consist of fill materials over thin natural soils underlain by rock. The recommended seismic design parameters (seismic site class, mapped spectral accelerations and site coefficients) are provided below in accordance with the Building Code.

Seismic Parameters	**Value at short period**	**Value at 1-second period**
Mapped Spectral Response Acceleration *(in terms of gravitational acceleration, g)*	S_s= 0.365g	S_1= 0.071g
Seismic Site Class	Class D (stiff soil)	
Seismic Site Coefficients	F_a= 1.51	F_v=2.4

Liquefaction Potential

Subsurface materials below the foundations consist of materials that are not susceptible to liquefaction. Thus, liquefaction potential is not a concern and does not need to be taken into account in the design.

CONSTRUCTION DOCUMENTS AND QUALITY ASSURANCE

Technical specifications and design drawings should incorporate Langan's recommendations. When authorized, Langan will assist the design team in preparing specification sections related to geotechnical issues such as earthwork, ground improvement, foundations (shallow or deep), backfill and excavation support. Langan should also, when authorized, review construction shop drawings and submittals prepared by the contractor relating to materials and construction procedures for geotechnical work.

A professional engineer must verify that the soils, rock and groundwater conditions encountered at the site during construction are consistent with those described in this report since all recommendations presented are dependent on this consistency. Failure to verify these conditions could cause the recommendations provided to no longer be valid.

Langan has explored and interpreted the site subsurface conditions and developed the foundation design recommendations contained herein, and is, therefore, best suited to perform quality assurance observation and testing of geotechnical-related work during construction. This work requiring quality assurance confirmation includes, but is not limited to, earthwork, backfill, ground improvement, foundations, and excavation support. Recognizing that construction is essentially the completion of design, Langan's quality assurance observation and testing during construction is necessary to maintain our continuity of responsibility on this project.

RIOC AND CONTRACTOR OBLIGATIONS

The Contractor is responsible for construction quality control, which includes satisfactorily constructing the foundation system and any associated temporary works to achieve the design

intent while not adversely impacting or causing loss of support to neighboring structures. Construction activities that can alter the existing ground conditions such as excavation, fill placement, foundation construction, ground improvement, pile driving/drilling, dewatering, etc. can also potentially induce stresses, vibrations, and movements in nearby structures and utilities, and disturb occupants of nearby structures. Contractors working at the site must ensure that their activities will not adversely affect the performance of the structures and utilities, and will not disturb occupants of nearby structures. Contractors must also take all necessary measures to protect the existing structures during construction.

The preparation and use of this report is based on the condition that the project construction contract between RIOC and their Contractor(s) will include: 1) Langan being added to the Project Wrap and/or Contractor's General Liability insurance as an additional insured, and 2) language specifically stating the Foundation Contractor will defend, indemnify, and hold harmless RIOC and Langan against all claims related to disturbance or damage to adjacent structures or properties.

LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from a limited number of borings and test pits. Recommendations provided are dependent upon one another and no recommendation should be followed independent of the others.

Any proposed changes in structures or their locations should be brought to Langan's attention as soon as possible so that we can determine whether such changes affect our recommendations. Information on subsurface strata and groundwater levels shown on the logs represent conditions encountered only at the locations indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to Langan's attention for evaluation, as they may affect our recommendations.

Environmental issues (such as potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate study by qualified professionals.

This report has been prepared to assist RIOC and Langan in the design process and is only applicable to the design of the specific project identified. The information in this report cannot be utilized or depended on by engineers or contractors who are involved in evaluations or designs of facilities (including underpinning, grouting, stabilization, etc.) on adjacent properties which are beyond the limits of that which is the specific subject of this report.

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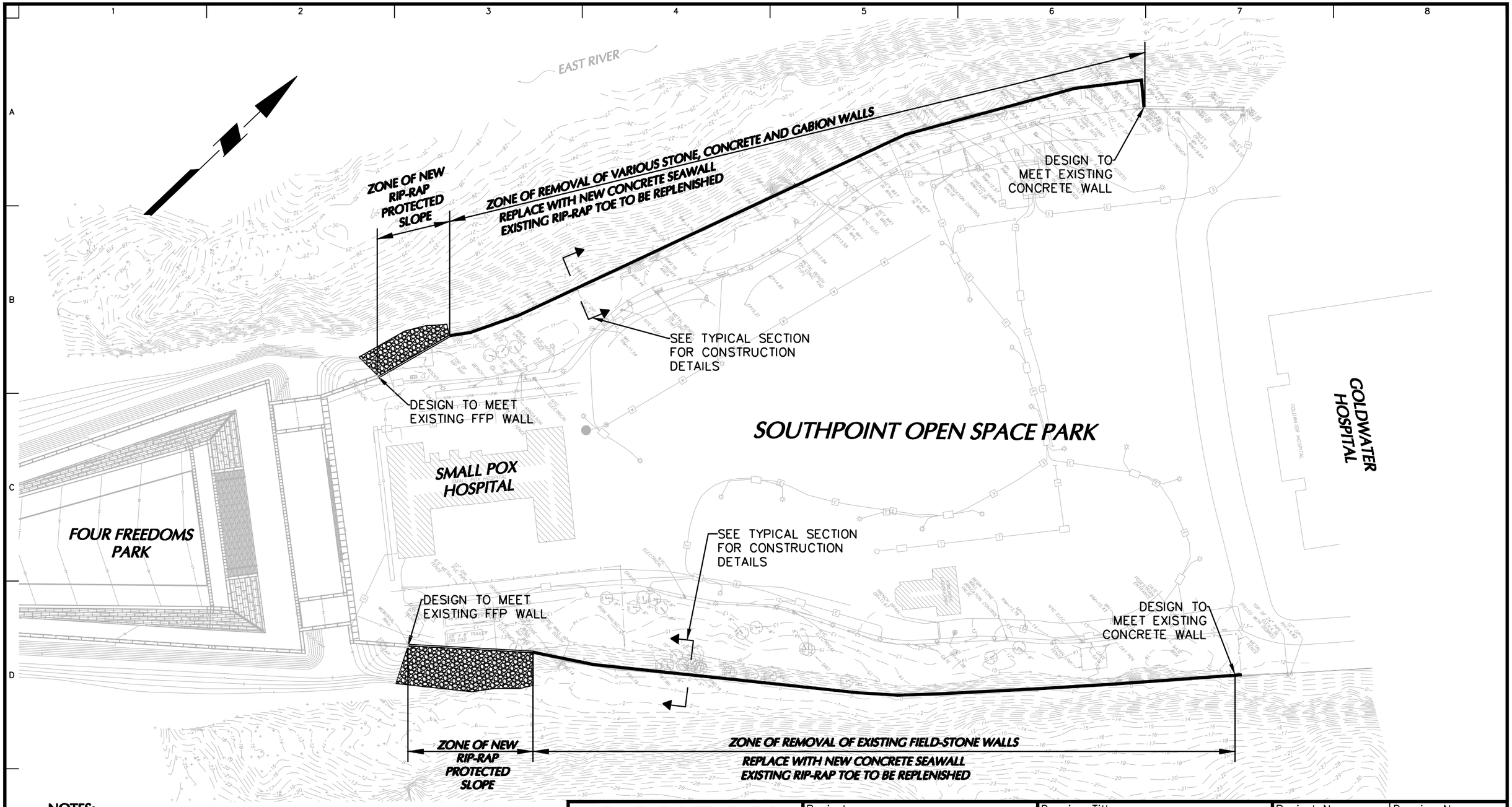
FIGURES



NOTES:

1. **DESIGN ALTERNATE: STONE WALL PRESERVATION WITH PARTIAL RECONSTRUCTION ON THE EAST SIDE ONLY**
2. **WORK TO ALSO INCLUDE A STABLE SUB-GRADE FOR ADJACENT FUTURE PROMENADE**

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Langan International LLC
Collectively known as Langan
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
SEAWALLS RECONSTRUCTION
SOUTHPOINT OPEN SPACE PARK
ROOSEVELT ISLAND NEW YORK

Drawing Title
PLAN OF RECONSTRUCTION PROGRAM

Project No. 100332701	Drawing No. FIG-1
Date 05/22/2013	
Scale 1" = 90'	
Drawn By JCO	
Submission Date	

Filename: \\langan.com\data\EP\data7\100332701\Cadd Data - 100332701\SheetFiles\100332701 - Fig 1.dwg Date: 5/22/2013 Time: 15:23 User: josorio Style Table: Langan.stb Layout: FIG-1

NOTES

1. BASE PLAN AND ELEVATIONS TAKEN FROM A TOPOGRAPHIC SURVEY DATED APRIL 2007, PREPARED BY LANGAN ENGINEERING.
2. ALL TEST PITS WERE PERFORMED UNDER FULL-TIME OBSERVATION OF LANGAN MARCH11, 2013.
3. ALL ELEVATIONS SHOWN ARE REFERENCED TO ROOSEVELT ISLAND DATUM, WHICH IS 2.265 FEET BELOW US COAST AND GEODETIC SURVEY DATUM (MSL) SANDY HOOK, N.J.

LEGEND

- TP-1 — APPROXIMATE 1993 TEST PIT LOCATION
- LTP-1 — APPROXIMATE 2013 TEST PIT LOCATION
- APPROXIMATE 1993 BORING LOCATION

EAST RIVER

SMALL POX HOSPITAL

FOUR FREEDOMS PARK

GOLDWATER HOSPITAL

SOUTHPOINT OPEN SPACE PARK

W — W'

E — E'

80 0 20 50 80

SCALE IN FEET

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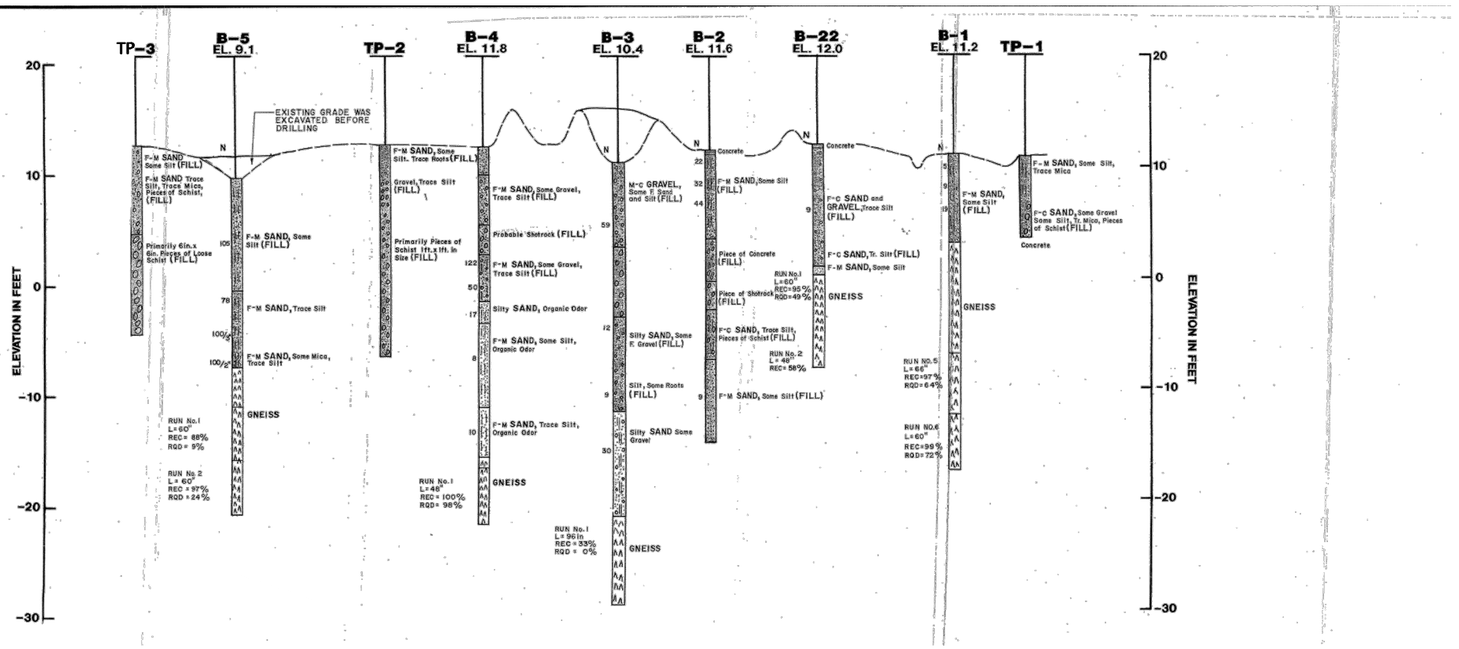
Project
SEAWALLS RECONSTRUCTION
SOUTHPOINT OPEN SPACE PARK
ROOSEVELT ISLAND NEW YORK

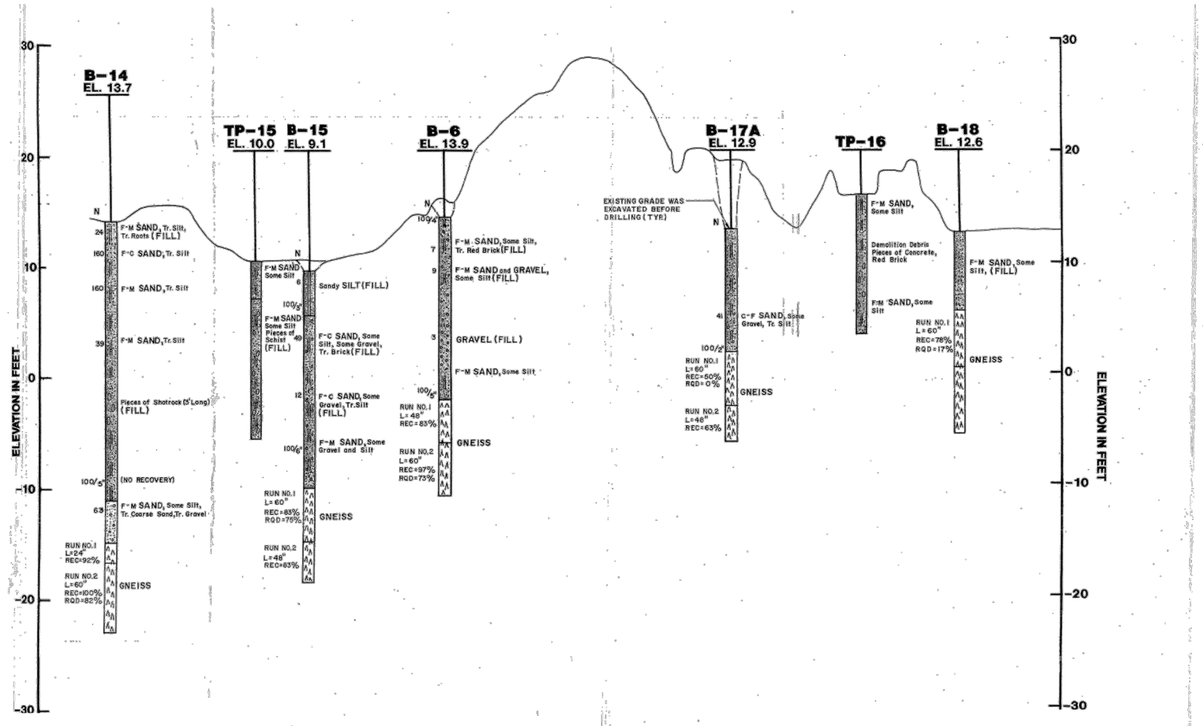
Drawing Title
BORING AND TEST PIT LOCATION PLAN

Project No. 100332701	Drawing No. FIG-2
Date 05/22/2013	
Scale 1" = 80'	
Drawn By JCO	
Submission Date	

Filename: \\langan.com\data\EP\data7\100332701\Cadd Data - 100332701\SheetFiles\Geotechnical\100332701 - Fig 2 (Geotech Report).dwg Date: 5/22/2013 Time: 15:27 User: josorio Style Table: Langan.stb Layout: FIG-2G



SECTION W-W' (FACING WEST)
SCALE: 1"= 50' HORIZ.
1"= 5' VERT.



SECTION E-E' (FACING WEST)
SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

NOTES:

1. THIS DRAWING SHOWS SUBSURFACE CONDITIONS AT SELECTED BORING AND TEST PIT LOCATIONS ONLY. SOME VARIATION FROM THESE CONDITIONS CAN BE EXPECTED BETWEEN BORINGS AND TEST PITS.
2. BORING AND TEST PIT LOCATIONS ARE SHOWN IN FIGURE **2**
3. ALL ELEVATIONS ARE BASED ON THE BELMONT ISLAND DATUM.
4. FOR DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS, SEE BORING AND TEST PIT LOGS.

LEGEND

B-1	**BORING IDENTIFICATION NUMBER**
TP-1	**TEST PIT IDENTIFICATION NUMBER**
N	**STANDARD PENETRATION RESISTANCE N-VALUE (BLOWS/.FT.)**
EL. 18.0	**GROUND SURFACE ELEVATION AT TIME OF INVESTIGATION**
	FILL
	SAND
	SILT
	GNEISS

Date	Description	No.
REVISIONS		

SIGNATURE DATE SIGNED

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Project
CONCRETE SEAWALL & RIP-RAP PROTECTION
SOUTHPOINT OPEN SPACE PARK
ROOSEVELT ISLAND **NEW YORK**

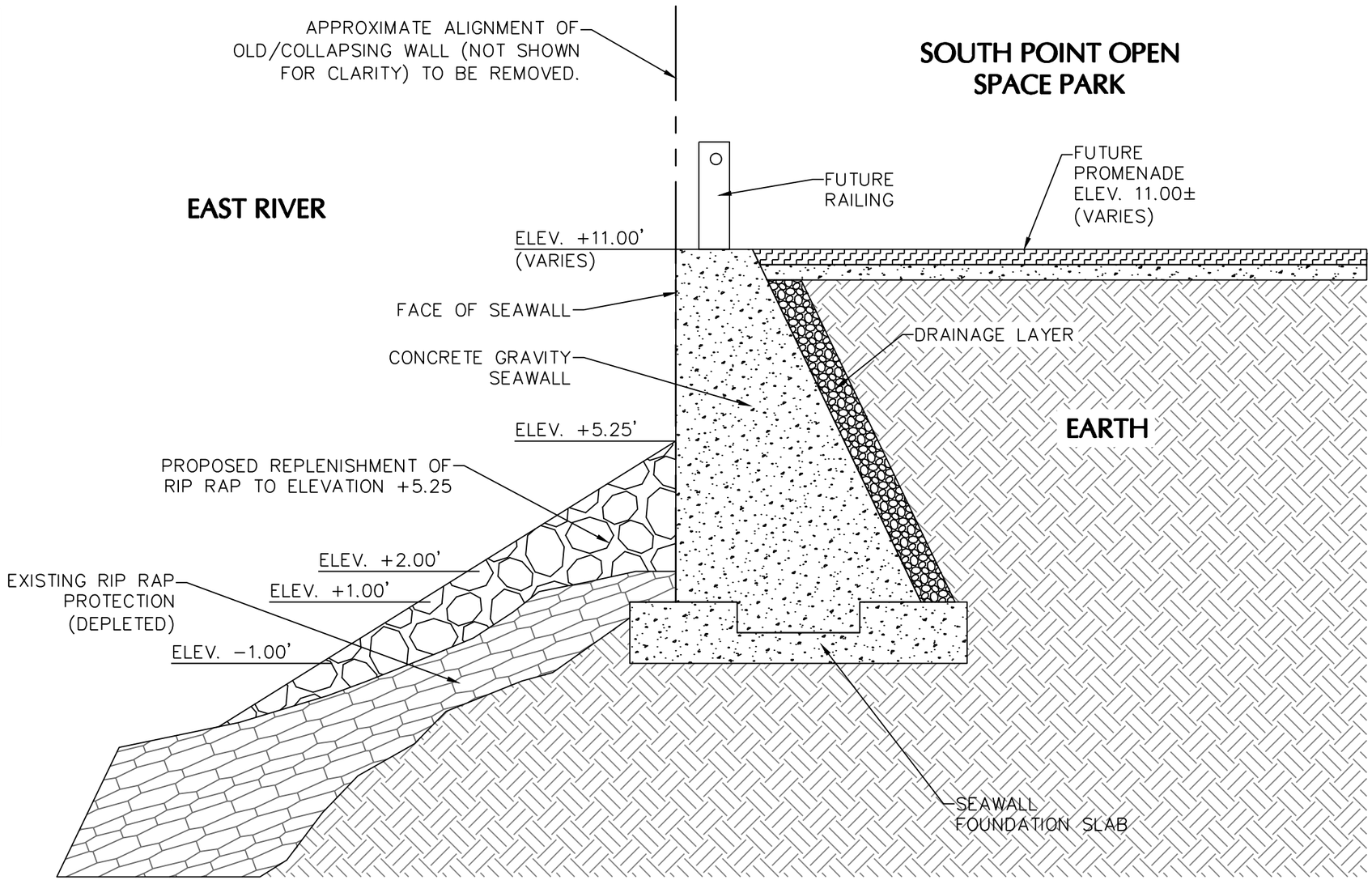
Drawing Title
SUBSURFACE PROFILE W-W' AND E-E'

Project No.	**100332701**
Date	**05/22/2013**
Scale	**AS SHOWN/REDUCED**
Drawn By	**SC**
Submission Date	

Drawing No. **FIG-3**

Filename: \\langan.com\data\EP\data7\100332701\Cadd Data - 100332701\Sheet Files\Geotechnical\100332701 - Fig 3 (Geotech Report).dwg Date: 5/22/2013 Time: 15:13 User: psorro Style Table: Langan.stb Layout: FIG-3D

TIDAL DATUM LEGEND	
M.H.W.S. (SPRING)	+6.00±
M.H.H.W.	+5.50±
M.H.W.	+5.25±
MEAN TIDE LEVEL	+3.00±
M.L.W.	+0.75±
M.L.L.W..	+0.50±
M.L.W.S. (SPRING)	+0.00±



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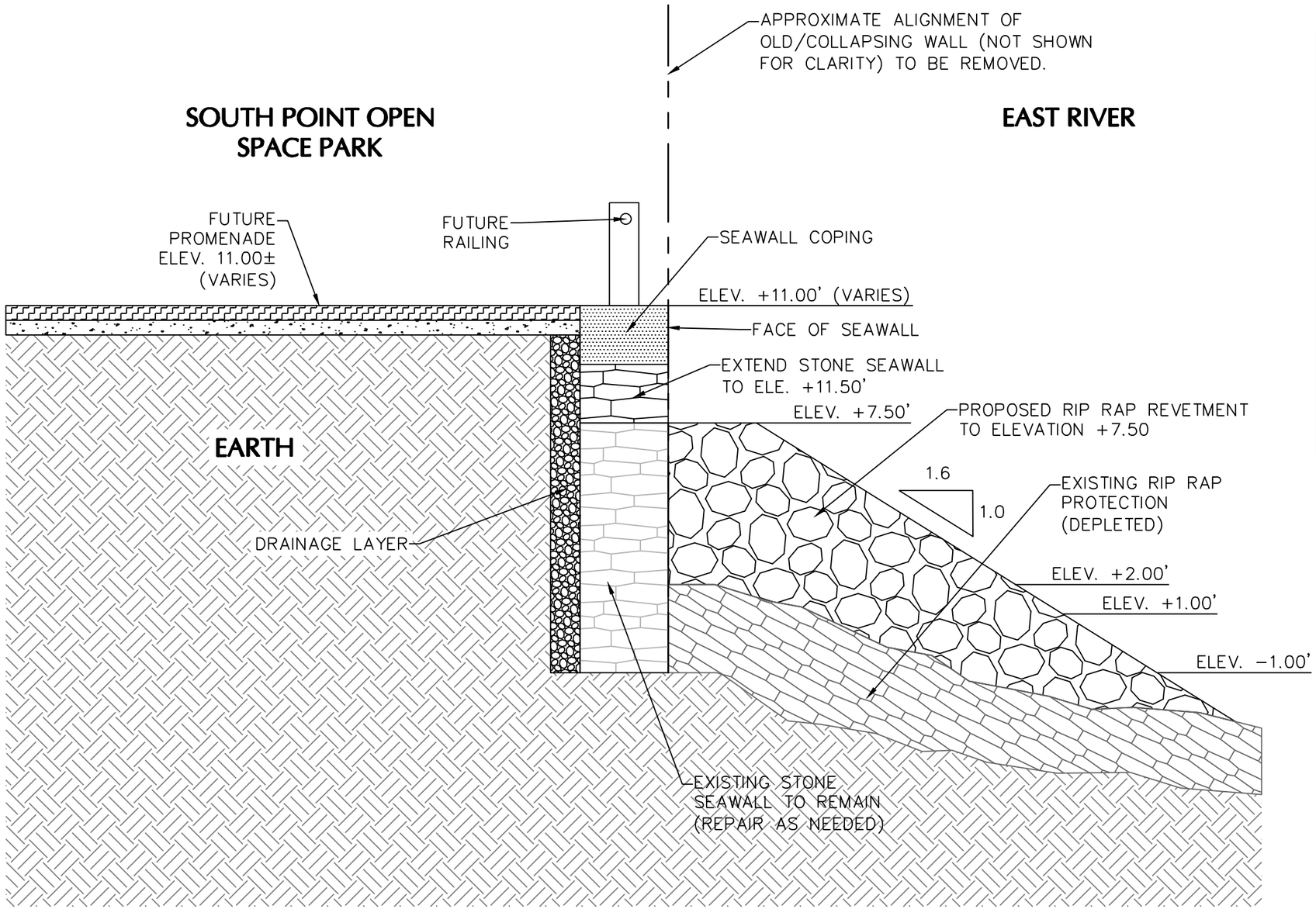
NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project
SEAWALLS RECONSTRUCTION
SOUTHPOINT OPEN SPACE PARK
ROOSEVELT ISLAND **NEW YORK**

Drawing Title
TYPICAL CONCRETE SEAWALL SECTION

Project No.	Drawing No.
100332701	FIG-4
Date: 05/22/2013	
Scale: 1" = 4'	
Drawn By: JCO	
Submission Date	

Filename: \\langan.com\data\EP\data7\100332701\Cadd Data - 100332701\SheetFiles\Geotechnical\100332701 - Fig 4 (Geotech Report).dwg Date: 5/23/2013 Time: 10:47 User: agardner Style Table: Langan.stb Layout: FIG-4G



TIDAL DATUM LEGEND	
M.H.W.S. (SPRING)	+6.00±
M.H.H.W.	+5.50±
M.H.W.	+5.25±
MEAN TIDE LEVEL	+3.00±
M.L.W.	+0.75±
M.L.L.W..	+0.50±
M.L.W.S. (SPRING)	+0.00±

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Project
SEAWALLS RECONSTRUCTION
SOUTHPOINT OPEN SPACE PARK
ROOSEVELT ISLAND **NEW YORK**

Drawing Title
DESIGN ALTERNATE TYPICAL STONE SEAWALL PRESERVATION SECTION

Project No. 100332701	Drawing No. FIG-5
Date 05/22/2013	
Scale 1" = 4'.	
Drawn By JCO	
Submission Date	

Filename: \\langan.com\data\EP\data7\100332701\Cadd Data - 100332701\SheetFiles\Geotechnical\100332701 - Fig 5 (Geotech Report).dwg Date: 5/23/2013 Time: 10:42 User: agardner Style Table: Langan.stb Layout: FIG-5G

APPENDIX A

Logs of 2013 Test Pits

Langan
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LOG OF TEST PIT LTP#1 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ± 11
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±1
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA ±2

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, some red brick, some concrete debri, some gravel [Fill]	1–8			
	Brown m-c SAND, trace clay	8–10			
	END OF TEST PITS	10			
		11–16			

Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP #2 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±12
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±1
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA Not Encountered

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, some red brick, [Fill] trace gravel	1–5			
	Concrete Slab	5–6			
	Brown m-f SAND, some concrete debri some red brick [Fill]	6–9			Strong Foul Odor
	Brown m-f SAND	9–11			
		11–16			

Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP#3 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±12
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±6
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA Not Encountered

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, Some concrete debri some gravel [Fill]	1			
	8" concrete slab	2			
	Reddish brown m-f SAND, some red brick, some gravel [Fill]	3 4 5			
	Brown m-f SAND trace gravel [Fill]	6 7			
	Black m-f SAND [Fill]	8			
	Brown m-f SAND trace gravel [Fill]	9 10			
		11 12 13 14 15 16			

Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP#4 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±5
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ± 1.5
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, trace silt ▽	1 2 3			
	End of Test Pit	4 5 6 7 8 9 10 11 12 13 14 15 16			

Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP#5 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±12
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±2
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA ±1.2

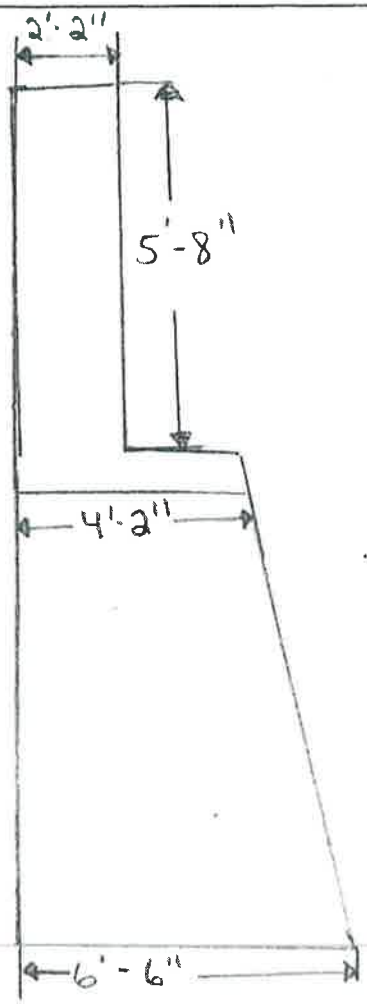
ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, trace brown clay brick [Fill]	1			
	Brown m-f SAND, trace red brick and gravel [Fill]	2 3 4 5 6 7 8 9			
	End of Test Pit	10 11 12 13 14 15 16			

Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP#6 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±12
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±11
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND, trace clay and red brick [Fill]	1			
	Brown m-f SAND some gravel, trace clay brick [Fill]	2 3 4 5			
	Brown m-f SAND, trace gravel [Fill]	6 7 8 9 10 11			
		12 13 14 15 16			



Langan
Engineering and Environmental Services Inc.

LOG OF TEST PIT LTP#7 SHEET 1 OF 1

PROJECT Southpoint Park	PROJECT NO. 100332701
LOCATION Roosevelt Island	ELEVATION AND DATUM ±11
EXCAVATION CONTRACTOR Mikes Exterior Cont. Corp.	DATE 3-11-2013 / COMPLETION DEPTH ±1
EXCAVATION EQUIPMENT Deer Backhoe	OBSERVED WATER LEVEL DATA

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLE NO LOC	SAMPLE TYPE	REMARKS
	Brown m-f SAND trace gravel	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16			

APPENDIX B

Logs of 1993 Land Borings

Langan
Engineering and Environmental Services, Inc.

LOG OF BORING B1 SHEET 1 OF 2

PROJECT: SOUTHERN TIP	PROJECT NO.: 1142701
LOCATION: ROOSEVELT ISLAND	ELEVATION AND DATUM: EL 11 - BELMONT ISLAND
DRILLING AGENCY: WARREN GEORGE	DATE STARTED: 1-27-93 / DATE FINISHED: 1-27-93
DRILLING EQUIPMENT: CME-55 RIG	COMPLETION DEPTH: 28 FT. 6 INCHES / ROCK DEPTH: 8 FT.
SIZE AND TYPE OF BIT: 6 INCH / 3 3/4 INCH / 2 15/16 TRICONE ROLLER	NO. SAMPLES: DIST. 4 / UNDIST. / CORE 6
CASING: 4 INCH DIAMETER / 3 INCH DIAMETER STEEL	WATER LEVEL: FIRST 7.4 FT / COMPL. — / 24 HR.
CASING HAMMER / WEIGHT / DROP	FOREMAN: DAN AND JOHN IMPARATO - DRILLERS
SAMPLER: 2 INCH OUTSIDE DIAMETER SPLIT SPOON	INSPECTOR: RON BOYER
SAMPLER HAMMER / WEIGHT: 140 lb. / DROP: 30 INCHES	

MATERIAL SYMBOL	NYC GEOL. CODE CLASS	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	grey-brown F-M SAND some silt [FILL]		1	S1	SS	8 INCHES	1 3 2 3	• DRIVE SS FROM 0-2 FT.
		grey-brown F-M SAND some silt, trace mica, trace red brick [FILL]		2 3	S2	SS	8 INCHES	3 2 7 8	• DRIVE SS FROM 2-4 FT.
FILL	11-65	grey-brown F-M SAND some silt, trace mica, trace red brick [FILL]		4 5	S3	SS	7 INCHES	17 10 9 23	• DRIVE SS FROM 4-6 FT.
		grey-brown F-M SAND some silt, trace roots [FILL]		6	S4		3 INCHES	40 13 100	• 100 BLOWS PER INCH AFTER 7 FT. STARTED BOUNCING
		WATER ENCOUNTERED ▽ 7.4		7					• FILLED TUB WITH WATER
		ROCK ENCOUNTERED - APPARENTLY AN EXTREMELY LARGE PIECE		8 9 10					• DRILLING FROM 0-3 FT. WITH 6 INCH TRICONE ROLLER BIT - DRILLING IS SMOOTH • DRILLING FROM 3 FT. TO 6 FT. DIFFICULT • DRILLING 4 INCH DIAMETER CASING FROM 0-3 FT. • DRILLING WITH 3 3/4 INCH DIAMETER BIT FROM 8 FT. TO 11 FT. • STRAINED WASHWATER FROM 8 FT. TO 9 FT. SHOWS FRAGMENTS OF ROCK
	3-65	ROCK IS GNEISS WITH TRACE MICA		11	RUN NO. 1	NX ROCK CORE	REC. = 25 INCHES	RQD = 96%	• ROCK CORE FROM 11 FT. TO 13 FT. 1 INCH RECOVERY 25 INCHES (STOPPED TO REPLACE DEFECTIVE BIT - IT DID NOT GET RUINED ON THIS JOB)
		ROCK IS NOW BELIEVED TO BE BEDROCK		12 13					
				14	RUN NO. 2	NX ROCK CORE			• ROCK CORES ARE ALL 2 INCH INSIDE DIAMETER

Langan Engineering

JOB NO. 1142701

DATE 1-27-93

LOG OF BORING NO. B1

SHEET 2 OF 2

	DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
3-6.5'	GNEISS WITH TRACE MICA	15	RUN NO. 2	NX ROCK CORE	REC. = 40 INCHES	RQD = 90%	• ROCK CORE FROM 13 FT. 1 INCH TO 16 FT. 4 INCHES
		16					
	ROCK QUALITY BEGINS TO DETERIORATE	17	RUN NO. 3	NX ROCK CORE	13.5 INCHES	RQD = 0	• ROCK CORE FROM 16 FT. 4 INCHES TO 17 FT. 6 INCHES
			RUN NO. 4	NX	4.5	0 INCHES	← STOP AT 12:15 TO 1:00 (LUNCH)
		18					• DRILLING 4 INCH DIAMETER CASING FROM 8 FT TO APPROXIMATELY 8 FT. 3 INCHES BECOMING EXTREMELY DIFFICULT. 4 INCH DIAMETER CASING IS REMOVED AND 3 INCH CASING IS USED IN ITS STEAD. 3 INCH CASING IS DRILLED FROM 0-10 FT.
	APPARENT DISCONTINUITY IN ROCK	19					
3-6.5'	GNEISS	20	RUN NO. 5	NX ROCK CORE	REC. = 64 INCHES	RQD = 64%	• DRILLING WITH $2^{15}/_{16}$ TRICONE ROLLER BIT UNTIL 18 FT. TO CLEAR HOLE.
		21					• DRILLING ROCK CORE FROM 18 FT.
		22					• DRILLING WAS EASY FROM 19 FT. TO 19 FT. 6 INCHES. IT APPEARS AS THOUGH WE HAVE EXITED ONE ROCK AND ENTERED ANOTHER.
		23					• DRILLING FROM 22 FT. TO 23 FT. GOES RELATIVELY QUICKLY (1 FT/10 MINUTES)
		24	RUN NO. 6	NX ROCK CORE	REC. = 59 INCHES	RQD = 72%	• SOME ROCK CORE WAS STICKING OUT OF BARREL. DRILLING WENT FOR MORE THAN 5 FT. RUN.
		25					
		26					• FOR RUN NO. 6, DRILLING RATE IS 1 FT./8 MINUTES.
		27					
		28					
	COMPLETION DEPTH = 28 FT. 6 INCHES	29					
		30					
		31					

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LOG OF BORING B2 **SHEET** 1 **OF** 2

PROJECT: SOUTHERN TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM: EL 11 - BELMONT ISLAND	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 1-28-93	DATE FINISHED: 1-29-93
DRILLING EQUIPMENT: CME-55 RIG		COMPLETION DEPTH: 26 FT. 5 INCHES	ROCK DEPTH: WAS NOT REACHED
SIZE AND TYPE OF BIT: 2 15/16" TRICONE ROLLER		NO. SAMPLES: DIST. 7	UNDIST. – CORE 1
CASING: 3 INCH DIAMETER STEEL		WATER LEVEL: FIRST –	COMPL. – 24 HR.
CASING HAMMER: WEIGHT: DROP:		FOREMAN: JOHN AND DAN IMPARATO	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT: 140 lbs. DROP: 30 INCHES			

MATERIAL SYMBOL	NYC BUILDING CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		gray F-M SAND [FILL]						43	TIME START: 7:40 A.M.
		CONCRETE						14	
FILL	11-65	light brown F-M SAND [FILL]		1	S1	SS	10"	8	
				2				8	
								6	• SS FROM 0-2 FT.
				3	S2	SS	12"	4	• SS FROM 2-4 FT.
								28	
				4				26	
								38	
				5	S3	SS	6"	20	• SS FROM 4-6 FT.
								24	
				6				27	
FILL	11-65	brown F-M SAND Some silt [FILL]				SS	NONE	33	• SS FROM 6-7 FT. NO RECOVERY → DECIDED TO SS FROM 7-9 FT.
				7				28	
		brown F-M SAND Some silt, trace red brick [FILL]			S4	SS	3"	40	• SS FROM 7 FT - 7 FT. 11" - REFUSAL.
								100/5"	• WASH WATER TUB FILLED WITH WATER ONLY
		PROBABLE PIECE OF CONCRETE		8					• DRILLING WITH 2 15/16" TRICONE ROLLER BIT TO MAKE PILOT HOLE TO 9.5 FT.
				9					• DRILLING 3 INCH DIAMETER CASING TO 5 FT
FILL	11-65								• DRILLING WITH 2 15/16" TRICONE ROLLER BIT TO CLEAN HOLE TO 9.5 FT.
		PIECE OF CONCRETE		10					• DRILLING 3 INCH CASING TO 8.5 FT.
									• DRILLING WITH 2 15/16" TRICONE ROLLER TO 10 FT. – STAINED WASHWATER CONTAINS SMALL AMOUNTS OF ROCK FRAGMENTS
				11					• DRILLING 3 INCH CASING TO 9.5 FT.
				12	RUN NO. 1	NX ROCK CORE	36"	RQD = 14 %	• ROCK CORING FROM 10-15 FT. WITH 2 INCH INNER DIAMETER
									• WASHWATER WAS LOST AT 12 FT. – SUSPECTED END OF PIECE OF CONCRETE DRILLING EASIER FROM 13.5-15 FT.
F/LL	11-65	MICA SCHIST		13					• DRILLING 3 INCH CASING FROM 9.5 FT. TO 14 FT.
				14					

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JOB NO. 1142701

DATE 1-28-93

LOG OF BORING NO. B2

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BUILDING CODE	DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLG in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	gray - brown F-C SAND trace silt, pieces of schist, pieces of red brick [FILL]		15	S5	SS	3"	65 100/1"	• CLEANED OUT TO 15 FT. WITH 2 15/16" TRICONE ROLLER • SS FROM 15 FT. - 15 FT. 7 INCHES • DRILLING 3 INCH CASING TO 15 FT. 7 INCHES • DRILLING WITH 2 15/16" TRICONE ROLLER FROM 15 FT. 7" TO 17 FT. DRILLING BECOMES NOTICEABLY SLOWER AT 16.5 FT. • DRILLING 3 INCH CASING TO 17 FT. • DRILLING 2 15/16" TRICONE TO 19 FT. • DRILLING 3 INCH CASING TO 19 FT. • DRILLING WITH 2 15/16" TRICONE TO 20 FT. • AT 19 FT. DRILLING BECOMES EXTREMELY EASY (2 FT/MIN)
				16					
				17					
				18					
				19					
				20					
FILL	11-65	gray-brown F-M SAND some silt [FILL]		21	S6	SS	15"	8 6 3 2	• SS FROM 20 - 22 FT.
				22					
				23					• DRILLING WITH 2 15/16" TRICONE TO 25 FT.
				24					
				25					
		brown F-M SAND trace silt, small pieces of micaceous schist [FILL]		26	S7	SS		90 76 100/5"	• SS FROM 25 FT. TO 26 FT. 5" • DRILLING 3 INCH CASING TO 25 FT. TIME FINISH (FOR DAY): 2:40 P.M. 7:35 A.M (1-29-93): RESUME WORK 9:00 A.M: 3 INCH CASING AND ROD BROKEN FROM APPROXIMATELY 20-25 FT. A 5 FT. SECTION OF CASING AND ROD WAS LOST IN HOLE. 9:30 A.M: USABLE CASING REMOVED FROM HOLE. 10:00 A.M.: FINISH
		COMPLETION DEPTH = 26 FT. 5 INCHES (NO BEDROCK REACHED)		27					
				28					
				29					
				30					
				31					

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LOG OF BORING B-3 SHEET 1 OF 3

PROJECT	Roosevelt. Island	PROJECT NO.	11427
LOCATION	Roosevelt Island, NY	ELEVATION AND DATUM	10.4
DRILLING AGENCY	Warren George	DATE STARTED 2/11/93	DATE FINISHED 2/15/93
DRILLING EQUIPMENT	Diedrich D-50	COMPLETION DEPTH 40	ROCK DEPTH 32
SIZE AND TYPE OF BIT	3" Roller bit	NO. SAMPLES DIST. 5	UNDIST. – CORE 8 FT
CASING	3" steat Pipe Casing	WATER LEVEL FIRST –	COMPL. – 24 HR. –
CASING HAMMER	WEIGHT 300 DROP 24	FOREMAN	Armondo
SAMPLER	2" OD SS sampler, NX core Barrel	INSPECTOR	Jason Yang
SAMPLER HAMMER	WEIGHT 140 DROP 30		

SYMBOL	NYC BLDG CODE CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
								Drilling started @ 800 2/11/93
								drill casing to 5 ft.
								Drilling Hard
FILL	11-65	M-C GRAVEL, sm f. sand and silt. rock fragment. [FILL]	5	S-1	SS	2"	30 30 29 49	sample @ 5 ft
			6					drill cassing to 7½ ft encountered obstruction Start to core to 10ft
			7					
	11-65	Boulder.	8					Nx core thru.
			9					
			10				100/1"	sample @ 10 FT.
	11-65	Boulder.	11	S-2	SS	0"		refusal. Core to 14 ft.
			12					Nx Core thru.
			13	S-3	1	1	1	
			14	S-4	SS	2	26 9	

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JOB NO. 11427
DATE

LOG OF BORING NO. B-3

SHEET 2 OF 3

SYMBOL	HVE (BLOWS/6" CORE CLIMB)	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	Black silty SAND. sm f. gravel.	15	S-4	SS	6"	3 3	drill casing to 20 FT
			16					drilling smooth
			17					↓
			18					
			19					
		Black SILT. sm roots [FILL]	20					Sample @ 20FT
			21	S-5	SS	10"	2 4 5 6	
			22					drill casing to 23 FT encountered obstruction
			23					drill ⊔ 3" bit.
			24					drilling hard
SAND	8-65	Dr. Brn. silty SAND sm. gravel.	25					↓
			26	S-6	SS	8"	9 14 16 22	Sample @ 25 ft
			27					drilling ⊔ 3" bit
			28					drilling smooth
			29					↓
			30					
ROCK	4-65	Decomposed MICA-SHIST	31	S-7	SS	3"	19 24 10/4"	refusal @ 31'-6".
		GNEISS	32					core.

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JOB NO. 11427

DATE

LOG OF BORING NO. B-3

SHEET 3 OF 3

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
ROCK	B-65 GNEISS	33 34 35 36 37 38 39 40	Run No. 1	Nx Core	Rec. = 32 in	RQD = 0	
	Boring completed @ D=40'						

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LOG OF BORING B4 SHEET 1 OF 3

PROJECT: SOUTH TIP	PROJECT NO.: 1142701
LOCATION: ROOSEVELT ISLAND	ELEVATION AND DATUM: EL 12 - BELMONT ISLAND
DRILLING AGENCY: WARREN GEORGE	DATE STARTED: 2-11-93 / DATE FINISHED: 2-12-93
DRILLING EQUIPMENT: CME-55	COMPLETION DEPTH: 34 FT. / ROCK DEPTH: 28 FT.
SIZE AND TYPE OF BIT: 3 3/4" TRICONE ROLLER	NO. SAMPLES: DIST. 7 / UNDIST. – / CORE 2
CASING: 4" DIAMETER STEEL	WATER LEVEL: FIRST – / COMPL. – / 24 HR. –
CASING HAMMER: WEIGHT 300 lbs. / DROP 24"	FOREMAN: JOHN IMPARATO
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR: RON BOYER
SAMPLER HAMMER: WEIGHT 140 lbs. / DROP 30"	

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES: NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
									TIME START: 7:55 A.M.
									• DRILLING 3 3/4" TRICONE FROM 0-5 FT
		PROBABLE PIECE OF SHOTROCK		1					BIT RATTLING FROM 1-5 FT. BUT ACCOMPANIED BY GRIND FROM 1-2 FT.
FILL	11-65			2					
				3					
				4					
		Gray-brown F-M SAND, some gravel, trace red brick, trace cinders, trace silt, rock fragments [FILL]		5				7	8:12 • SS FROM 5-7 FT.
					S1	SS	7"	3	
				6				4	
								5	
		PROBABLE PIECE OF SHOTROCK		7					• DRILLING 3 3/4" TRICONE FROM 7-10 FT. SMOOTH BUT SLOW DRILLING.
FILL				8					
									• BROKE THROUGH POSSIBLE SHOTROCK AT 8.5 FT. (AT 8:49)
		PROBABLE PIECE OF SHOTROCK		9					• BIT IS RATTLING AT 9 FT.
		Gray-brown F-M SAND, some gravel, trace red brick, trace cinders, trace silt, rock fragments [FILL]		10				26	• SS FROM 10-12 FT.
	11-65				S2	SS	4"	70	
				11				52	
								27	
FILL		Gray-brown F-M SAND, some gravel, trace red brick, trace cinders, trace silt, rock fragments [FILL]		12				50	9:18 • SS FROM 12-14 FT. DRILLING 4" CASING FROM 0-8 FT.
								33	
				13	S3	SS	14"	17	• DRILLING 4" CASING TO 14 FT.
								8	
				14					• SS FROM 14-16 FT.
					SA	SS		5	

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JOB NO. 1142701
DATE 2-11-93

LOG OF BORING NO. B4

SHEET 2 OF 3

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOG.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	7-65	Dark gray silty SAND, organic odor	10 38	15	S4	SS	18"	6 11	
	7-65	Dark gray F-M SAND, some silt, organic odor	14 28 11	16 17 18 19	S5	SS	4"	18	• HAMMER 4" CASING TO 19 FT. • DRILLING 3¾" TRICONE TO 20 FT. - SMOOTH AND EASY DRILLING • WASHWATER GRAY
	7-65	Dark gray F-M SAND, some silt, organic odor		20 21 22	S6	SS	21"	2 4 4 2	• SS FROM 20-22 FT. • DRILLING 3¾" TRICONE TO 25 FT. USING DRILL MUD.
		PROBABLE PEAT LAYER		23 24					- MUD TURNS LIGHTER AND MORE BROWN - FIBROUS PEAT WASHES UP. - MUD TURNS LIGHT GRAY
	7-65	Gray F-M SAND, trace silt, organic odor		25 26 27	S7	SS	20"	5 3 7 20	11:55 • DRILLING 3¾" TRICONE FROM 27-29 FT. AT 28 FT. BIT STARTS RATTLING. • ROCK CORING FROM 29 FT.
	3-65	GNEISS		28 29 30 31	RUN 1 RUN NO. 2 NX ROCK CORE 48"	NX 12"		RQD = 98%	• CORE BLOCKS UP AT 30 FT. PUMP BROKE STOP FOR DAY - 2:00 P.M. CORING RATE - 7 MIN/FT. • RESUME 8:15 2-12-93

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JOB NO. 1142701

LOG OF BORING NO. B4

DATE 2-12-93

SHEET 3 OF 3

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65			32	RUN NO. 2	NX ROCK CORE	48"	RQD=98%	• CORING RATE IS 9 MIN/FT.
		COMPLETION DEPTH = 34 FT.		33					
				34					
				35					
				36					
				37					
				38					
				39					
				40					
				41					
				42					
				43					
				44					
				45					
				46					
				47					
				48					
				49					

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LOG OF BORING B5 SHEET 1 OF 2

PROJECT: SOUTH TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM: EL-11 BELMONT ISLAND	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 2-10-93	DATE FINISHED: 2-11-93
DRILLING EQUIPMENT: MOBILE-BG1		COMPLETION DEPTH: 30.5 FT.	ROCK DEPTH: 17 FT. 2"
SIZE AND TYPE OF BIT: 4.5", 3¾" TRICONE ROLLER		NO. SAMPLES: DIST. 4 UNDIST. —	CORE 2
CASING: 4" DIAMETER STEEL		WATER LEVEL: FIRST —	COMPL — 24 HR. —
CASING HAMMER: WEIGHT 300 lbs.	DROP 24"	FOREMAN: ERNIE THOMAS	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT 140 lbs.	DROP 30"		

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
									TIME START: 1:22
									• DRILLING 4½" TRICONE TO 5 FT. BIT RATTLING, WASHWATER IS BROWN - AT 1.5 FT → LOUD GRINDING, RIG BOUNCING UNTIL 2 FT.
		PROBABLE PIECE OF SHOTROCK		2					BIT RATTLES FROM 2-5 FT.
				3					PROBABLE SHOT ROCK BETWEEN 3 AND 4 FT. - HIGH CASING BLOWS
			87	4					
			14	5					• SS FROM 5-7 FT.
FILL	11-65	Brown F-M SAND, some silt, rock fragments [FILL]	52	6	S1	SS	4"	28 87 18 30	← PROBABLE PIECE OF SHOTROCK IN CONE
			51	7					• 4" CASING PUSHED TO 3 FT.
			48	8					• 4" CASING HAMMERED TO 4 FT.
			27	9					• DRILLING 3¾" TO 9 FT. BIT IS RATTLING
									• 4" CASING HAMMERED TO 9 FT.
				10					• STOP FOR DAY: 2:50 P.M. - RESUME 7:45 2-11-93
		Brown F-M SAND, trace silt, rock fragments			S2	SS	6"	82 38 40 22	• 4" CASING IS NOT PLUMB - REMOVED
				11					• REDRILLING TO 9 FT. WITH 3¾" TRICONE
	7-65			12					• DRILLING 4" CASING TO 9 FT. UNTIL 10:20 A.M.
		Brown F-M SAND, trace silt, trace gravel, rock fragments			S3	SS	8"	52 100/3"	• DRILLING 3¾" TO 10 FT.
				13					• SS FROM 10-12 FT.
									• SS FROM 12-14 FT.
				14					• DRILLING 3¾" FROM 12'9" TO 16 FT. (UNTIL 11:34) ROCK FRAGMENTS IN WASHWATER

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JOB NO. 1142701
DATE 2-11-93

LOG OF BORING NO. B5

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		PROBABLE PIECE OF SHOTROCK		15					PROBABLE SHOTROCK ENDS AT 15.5 FT.
	7-65	Brown F-M SAND, some mica, trace silt (decomposed rock)		16					• SS FROM 16-18 FT.
					S1	SS	2"	15 45 100/2"	
		GNEISS -WEATHERED		17					• DRILLING 3¾" TRICONE TO 21 FT.
				18					• WASHWATER IS BROWN
				19					• BIT IS RATTLING SLIGHTLY
	3-65			20					
				21					12:10 START ROCK CORING FROM 21 FT. TO 25.5 FT.
				22					
				23	RUN NO.1	NX ROCK CORE	REC.= 53"	RQD = 9.3%	RATE OF CORING = 5 MIN./FT.
		GNEISS		24					
				25					← CORE GOT JAMMED UP AFTER 4.5 FT. 12:50
	3-65			26					
				27					RATE OF CORING = 6 MIN/FT.
				28	RUN NO.2	NX ROCK CORE	REC.= 58"	RQD = 24.2%	
				29					
				30					
		COMPLETION DEPTH = 30.5 FT.		31					TIME STOP: 1:20 P.M.

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LOG OF BORING B9 **SHEET** 1 **OF** 2

PROJECT: SOUTH TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM: EL- 16 BELMONT ISLAND	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 2-12-93	DATE FINISHED: 2-15-93
DRILLING EQUIPMENT: MOBILE BG-1		COMPLETION DEPTH: 18 FT.	ROCK DEPTH: 6 FT. 11"
SIZE AND TYPE OF BIT: 4½", 3¾" TRICONE ROLLER		NO. SAMPLES: DIST. 1	UNDIST. — CORE 2
CASING: 4", 3" DIAMETER STEEL		WATER LEVEL: FIRST —	COMPL — 24 HR. —
CASING HAMMER: WEIGHT: DROP:		FOREMAN: ERNIE THOMAS	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT: 140 lbs. DROP: 30"			

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		CONCRETE ROAD 6" THICK							TIME START: 8:00 A.M.
	7-65	Brown F-M SAND, Some silt		1 2 3 4 5 6 7				37 34 34 100/5"	• DRILLING 4.5" TRICONE ROLLER TO 5 FT. • WASHWATER IS BROWN FROM 6" TO 5 FT. 8:27 • SS FROM 5-7 FT. • DRILLING 4" CASING TO 4.5 FT. • DRILLING 3¾ TRICONE TO CLEAN OUT HOLE TO 8 FT. (9:15) • AT 10:00, WATER PUMP BREAKS • STOP WORKING 12:00 • RESUME 8:15 2-15-93 • DRILLING 3" CASING TO 8 FT.
	3-65	GNEISS		8 9 10 11 12 13 14	RUN NO. 1	NX ROCK CORE	56"	RQD = 70%	8:44 - ROCK CORING FROM 8-13 FT. - NO PROGRESS WITH OLD BITS. 9:44: ROCK CORING FROM 8-13 FT. WITH NEW BIT 10:54 CORING RATE = 12 MIN/FT

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JOB NO. 1142701
DATE 2-15-93

LOG OF BORING NO. B9

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65			15	RUN NO. 2	NX ROCK CORE	59"	RQD = 98%	RATE OF CORING = 13 MIN/FT.
		COMPLETION DEPTH = 18 FT.		16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					12:00 : TIME STOP

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LOG OF BORING B14 SHEET 1 OF 3

PROJECT	SOUTH TIP	PROJECT NO.	114270 1
LOCATION	ROOSEVELT ISLAND	ELEVATION AND DATUM	EL 12 - BELMONT ISLAND
DRILLING AGENCY	WARREN GEORGE	DATE STARTED 2-1-93	DATE FINISHED 2-3-93
DRILLING EQUIPMENT	MOBILE - BG 1	COMPLETION DEPTH 37 FT.	ROCK DEPTH 29 FT.
SIZE AND TYPE OF BIT	6", 3 3/4", 2 15/16" TRICONE ROLLER BIT	NO. SAMPLES DIST. 5	UNDIST. — CORE 3
CASING	4", 3" DIAMETER STEEL	WATER LEVEL FIRST —	COMPL. — 24 HR. —
CASING HAMMER	WEIGHT 300 lbs. DROP 24"	FOREMAN	ERNIE THOMAS
SAMPLER	2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR	RON BOYER
SAMPLER HAMMER	WEIGHT 140 lbs. DROP 30"		

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING B LOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/FT.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	Brown F-M SAND trace silt, trace coarse sand, trace mica, trace roots [FILL]		1	S1	SS	6"	7 12 12 13	• SS FROM 0-2 FT.
		Brown F-C SAND, trace silt [FILL]		2	S2	SS	4"	17 31 79 100/2"	• SS FROM 2-3 FT. 8"
FILL	11-65	PROBABLE PIECE OF SHOTROCK		3 4					• DRILL 6" TRICONE ROLLER TO 5 FT.
		Gray-brown F-M SAND trace silt		5 6	S3	SS	12"	14 76 84 93	• SS FROM 5-7 FT.
FILL	11-65			7 8 9					• DRILL 3 3/4" TRICONE ROLLER TO 9 FT. • DRILL 4" CASING TO 10 FT. • DRILL 3 3/4" TRICONE TO 10 FT.
		Gray-brown F-M SAND trace silt		10 11	S4	SS	2"	12 17 22 36	• SS FROM 10-12 FT.
				12 13 14					• DRILLING 4" CASING TO 15 FT.

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JOB NO. 1142701
DATE 2-1-93

LOG OF BORING NO. B 14

SHEET 2 OF 3

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV./FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				15					• DRILL 3¾" TRICONE ROLLER TO 15 FT.
	11-65	SHOT ROCK		16	RUN NO. 1	NX ROCK CORE	18"	RQD = 21.1%	• ROCK CORE FROM 15-20 FT. RATE = 1 FT/9 MINUTES
				17					
				18					CORE BROKE THROUGH AT 18 FT.
				19					
				20					• DRILLING 3¾" TRICONE FROM 15 - 19 FT.
				21					
				22				41	• DRILLING 3" CASING TO 19.5 FT. STOP FOR DAY AT 2:35 P.M. RESUME 7:50 A.M. 2-3-93
				23		SS	NONE	100/5"	• DRILLING 3" CASING FROM 19.5-20 FT. (3 MINUTES) FROM 20-21 FT. (5 SECONDS) • SS FROM 22-22 FT. 11"
				24					
	7-65	Golden brown F-M SAND, some silt, trace coarse Sand, trace gravel		25				24	• DRILLING 3" CASING TO 25 FT.
				26	SS	SS	8"	33	• DRILL 2 15/16" TO 25 FT.
								30	• SS FROM 25 - 26 FT. 8"
								100/2"	
				27					• DRILL 3" CASING TO 29 FT. REFUSAL AT 29 FT.
				28					• DRILL 2 15/16" TO 30 FT.
				29					
	3-65	WEATHERED GNEISS		30	RUN NO. 2	NX ROCK CORE	22"	RQD = 20.8%	• ROCK CORE FROM 30-32 FT. (CORE GOT JAMMED UP.) RATE OF CORE IS 1 FT/5 MINUTES
				31					

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JOB NO. 1142701
DATE 2-3-93

LOG OF BORING NO. B14

SHEET 3 OF 3

MATERIAL SYMBOL GRAPHIC LOG	NYS CODE	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65	GNEISS	32	RUN NO. 3	NX ROCK CORE	60"	RQD = 81.6%	• ROCK CORE FROM 32-37 FT.
		COMPLETION DEPTH = 37 FT.	37					
			38					
			39					
			40					
			41					
			42					
			43					
			44					
			45					
			46					
			47					
			48					

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LOG OF BORING B15 **SHEET** 1 **OF** 2

PROJECT: SOUTH TIP	PROJECT NO.: 1142701
LOCATION: ROOSEVELT ISLAND	ELEVATION AND DATUM: EL 12 - BELMONT ISLAND
DRILLING AGENCY: WARREN GEORGE	DATE STARTED: 2-1-93 / DATE FINISHED: 2-3-93
DRILLING EQUIPMENT: CME - 55	COMPLETION DEPTH: 28 FT. / ROCK DEPTH: 20 FT.
SIZE AND TYPE OF BIT: 6", TRICONE ROLLER	NO. SAMPLES: DIST. 5, UNDIST., CORE 2
CASING: 4" DIAMETER STEEL	WATER LEVEL: FIRST —, COMPL —, 24 HR.
CASING HAMMER: WEIGHT 300 lbs. DROP 24"	FOREMAN: JOHN IMPARATO
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR: JASON YANG
SAMPLER HAMMER: WEIGHT 140 lbs. DROP 30"	

MATERIAL SYMBOL	NYC BUILDING CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES: NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	Dark brown sandy SILT [FILL]		1	S1	SS	3"	4 3 3 3	• TIME START 2:15 P.M. • SS FROM 0-2 FT.
		Dark brown sandy SILT [FILL]		2				34 100/3"	• START 7:45 2-3-93 8:00 - 9:00 ENCOUNTERED OBSTRUCTION
				3	S2	SS	4"		• DRILL WITH 6" BIT TO 3.5 FT.
			32	4		NX CORE			
FILL	11-65	Dark brown F-C SAND some silt, some gravel, trace brick [FILL]		5					• LOSE WASHWATER
			33	6	S3	SS	6"	15 22 27 27	• DRILL CASING TO 3 FT.
			24	7					
			83	8					• DRIVE CASING TO 8 FT.
			44	9					
			40	10					
FILL	11-65	Dark gray F-C SAND some gravel, trace silt [FILL]	18	11	S4	SS	4"	13 10 2 3	• DRIVE CASING TO 14 FT.
			22	12					
			37	13					• WASHWATER BECOMES BROWN
	7-65		53	14					

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JOB NO. 1142701
DATE 2-3-93

LOG OF BORING NO. B 15

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./DIC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	7-65	Brown F-M SAND, some gravel and silt		15	SS	SS	6"	50/6"	· REFUSAL AT 15.5 FT.
				16					
				17					
				18					· WASH BECOMES LIGHT BROWN
				19					
				20					· ENCOUNTERED OBSTRUCTION
	3-65	GNEISS		21	RUN NO. 1	NX ROCK CORE	50"	RQD = 75%	
				22					
				23					
				24					
				25					
				26	RUN NO. 2	NX ROCK CORE	40"		
				27					
		COMPLETION DEPTH = 28 FT.		28					TIME STOP: 13:30
				29					
				30					
				31					
				32					

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LOG OF BORING B16 **SHEET** 1 **OF** 2

PROJECT: SOUTHERN TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM: EL 13 - BELMONT ISLAND	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 2-1-93	DATE FINISHED: 2-1-93
DRILLING EQUIPMENT: CME-55		COMPLETION DEPTH: 25 FT.	ROCK DEPTH: 16 FT. 5"
SIZE AND TYPE OF BIT: 3 3/4" TRICONE ROLLER, 2 15/16" TRICONE ROLLER		NO. SAMPLES: DIST. 6	UNDIST. - CORE 2
CASING: 4", 3" DIAMETER STEEL		WATER LEVEL: FIRST —	COMPL — 24 HR.
CASING HAMMER: WEIGHT 300 lbs.	DROP 24"	FOREMAN: JOHN IMPARATO	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT 140 lbs.	DROP 30"		

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL		Gray-brown F-M SAND, some silt		1	S1	SS	1"	100/4"	• TIME START: 7:45 A.M.
FILL	11-65	PROBABLE SHOT ROCK OR PIECE OF CONCRETE							• SS FROM 0 - 4"
									• DRILLING 3 3/4" TRICONE ROLLER TO 2 FT.
		Brown F-M SAND, some silt, trace red brick [FILL]		2				2	• AT 1.5 FT. DRILLING BECOMES NOTICEABLY EASIER
					S2	SS	5"	2	
				3				5	• SS FROM 2-4 FT.
								3	
FILL	11-65	Brown F-M SAND and Gravel, some silt [FILL]	11	4				5	• SS FROM 4-6 FT.
					S3	SS	2"	4	
			16	5				5	
								16	
		Brown F-M SAND and Gravel, some silt [FILL]	30	6	S4	SS	1"	20	• SS FROM 6-7 FT.
								24	
			26	7					• DRILLING TO 4 FT. WITH 6" TRICONE ROLLER
				8					• DRILLING 4" CASING TO 4 FT.
			23						• HAMMERING 4" CASING TO 9 FT.
				9					• DRILLING 3 3/4" TRICONE TO 10 FT.
			11						
FILL	11-65	Gray gravel [FILL]		10					• HAMMERING 4" CASING TO 14 FT
			12					6	
				11	S5	SS	2"	1	
			23					2	
				12				4	
			31						
				13					
			44						
				14					

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JOB NO. 1142701
DATE 2-1-93

LOG OF BORING NO. B16

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	7-65	Brown F-M SAND some silt		15				12	• SS FROM 15-16 FT. 5"
				16	S6	SS	5"	15 100/5"	• DRILLING 3¾" TRICONE TO 17 FT.
		GNEISS		17					• DRILLING 3" CASING TO 17 FT.
				18	RUN NO. 1	NX ROCK CORE	31"	RQD = 86%	• CLEANING OUT WITH 2 15/16" ROLLER.
				19					• ROCK CORE FROM 17 FT. TO 20 FT.
				20					• STRAINED WASHWATER SHOWS NOTHING (TOO FINE) RATE IS 1 FT/4 MINUTES
	3-65			21	RUN NO. 2	NX ROCK CORE	59"	RQD = 88%	• ROCK CORE FROM 20-25 FT. RATE IS 1 FT/5 MINUTES.
				22					
				23					
				24					
				25					
		COMPLETION DEPTH = 25 FT		26					TIME FINISH: 12:15
				27					
				28					
				29					
				30					
				31					

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LOG OF BORING B17 **SHEET** 1 **OF** 2

PROJECT: SOUTHERN TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM: EL - 12 BELMONT ISLAND	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 1-29-93	DATE FINISHED: 2-1-93
DRILLING EQUIPMENT: MOBILE B61		COMPLETION DEPTH: 22 FT.	ROCK DEPTH: 12 FT.
SIZE AND TYPE OF BIT: 5", 3 3/4", 2 15/16" TRICONE ROLLER BIT		NO. SAMPLES: DIST. 4	UNDIST. — CORE 2
CASING: 4" AND 3" DIAMETER		WATER LEVEL: FIRST —	COMPL — 24 HR.
CASING HAMMER: WEIGHT: DROP:		FOREMAN: ERNIE THOMAS, GUS JURI	
SAMPLER: 2 INCH DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT: 140 lbs.	DROP: 30 INCHES		

MATERIAL SYMBOL	NYC BUILDING CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST. BLG/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-65	brown F-M SAND some silt, pieces of rock, trace red brick [FILL]		1	S1	SS	12"	2 2 28 10	TIME START: 11:30 A.M. • SS FROM 0-2 FT.
		brown F-M SAND, some silt, trace red brick [FILL]		2 3 4	S2	SS	12"	11 52 25 24	• SS FROM 2-4 FT.
		brown and yellow F-M SAND, some silt, trace mica, pieces of schist [FILL]		5	S3	SS	11"	39 46 42 58	• SS FROM 4-6 FT.
		brown F-M SAND some silt, trace mica		6	S4	SS	4"	100/5"	• SS FROM 6 FT. - 6 FT. 5 INCHES
		PROBABLE PIECE OF SHOT ROCK		7 8					STRAINED WASHWATER CONTAINS ROCK FRAGMENT • DRILLING 5" TRICONE ROLLER BIT TO 5 FT. • DRILLING 4" CASING TO 7 FT. → REFUSAL • DRILLING 3 3/4" TRICONE ROLLER TO 9.5 FT. (SLOWER BETWEEN 7 AND 8 FT.)
				9					• DRILLING 4" CASING TO 9.5 FT.
	3-65	PROBABLE PIECE OF SHOT ROCK		10					• DRILLING 3 3/4" TRICONE ROLLER TO 12 FT.
		PROBABLE PIECE OF SHOT ROCK		11					• AT 10 FT. RIG STARTS BOUNCING DRAMATICALLY. • AT 10 FT. 5", ROD DROPS FOR 1". - TOO HARD TO DRIVE SS AT 10 OR 12 FT.
		ROCK IS WEATHERED AND HAS SEAMS		12	RUN NO. 1	NX ROCK CORE	7"	RQD = 0%	• DRILLING IN 3" CASING FROM 0-12 FT STRAINED WASHWATER HAS ROCK FRAGMENTS. • DRILLING 2 15/16" TRICONE ROLLER TO 12 FT. → VERY SOLID HERE • ROCK CORING FROM 12 FT. RATE OF CORING IS 1 FT/9 MIN.
				13 14					

Langan Engineering

JOB NO. 1142701

DATE 1-29-93

LOG OF BORING NO. B17

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BUILDING CODE	DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			15					• AT 14.5 FT, CORE BARREL APPEARED TO EXIT A ROCK
			16					• STOP AT 3:00 P.M FOR DAY RESUME 8:00 A.M
			17					• DRILLING 2 15/16" TRICONE ROLLER TO 17 FT.
								• DRILLING 3" CASING TO 17 FT.
	3-65	BEDROCK - GNEISS	18	RUN NO. 2	N.X. ROCK CORE	51"	RQD = 68%	• ROCK CORING FROM 17 FT. TO 22 FT. RATE OF CORING IS 1 FT./5 MIN.
			19					• STRAINED WASHWATER CONTAINS TRACE AMOUNTS OF SAND.
			20					• BEDROCK HAS LOTS OF SEAMS.
			21					
			22					
		COMPLETION DEPTH = 22 FT.	23					TIME FINISH: 9:42 A.M. (2-1-93)
			24					
			25					
			26					
			27					
			28					
			29					
			30					
			31					

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LOG OF BORING B-17A SHEET 1 OF 2

PROJECT	Roosevelt Island	PROJECT NO.	11427
LOCATION	Roosevelt Island, NY	ELEVATION AND DATUM	13.0
DRILLING AGENCY	Warren George	DATE STARTED 2/15/93	DATE FINISHED 2/15/93
DRILLING EQUIPMENT	Mobile Drill B61	COMPLETION DEPTH 19	ROCK DEPTH 11
SIZE AND TYPE OF BIT	3" Roller bit	NO. SAMPLES DIST. 2 UNDIST. –	CORE 8 FT
CASING	3" & 4" Casing	WATER LEVEL FIRST – COMPL. –	24 HR. –
CASING HAMMER	WEIGHT 300 DROP 24	FOREMAN	Vincent
SAMPLER	2" SS sampler. NX core barrel	INSPECTOR	Jason Yang
SAMPLER HAMMER	WEIGHT 140 DROP 30		

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLG Inc.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
0-11 FILL	120					Drive casing to 7 FT.
	31					Drilling hard
	78					
	65					
	78					
	93					
	120					↓
Brn c-f SAND. sm. gravel, tr. silt.	76	S-1	SS	10"	12 25 16 15	Sample @ 7 FT.
	83					
Brn. c-f SAND sm. gravel. tr. silt.	92	S-2	SS	6"	15 15 100/2	Sample @ 9 FT
	198					
11-65 ROCK GNEISS		RUN No 1	Nx Core	Rec = 30 inch	RQD = 0	

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JOB NO. 11427
DATE 2/15/92

LOG OF BORING NO. B-17 A

SHEET 2 OF 2

	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
SS-6S ROCK	GNEISS	15					
		16	Run No. 2	NX core	REC = 30	RQD = 54%	
		17					
		18					
		19					
	Boring Completed @ D = 19 ft						Drilling stopped @ 1400.

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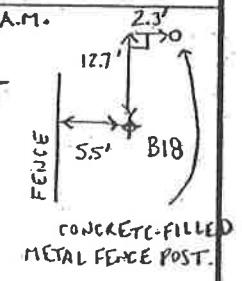
LOG OF BORING B18 SHEET 1 OF 2

PROJECT: SOUTHERN TIP	PROJECT NO.: 1142701
LOCATION: ROOSEVELT ISLAND	ELEVATION AND DATUM: EL 12 BELMONT ISLAND
DRILLING AGENCY: WARREN GEORGE	DATE STARTED: 1-29-93 / DATE FINISHED: 1-29-93
DRILLING EQUIPMENT: CME-55	COMPLETION DEPTH: 18 FT. / ROCK DEPTH: 7 FT.
SIZE AND TYPE OF BIT: 3¾" TRICONE ROLLER	NO. SAMPLES: DIST. 4, UNDIST. —, CORE 3
CASING: 4" DIAMETER STEEL	WATER LEVEL: FIRST —, COMPL —, 24 HR. —
CASING HAMMER: WEIGHT 300 lbs. DROP 24 INCHES	FOREMAN: GREG MARNEY, DAN IMPARATO
SAMPLER: 2 INCH DIAMETER SPLIT SPOON	INSPECTOR: RON BOYER
SAMPLER HAMMER: WEIGHT 140 lb. DROP 30 INCHES	

MATERIAL STRATA	DATE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BLS/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	11-6-93	brown F-M SAND, some silt [FILL]	17	1	S1	SS	8"	5 4 3 4	TIME START: 11:00 A.M. LOCATION: • SS FROM 0-2 FT.
		gray-brown F-M SAND, some silt, trace gravel [FILL]	15	2					
			22	3	S2	SS	6"	8 29 5 7	• SS FROM 2-4 FT.
			19	4					
		brown F-M SAND, some silt, trace of red brick [FILL]	19	5	S3	SS	12"	10 11 9 8	• SS FROM 4-6 FT.
			25	6					
		gray-brown F-M SAND, trace red brick, pieces of schist with mica [FILL]	100/REFUSAL	7	S4	SS	4"	13 18	• SS FROM 6-7 FT. • HAMMER 4" CASING FROM 0-7 FT. • DRILLING WITH 3¾" TRICONE ROLLER BIT TO 10 FT. MATERIAL IS TOO HARD TO SS SAMPLE AT 10 FT.
WEATHERED GNEISS	11-6-93			8					
				9					
				10					• ROCK CORE FROM 10 FT. TO 14 FT. AT 14 FT. CORE GOT JAMMED, AND WATER PUMP GOT STOPPED UP SO CORE IS ONLY 4 FT. RUN.
				11	RUN NO. 1	NX ROCK CORE	47"	RQD=16.7%	• CORING IS AT A RATE OF 1 FT/5 MINUTES.
				12					
				13					
				14					• ROCK CORE FROM 14 FT.



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JOB NO. 1142701

DATE 1-29-93

LOG OF BORING NO. B18

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BUILDING CODE	DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLWS in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65		15	RUN No. 2	NX CORE	12"	RQD = 54%	• AT 15 FT., PUMP STOPS UP AGAIN.
			16	RUN NO. 3	NX ROCK CORE	36"	RQD = 75%	• ROCK CORE FROM 15-18 FT. CORING IS AT A RATE OF 1 FT/7 MIN.
			17					
		COMPLETION DEPTH = 18 FT.	18					TIME FINISH: 1:45 P.M.
			19					
			20					
			21					
			22					
			23					
			24					
			25					
			26					
			27					
			28					
			29					
			30					
			31					

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LOG OF BORING B-21 SHEET 1 OF 2

PROJECT: Roosevelt Island		PROJECT NO.: 11427	
LOCATION: Roosevelt Island, NY		ELEVATION AND DATUM: 13.2	
DRILLING AGENCY: Warren George		DATE STARTED: 2/15/93	DATE FINISHED: 2/15/93
DRILLING EQUIPMENT: Mobile Drill B61		COMPLETION DEPTH: 18	ROCK DEPTH: 10
SIZE AND TYPE OF BIT: 3" Roller bit		NO. SAMPLES: DIST. 1 UNDIST. –	CORE 8 FT
CASING: 3" & 4" casing		WATER LEVEL: FIRST –	COMPL. – 24 HR. –
CASING HAMMER: WEIGHT 300	DROP 24	FOREMAN: Vincent.	
SAMPLER: 2" SS sampler. NX core		INSPECTOR: Jason Yang	
SAMPLER HAMMER: WEIGHT 140	DROP 30		

ELEV.	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO.LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		32					start drilling @ 800
		1					Drive casing to 5 ft
		152					drilling hard
		2					
		47					
		3					
		128					
		4					
		35					
		5					sample @ 5 ft
8.2	FILL	130	S-1	SS	3"	51 / 100/6	
	Brn. m-f SAND sm gravel tr. brick fragment. [FILL]	6				41* 32"	} 300 Hammer
		86					
		7					Drive casing to 10 FT.
		75					drilling hard.
		8					
		60					
		9					
		189					
3.2		10					Casing encounter obstruction @ 10 FT. Possible rock. Core @ 10 FT
	GNEISS	11	Run No. 1	NX CORE	REC = 60 inches	RQD = 72 %	
		12					
		13					
		14					

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JOB NO. 11427
DATE 2/15/93

LOG OF BORING NO. B-21

SHEET 2 OF 2

SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
GNEISS 3-65 ROCK	15 16 17 18	Run No. 2	NX CORE	REC = 32 inch	RQD = 1	
Boring Completed @ D=18FT.						Drilling finished @ 1100

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LOG OF BORING B22 SHEET 1 OF 2

PROJECT: SOUTH TIP	PROJECT NO.: 1142701
LOCATION: ROOSEVELT ISLAND	ELEVATION AND DATUM: EL 11 - BELMONT ISLAND
DRILLING AGENCY: WARREN GEORGE	DATE STARTED: 2-15-93 / DATE FINISHED: 2-15-93
DRILLING EQUIPMENT: CME-55	COMPLETION DEPTH: 20 FT. / ROCK DEPTH: 11 FT. 8"
SIZE AND TYPE OF BIT: 3 3/4" TRICONE ROLLER	NO. SAMPLES: DIST. 2, UNDIST. —, CORE 2
CASING	WATER LEVEL: FIRST —, COMPL —, 24 HR. —
CASING HAMMER / WEIGHT / DROP	FOREMAN: JOHN IMPARATO
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR: RON BOYER
SAMPLER HAMMER / WEIGHT: 140 lbs. / DROP: 30"	

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES: NO./LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		CONCRETE 4" THICK							TIME START: 10:10 A.M.
				1					DRILLING 3 3/4" TRICONE ROLLER TO 5 FT. - SMOOTH
				2					• WASHWATER IS BROWN
				3					
				4					
FILL	11-65	Brown F-C SAND and GRAVEL, trace silt, trace cinders and red brick fragments [FILL]		5	S1	SS	4"	5 4 5 6	• SS FROM 5-7 FT.
				6					
				7					• DRILLING 3 3/4" TRICONE TO 10 FT. - FAIRLY EASY
				8					• WASHWATER IS STILL BROWN
				9					
FILL		Brown F-C SAND, trace silt, trace red brick [FILL]		10	S2	SS	5"	44 14	• SS FROM 10-12 FT.
	7-65	Brown F-M SAND, some silt		11	S3	SS	3"	40 100/2"	
		GNEISS		12	RUN NO. 1	NX ROCK CORE	57"	RQD = 49%	• STOP AFTER SAMPLING TO FIX TIRE (11:00-11:35)
	3-65			13					• ROCK CORING FROM 12-17 FT. START CORING: 11:45
				14					

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JOB NO. 1142701
DATE 2-15-93

LOG OF BORING NO. B22

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST. BLOWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65	GNEISS		15	RUN NO. 1	NX ROCK CORE	57"	RQD = 49%	CORING RATE = 1 FT/6 MIN.
				16					
				17					
				18	RUN No. 2	NX ROCK CORE	34.5"	RQD = 42%	CORING RATE = 1 FT/6 MIN.
				19					
				20					
		COMPLETION DEPTH = 20 FT.		21					TIME STOP: 12:35
				22					
				23					
				24					
				25					
				26					
				27					
				28					
				29					
				30					
				31					

APPENDIX C

Logs of 1993 Marine Borings

Langan
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LOG OF BORING MB-1 SHEET 1 OF 3

PROJECT SOUTH TIP	PROJECT NO. 1142701
LOCATION ROOSEVELT ISLAND	ELEVATION AND DATUM
DRILLING AGENCY WARREN GEORGE	DATE STARTED 3-30-93 / DATE FINISHED 3-30-93
DRILLING EQUIPMENT B-61 MOBILE	COMPLETION DEPTH 46 FT. / ROCK DEPTH 36 FT. 9"
SIZE AND TYPE OF BIT 2 15/16" DIAMETER TRICONE ROLLER	NO. SAMPLES DIST. 6 UNDIST. – CORE 2
CASING 4" DIAMETER STEEL	WATER LEVEL FIRST – COMPL. – 24 HR. –
CASING HAMMER WEIGHT 300 lbs. DROP 24"	FOREMAN GREG MARNEY
SAMPLER 2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR RON BOYER
SAMPLER HAMMER WEIGHT 140 lbs DROP 36"	

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				1					TIME START 10:15 A.M.
		WATER		2					
				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					

Langan Engineering

JOB NO. 142701 | LOG OF BORING NO. MB-1

DATE 3-30-93 | SHEET 2 OF 3

MATERIAL SYMBOL	NYC PLDIS CODE	DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLOS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		15 16 17 18					• PUSH 4" CASING TO 18 FT.
		Black silty f-m SAND and GRAVEL, slight petroleum odor		19	S1	SS	6"	WOR WOR WOR WOR	• SS FROM 18-20 FT.
		Gray f-m SAND and GRAVEL, trace silt		20 21 22	S2	SS	1"	WOR 1 1 2	• SS FROM 20-22 FT.
	7.65	Dark gray f-m SAND, trace silt		23	S3	SS	3"	1 1 1 1	• SS FROM 22-24 FT.
				24					• PUSH 4" CASING TO 25 FT.
		Gray f-c GRAVEL, trace sand		25 26 27	S4	SS	1"	4 2 2 5	• SS FROM 25-27 FT. • 10:57 A.M. - START DRILLING 2 15/16" TRICONE ROLLER - WASHWATER IS GRAY, DRILLING IS SMOOTH TO 25 FT. WASHWATER CLEARS SLIGHTLY AT 23.5 FT.
			40	28 29					• PUSH 4" CASING TO 28 FT.
			31	30					• HAMMER 4" CASING TO 30 FT. • DRILL 2 15/16" TO 30 FT.
	7.65	Light brown f-m SAND, trace gravel	6	31	S5	SS	13"	12 7	• WASHWATER TURNS BROWN AT 28 FT.
			7					6	• SS FROM 30-32 FT.

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JOB NO. 114270 | LOG OF BORING NO. MB-1

DATE 3-30-93 | SHEET 3 OF 3

MATERIAL SYMBOL	NYC BLDG. CODE	DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLWS in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				32				7	
	7-65	Brown f-m SAND, some silt	12	33					• HAMMER CASING TO 35 FT.
			5	34					• 11:45 DRILL 2 15/16" TRICONE TO 35 FT. - VERY SMOOTH (TOOK 1.5 MINUTES FROM 32-35)
			4	35					• WASHWATER IS CLEAR AT 33 FT.
			11	36	S6	SS	12"	4 15	• SS FROM 35-37 FT.
			6/9" 4 0/0"	37				40 100/3"	• 12:00 - ROCK FRAGMENTS IN TIP OF CONE
				38					• HAMMER 4" CASING TO 36'9"
				39					• 12:12 - DRILL 2 15/16" TRICONE TO 38 FT. (BIT IS RATTLING FROM 37 FT.
		GNEISS		40	RUN NO. 1	NX CORE	REC. = 36"	RQD = 23"/60" = 38%	• WASHWATER IS CLEAR BUT HAS ROCK FRAGMENTS AND MICA FROM 37 FT. TO 38 FT.
				41					12:18 - STOP DRILLING 2 15/16" AT 38 FT.
				42					12:46 - START ROCK CORING FROM 38 FT.
	3-65			43					• WASHWATER IS SLIGHTLY GRAY/BROWN
				44	RUN NO. 2	NX CORE	REC. = 27"		• WASHWATER IS LOST AT 40 FT. BUT RETURNS AT 40.5 FT. CLEARER (STILL HAS ROCK FRAGMENTS)
				45					13:10 - STOP CORING AT 43 FT. RATE OF CORING = 5 MIN/FT.
				46					13:32 START CORING FROM 43 FT. WASHWATER IS UNCHANGED
		COMPLETION DEPTH = 46 FT.		47					13:46 - STOP CORING AT 46 FT. RATE OF CORING = 4 MIN/FT.
				48					

1

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LOG OF BORING MB-2 **SHEET** 1 **OF** 2

PROJECT: SOUTH TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM:	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 3-31-93	DATE FINISHED: 3-31-93
DRILLING EQUIPMENT: B-61 MOBILE		COMPLETION DEPTH: 31 FT.	ROCK DEPTH: 23 FT. 8"
SIZE AND TYPE OF BIT: 2 15/16" TRICONE ROLLER BIT		NO. SAMPLES: DIST. 4	UNDIST. / CORE 1
CASING: 4" DIAMETER STEEL		WATER LEVEL: FIRST	COMPL. / 24 HR.
CASING HAMMER: WEIGHT 300 lbs.	DROP 24"	FOREMAN: GREG MARNEY	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT 140 lbs.	DROP 36"		

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6"	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		1 2 3 4 5 6 7 8 9 10 11 12 13 14					

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JOB NO. 1142701
DATE 3-31-93

LOG OF BORING NO. MB-2

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/FT.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER							• PUSH 4" CASING TO 14.5 FT.
	7-65	Dark black f-m SAND, some silt, heavy petroleum odor		15	S1	SS	24"	WOR WOR WOR WOR	• SS FROM 14.5 FT. TO 16.5 FT.
	7-65	Gray silty f-m SAND, petroleum odor Gray silty f-m SAND, petroleum odor		16 17 18 19 20 21 22	S2	SS	24"	WOR WOR WOR WOR	• SS FROM 16.5 FT. TO 18.5 FT. • PUSH CASING TO 18 FT. 9:00 A.M. - • SS FROM 18.5 FT. TO 20.5 FT.
					S3	SS	24"	WOR WOR WOR WOR	• PUSH CASING TO 22 FT. • HAMMER CASING TO 23 FT. • 9:14 DRILL 2 15/16" TRICONE TO 23 FT. - FAIRLY SMOOTH • WASHWATER TURNS BROWN AT 22 FT.
		f-c GRAVEL	51 153/4"	23	S4	SS	1"	100/4"	• SS FROM 23-25 FT. • S4 HAD NO SOIL MATRIX DESPITE TRAP IN CONE
	3-65	GNEISS		24 25 26 27 28 29 30 31	RUN NO. 1 NX ROCK CORE REC. = 57 INCHES RQD = 53 %				• 9:40 - DRILL 2 15/16" TRICONE FROM 23 FT. - BIT IS GRINDING SLIGHTLY • WASHWATER CLEAR BUT CONTAINS ROCK FRAGMENTS • AT 25 FT. WASHWATER IS LOST AND RIG IS BOUNCING SLIGHTLY. • 10:21 - STOP DRILLING AT 26 FT. • 10:30 - START ROCK CORING FROM 26 FT ROCK CORING RATE = 5.5 MIN/FT. • 10:57 STOP ROCK CORING AT 31 FT.
		COMPLETION DEPTH = 31 FT.							

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LOG OF BORING MB-3 SHEET 1 OF 2

PROJECT: SOUTH TIP		PROJECT NO.: 114270.1	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM:	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 3-31-93	DATE FINISHED: 3-31-93
DRILLING EQUIPMENT: B-61 MOBILE		COMPLETION DEPTH: 21 FT.	ROCK DEPTH: 10 FT. 8"
SIZE AND TYPE OF BIT: 2 15/16" TRICONE ROLLER		NO. SAMPLES: DIST. 2	UNDIST. CORE 2
CASING: 4 INCH DIAMETER STEEL		WATER LEVEL: FIRST	COMPL. 24 HR.
CASING HAMMER: WEIGHT 300 lbs.	DROP 24"	FOREMAN: GREG MARNEY	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT 140 lbs.	DROP 36"		

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 In.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		1 2 3 4 5 6 7					TIME START: 12:05 • PUSH 4" CASING TO 7.5 FT. • SS FROM 7.5 FT. TO 9.5 FT.
	6-65	Black f-m SAND and GRAVEL, some silt, petroleum odor		8	S1	SS	3"	WOR WOR WOR WOR	
	7-65	Gray-brown f-m SAND, trace silt, trace mica [decomposed rock]	5 SS/8"	9 10	S2	SS	7"	45 100/5"	• SS FROM 9.5 FT TO 11.5 FT. • PUSH 4" CASING TO 9 FT. • HAMMER 4" CASING FROM 9 FT. TO 10 FT. 8" (15 BLOWS/8") • ROCK FRAGMENTS IN TIP OF CONE (40 BLOWS/0")
	3-65	GNEISS		11 12 13 14					• 12:33 DRILL 2 15/16" TRICONE ROLLER TO 13 FT. - BIT IS GRINDING SLIGHTLY • WASHWATER IS CLEAR BUT CONTAINS ROCK FRAGMENTS. 12:44 - BEGIN ROCK CORING FROM 13 FT.

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JOB NO. 1142701
DATE 3-31-93

LOG OF BORING NO. MB-3

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65	GNEISS		15	RUN NO. 1	NX ROCK CORE	REC = 30"	RQD = 5"/54" = 9%	• WASHWATER IS CLEAR BUT CONTAINS ROCK FRAGMENTS
				16					
				17					13:09 STOP CORING AT 17.5 FT. CORING RATE = 4.5 MIN/FT.
				18	RUN NO. 2	NX ROCK CORE	REC. = 38"	RQD = 12"/42" = 29%	13:21 RESUME CORING FROM 17.5 FT
				19					• WASHWATER IS NOT RETURNING
				20					
				21					13:46 • STOP CORING AT 21 FT. CORING RATE = 7 MIN/FT.
		COMPLETION DEPTH = 21 FT.		22					
				23					
				24					
				25					
				26					
				27					
				28					
				29					
				30					
				31					

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LOG OF BORING MB-4 SHEET 1 OF 3

PROJECT SOUTH TIP		PROJECT NO. 1142701	
LOCATION ROOSEVELT ISLAND		ELEVATION AND DATUM	
DRILLING AGENCY WARREN GEORGE		DATE STARTED 4/2/13	DATE FINISHED 4/2/13
DRILLING EQUIPMENT B-61 MOBILE		COMPLETION DEPTH 34 FT. 6"	ROCK DEPTH 26 FT. 5"
SIZE AND TYPE OF BIT 3 7/8" 2 15/16" TRICONE ROLLER		NO. SAMPLES DIST. 6	UNDIST. CORE 2
CASING 4" DIAMETER STEEL		WATER LEVEL FIRST	COMPL. 24 HR.
CASING HAMMER WEIGHT 300 lbs.	DROP 24"	FOREMAN GREG MARNEY	
SAMPLER 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR RON ROYER	
SAMPLER HAMMER WEIGHT 140 lbs.	DROP 36"		

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		1 2 3 4 5 6 7 8					TIME START: 8:22 A.M • PUSH 4" CASING TO 8 FT.
	8-65	Black silty f. SAND. petroleum odor		9	S1	SS	18"	WOR WOR WOR WOR	• SS FROM 8-10 FT.
	8-65	Black silty f. SAND, petroleum odor		10 11	S2	SS	21"	WOR WOR WOR WOR	• SS FROM 10-12 FT.
	8-65	Black silty f. SAND. petroleum odor		12 13 14	S3	SS	13"	WOR WOR WOR WOR	• SS FROM 12-14 FT.

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JOB NO. 1142701
DATE 4/2/93

LOG OF BORING NO. MB-4
SHEET 2 OF 3

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	8-65	Black silty f. SAND, heavy petroleum odor		15					• PUSH 4" CASING TO 13 FT. • SS FROM 15-17 FT.
				16	SA	SS	19"	WOR WOR WOR WOR	
				17					• PUSH 4" CASING TO 20 FT. • 8:42 - DRILL $2\frac{15}{16}$" TRICONE TO 20 FT. - VERY EASY, WASHWATER IS BLACK.
				18					
				19					
				20					• HAMMER CASING FROM 20 FT. TO 20 FT. 3" (5 BLOWS/3", 80 BLOWS/0")
		PROBABLE PIECE OF SHOTROCK	85/3" 8/1"	21	SS	SS	1"	100/1"	
		PROBABLE PIECES OF SHOTROCK	9 113/10" 20½"	22					• 9:00 - DRILL $2\frac{15}{16}$" TRICONE FROM 20 FT. - 25 FT. BIT RATTLING UNTIL 21 FT., NO WASHWATER RETURNING • BIT STARTS RATTLING AGAIN AT 21 FT. 3".
		PROBABLE PIECES OF SHOTROCK	150	23					• DRILLING IS SLOW - BIT IS BOUNCING ON CORED SHOTROCK UNTIL 25 FT.
		PROBABLE PIECES OF SHOTROCK	128	24					• 2:15 STOP DRILLING $2\frac{15}{16}$" TRICONE • HAMMER CASING TO 22 FT. 10"
	7-65	Brown f-m SAND, some silt, trace clay.	41 47/3"	25					• 9:35 DRILLING $3\frac{3}{4}$" TRICONE TO 25 FT. (REACH 25 FT. AT 9:46) • BIT RATTLING FROM 20-25 FT.
				26	S6	SS	5"	100/5"	• HAMMER CASING TO 26 FT.
		GNEISS		27					• 9:57 DRILL $3\frac{3}{4}$" TO 26 FT. • SLIGHTLY EASIER FROM 25-26 FT.
				28					• HAMMER CASING FROM 26 FT. TO 26 FT. 3"
	3-65			29					• 10:20 START DRILLING $3\frac{3}{4}$" TRICONE TO 29 FT. - FAIRLY SMOOTH - WASHWATER IS BROWN AND CONTAINS ROCK FRAGMENTS
				30	RUN No. 1 NX ROCK CORE REC.: 37" RQD: 17 = 46%				• 10:53 BEGIN ROCK CORING FROM 29 FT. • WASHWATER CONTAINS ROCK FRAGMENTS
				31					

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JOB NO. 1142701
DATE 4/2/93

LOG OF BORING NO. MB-4
SHEET 3 OF 3

MATERIAL SYMBOL	SOIL CODE	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6 IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			32					CORING RATE ≈ 14 MIN/FT. (USING OLD BIT)
								•11:43 STOP CORING RUN NO. 1
			33	RUN NO. 2	NX CORE	22"	RQD=0	•12:00 START CORING RUN NO. 2
		GNEISS						CORING RATE = 5 MIN/FT.
		3-65	34					
		COMPLETION DEPTH = 34.5 FT.	35					•12:10 STOP CORING
			36					
			37					
			38					
			39					
			40					
			41					
			42					
			43					
			44					
			45					
			46					
			47					
			48					

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LOG OF BORING MB-5 SHEET 1 OF 3

PROJECT: SOUTH TIP		PROJECT NO.: 1142701	
LOCATION: ROOSEVELT ISLAND		ELEVATION AND DATUM:	
DRILLING AGENCY: WARREN GEORGE		DATE STARTED: 4-5-93	DATE FINISHED: 4-5-93
DRILLING EQUIPMENT: B-61 MOBILE		COMPLETION DEPTH: 34 FT.	ROCK DEPTH: 26 FT.
SIZE AND TYPE OF BIT: 2 15/16" TRICONE ROLLER		NO. SAMPLES: DIST. 4	UNDIST. CORE 2
CASING: 4" DIAMETER STEEL		WATER LEVEL: FIRST	COMPL. 24 HR.
CASING HAMMER: WEIGHT 300 lbs.	DROP 24"	FOREMAN: GREG MARNEY	
SAMPLER: 2 INCH INNER DIAMETER SPLIT SPOON		INSPECTOR: RON BOYER	
SAMPLER HAMMER: WEIGHT 140 lbs.	DROP 36"		

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		1 2 3 4 5 6 7 8 9 10 11 12 13 14					TIME START: 8:05 . PUSH 4" CASING TO 15 FT.

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JOB NO. 1142701
DATE 4/5/93

LOG OF BORING NO. MB-5

SHEET 2 OF 3

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/IN.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		15					• SS FROM 15 FT. TO 17 FT.
	7-65	Gray f-c GRAVEL, some f. sand, trace silt, trace red brick		16	S1	SS	2"	WOR WOR WOR WOR	
		Dark gray f-m SAND and GRAVEL, trace silt, petroleum odor		17					• SS FROM 17-19 FT.
				18	S2	SS	10"	WOR WOR WOR WOR	
		Dark gray f-m SAND, some silt, strong petroleum odor		19					• SS FROM 19-21 FT.
				20	S3	SS	9"	WOR WOR WOR WOR	
				21					• PUSH 4" CASING TO 25 FT.
				22					• 8:34 START DRILLING 2 15/16" TRICONE TO 25 FT. - WASHWATER IS GRAY, DRILLING IS SMOOTH
				23					• AT 24 FT. 9" - WASHWATER TURNS BROWN
				24					
	7-65	Brown f. SAND, some silt, trace mica [decomposed rock]	67/10"	25	S4	SS	7"	40 100/3"	• 8:53 SS FROM 25-27 FT.
				26					• HAMMER 4" CASING FROM 25 FT. TO 25 FT. 10"
				27					• 9:08 DRILL 2 15/16" TRICONE FROM 25-27 FT - WASH WATER IS BROWN.
		GNEISS		28	RUN NO. 1	NX CORE	35"	RQD = 21" = 35%	• AT 26 FT., WASHWATER BEGINS TO CONTAIN ROCK FRAGMENTS
	3-65			29					• 9:20 START CORING RUN NO. 1 - WASHWATER IS BROWN AND CONTAINS ROCK FRAGMENTS
				30					• AT 29.5 FT. WASH WATER CLEARS CONSIDERABLY
				31					• CORING RATE ≈ 4 MIN/FT.

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JOB NO. 1142701
DATE 4/5/93

LOG OF BORING NO. MB-5
SHEET 3 OF 3

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLOWS/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
	3-65	GNEISS		32	RUN No. 2	NX CORE	24"	21"/24" = 87.5%	9:41 • STOP CORING RUN No. 1 • 9:55 START CORING RUN No. 2 CORING RATE = 4.5 MIN/FT
		COMPLETION DEPTH = 34 FT.		33					• 10:04 STOP CORING RUN No. 2
				34					
				35					
				36					
				37					
				38					
				39					
				40					
				41					
				42					
				43					
				44					
				45					
				46					
				47					
				48					

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LOG OF BORING MB-6 SHEET 1 OF 2

PROJECT	SOUTH TIP	PROJECT NO.	1142701
LOCATION	ROOSEVELT ISLAND	ELEVATION AND DATUM	
DRILLING AGENCY	WARREN GEORGE	DATE STARTED 4/5/93	DATE FINISHED 4/5/93
DRILLING EQUIPMENT	B-61 MOBILE	COMPLETION DEPTH 29 FT.	ROCK DEPTH 23 FT. 10"
SIZE AND TYPE OF BIT	2 15/16" TRICONE ROLLER	NO. SAMPLES DIST. 4	UNDIST. CORE 1
CASING	4" DIAMETER STEEL	WATER LEVEL FIRST	COMPL. 24 HR.
CASING HAMMER	WEIGHT 300 lbs. DROP 24"	FOREMAN	GREG MARNEY
SAMPLER	2 INCH INNER DIAMETER SPLIT SPOON	INSPECTOR	RON BOYER
SAMPLER HAMMER	WEIGHT 140 lbs. DROP 36"		

MATERIAL SYMBOL	NYC BLDG CODE	SAMPLE DESCRIPTION	CASING, BLOWS/FT.	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLS/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
									TIME START: 10:46 A.M.
		WATER		1 2 3 4 5 6 7 8 9 10 11 12 13 14					

Langan
Engineering and Environmental Services, Inc.

JOB NO. 1142701
DATE 4-5-93

LOG OF BORING NO. MB-6

SHEET 2 OF 2

MATERIAL SYMBOL	NYC BLDG. CODE	SAMPLE DESCRIPTION	CASING BLOWS/FT	DEPTH SCALE	SAMPLES NO./LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BLWS/FT.	REMARKS (DRILLING FLUID; DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
		WATER		15					• PUSH 4" CASING TO 16 FT.
				16					• SS FROM 16-18 FT. - NO RECOVERY DESPITE TRAP IN SAMPLE CONE
			22	17	S1	SS	NONE	WOR	• HAMMER 4" CASING TO 18 FT
			25	18				WOR	
	6-6-5							WOR	• SS FROM 18-20 FT.
			10	19	S2	SS	6"	20	
	6	Dark gray f-c GRAVEL, some f-m sand, trace silt	12	20				21	
								38	
								20	• SS FROM 20-22 FT.
	7-6-5	Dark gray f-m SAND, trace silt, trace mica	30	21	S3	SS	15"	4	• HAMMER 4" CASING TO 21 FT.
			8					5	• HAMMER 4" CASING TO 22 FT. 8"
				22				4	• 11:17 - START DRILLING 2 15/16" TRICONE ROLLER FROM 22 FT
			35/8"					6	- WASHWATER TURNS BROWN IMMEDIATELY AT 22 FT.
	6-6-5	Brown f-m SAND, some silt, trace mica [decomposed rock]		23	S4	SS	8"	55 100/4"	• 11:28 - STOP DRILLING AT 23 FT. SS FROM 23-25 FT.
				24					• 11:42 START CORING FROM 24 FT.
	3-6-5	GNEISS		25	RUN NO. 1	NX ROCK CORE	52"	RQD = 14/60" = 23%	• WASHWATER IS LIGHT BROWN WITH ROCK FRAGMENTS
				26					• WASHWATER IS LOST AT 26.5 FT.
				27					CORING RATE = 6 MIN/FT.
				28					
		COMPLETION DEPTH = 29 ft		29					• 12:12 STOP CORING
				30					
				31					

APPENDIX D

Logs of 1993 Test Pits

Langan Engineering **PROJECT NAME:** ROOSEVELT ISLAND **INSPECTOR:** RON BOYER

JOB NO. 1142701

LOG OF TEST PIT NO. 1

DATE 1-12-93 SURFACE ELEV. 13 FT. LOCATION SEE PLAN

	DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLWS in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	BROWN FINE TO MEDIUM SAND, SOME SILT TRACE MICA					SP-1	VEGETATION: SPARSE TREES SURROUNDING AREA.
	ELECTRIC CONDUIT ENCOUNTERED IT HAS 3 in. DIAMETER (DEPTH TO INVERT)	1					ADJACENT MANHOLE AT GRADE LEADS TO ELECTRIC UTILITY SERVICE AREA. MANHOLE DIAMETER = 2.3 FT
	WE ENCOUNTER A 0.18 FT. DIAMETER STEEL PIPE RUNNING AT A DEPTH OF 2.5 FT (INVERT) TO OLD CITY HOSPITAL, TRACKHOE SEVERED IT WITH NO TENSION.	2					SERVICE AREA IS HOLLOW RED BRICK STRUCTURE WITH 3 FT. WIDTH, 5 FT. LENGTH, 3 FT. DEPTH
	CONCRETE WALL AT NORTHWESTERN SIDE OF EXCAVATION (AT 2.7 FT.) - CANNOT LOCATE END OF IT	3					AN IDENTICAL RED BRICK STRUCTURE EXISTS UNDER CONCRETE ROADWAY AND LEADS TO OLD CITY HOSPITAL.
		4					CONCRETE ROAD IS 9 in. THICK
		5					HOLLOW SERVICE AREA: TOP VIEW
	GRAY FINE TO COARSE SAND, SOME GRAVEL SOME SILT, TRACE MICA, PIECES OF SCHIST	6				SP-2	3 in. CONDUIT, 3 in. CONDUIT, 5 in. CONDUIT, OPEN WIRES, 4 in. CONDUIT, 5 FT.
		7					
	COMPLETION DEPTH = 7.4 FT. REFUSAL BY CONCRETE SLAB SPANNING ENTIRE BOTTOM OF EXCAVATION.	8					TOP VIEW OLD CITY HOSPITAL ROADWAY ↑
		9					16 FT. 10 FT. MANHOLE
		10					LAST SEAWALL POST WEST CHANNEL
		11					
		12					
		13					LOCATION SKETCH
		14					WEST CHANNEL — LAST POLE OF EXISTING SEAWALL
		15					22.5 FT. 345° (APPROXIMATE)
		16					10.4 FT. 5.6 FT. → N
		17					

TIME BEGIN: 8:00 A.M.

TIME END: 9:15 A.M.

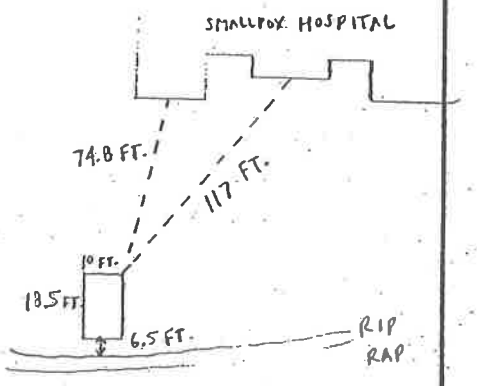
BACKFILLED: 7:30 1-13-93 8:30

Langan Engineering **PROJECT NAME:** ROOSEVELT ISLAND **INSPECTOR:** RON BOYER

JOB NO. 1142701

LOG OF TEST PIT NO. 2

DATE 1-12-93 SURFACE ELEV. 12 FT. LOCATION SEE PLAN

DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BL/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
GRAY FINE TO MEDIUM SAND, SOME SILT, TRACE ROOTS					SP-1	VEGETATION: SPARSE, SEVERAL LARGE TREES.
GRAY-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE ROOTS	2				SP-2	
ENCOUNTERED 1in. DIAMETER STEEL CABLE (AT 3 FT.) IT IS JUST DEBRIS. GRAY GRAVEL, TRACE SILT	4				SP-3	
TIDE WATER = 6.9 FT. ▽	6					
FILL — PRIMARILY PIECES OF SCHIST APPROXIMATELY 1 FT. BY 1FT. IN SIZE.	8 10 12 14 16 18					
COMPLETION DEPTH = 11 FT. FULL EXTENSION OF MACHINE AT SAFE LOCATION.	20 22 24 26 28 30 32 34					LOCATION SKETCH  TIME BEGIN: 9:30-10:50, 3:00 TIME END: 3:35

Langan Engineering **PROJECT NAME:** ROOSEVELT ISLAND **INSPECTOR:** RON B

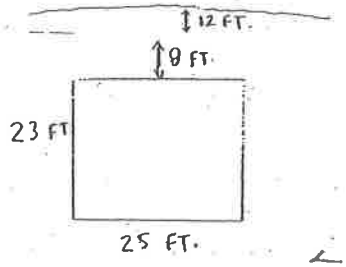
JOB NO. 1142701

LOG OF TEST PIT NO. 3

DATE 1-12-97 SURFACE ELEV. 15 FT. LOCATION SEE PLAN

	DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR RESIST BLWS in.	REMARKS (DRILLING FLUID, DEPTH OF CASIN CASING BLOWS, FLUID LOSS, ETC
FILL	BROWN FINE TO MEDIUM SAND, SOME SILT TRACE ROOTS, PIECES OF SCHIST	0				SP-1	VEGETATION: FOOT LONG GRASS, ROCKS, GARBAGE, AND DE ON SURFACE.
	GRAY BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE MICA PIECES OF SCHIST	1					
		2					
		3					
		4					
		5					
		6					
		7					
		8					
	PRIMARILY 6 in. BY 6 in. PIECES OF SCHIST MATERIAL IS WET AND EXTREMELY LOOSE	9				SP-2	
		10					
		11					
		12					
		13					
		14					
		15					
	TIDE WATER = 16 FT (AT 1:50 P.M.) ▽	16					
		17					
	COMPLETION DEPTH = 17 FT. CAVE-INS OCCURRING FASTER THAN EXCAVATION.						TIME BEGIN: 11:00 TIME END: 2:10

LOCATION SKETCH



Langan Engineering **PROJECT NAME:** ROOSEVELT ISLAND **INSPECTOR:** RON BOYER

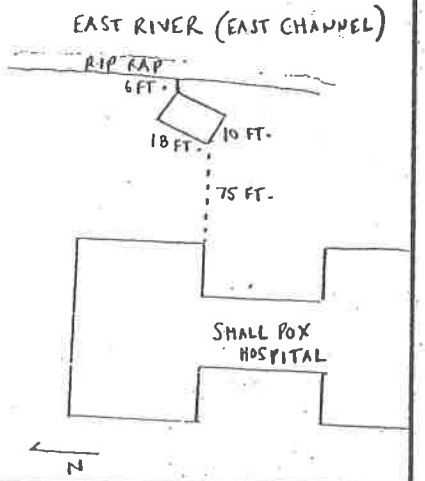
JOB NO. 1142701

LOG OF TEST PIT NO. 15

DATE 1-18-93 SURFACE ELEV. 15 FT. LOCATION SEE PLAN

DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOC.	SAMPLES TYPE	SAMPLES RECOV. FT	SAMPLES PENETR RESIST BLS/6 in.	REMARKS (DRILLING FLUID, DEPTH OF CASING; CASING BLOWS, FLUID LOSS, ETC.)
GRAY BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE ROOTS, PIECES OF SCHIST					SP-1	LARGE QUANTITIES OF DEBRIS EXIST ON SURFACE (CONCRETE WITH RE-BAR)
GRAY BROWN FINE TO MEDIUM SAND SOME SILT, TRACE GLASS SOME SCHIST	1 2 3				SP-2	
RUSTED PIECE OF STEEL PIPING (2in. DIAMETER 27in. LONG)	4					
CONCRETE AT WEST SIDE OF EXCAVATION - 5in. THICK					SP-3	← GRAY GRAVEL, SOME SILT, PIECES OF SCHIST
RED BRICK FACE AT WEST SIDE OF EXCAVATION - HOUSING FOR ELECTRICAL CONDUIT.	5					
BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE ROOTS, PIECES OF SCHIST	6				SP-4	
GRAY-BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE GRAVEL	7					
RUSTED THROUGH 1.5 in. DIAMETER PIPE AT 8 FT. TRACKHOE DUG THROUGH IT.	8				SP-5	
FILL	9					
LARGE AMOUNTS OF SCHIST (APPROXIMATELY 50+% OF MATRIX) PIECES VARY FROM 1 in. BY 1 in. TO 2 FT. BY 3 FT.	10 11					
BROWN FINE TO MEDIUM SAND TRACE SILT	12 13				SP-6	
▽ TIDEWATER (AT 11:15 A.M)	14					
	15 16					
COMPLETION DEPTH = 16 FT. CONCRETE AND BRICK FACE HAVE BECOME DANGEROUSLY UNDERMINED BY APPROXIMATELY 8 FT.	17					TIME BEGIN: 9:15 A.M. TIME END: 11:30 A.M. (20 MINUTES SPENT CLEARING AND PREPARING AREA FOR DIGGING)

LOCATION SKETCH

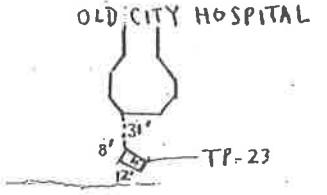


Langan Engineering **PROJECT NAME:** ROOSEVELT ISLAND **INSPECTOR:** RON BOYER

JOB NO. 1142701

LOG OF TEST PIT NO. 16

DATE 1-18-93 SURFACE ELEV. 15 FT. LOCATION SEE PLAN

DESCRIPTION	DEPTH SCALE	SAMPLES: NO. LOC.	SAMPLES: TYPE	SAMPLES: RECOV. FT	SAMPLES: PENETR RESIST BLWS/in.	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL GRAY BROWN FINE TO MEDIUM SAND, SOME SILT, TRACE ROOTS	1					DIGGING IS INTO MOUND APPROXIMATELY 8 FT. ABOVE CONCRETE ROAD.
	2					
	3					
EXTENSIVE DEMOLITION DEBRIS 2 FT. LONG 8 in. BY 4 in. STEEL I-BEAM ENCOUNTERED → PIECES OF CONCRETE SCATTERED IN EXCAVATION LARGE AMOUNTS OF CRUMBLY RED BRICK - SUPPOSED OLD FOUNDATION LOCATED BENEATH. IT APPEARS THAT A BUILDING WAS DEMOLISHED IN PLACE.	4					
	5	1			SP-1	
	6					
	7					
	8					
	9	2			SP-2	
STORM DRAIN PIPE ENCOUNTERED AND REMOVED BY TRACKHOE SHOVEL (DIAMETER IS 4.5 in., LENGTH IS 11 FT.) DEPTH TO INVERT → IT APPEARS TO BE A CATCH BASIN DRAIN PIPE. THERE IS A SIMILAR PIPE OF THE SAME DIAMETER EXTENDING VERTICALLY ALONG THE INNER WALL OF THE OLD CITY HOSPITAL AND ANOTHER WHICH EXITS INTO EAST CHANNEL.	10					
	11					LOCATION SKETCH
COMPLETION DEPTH = 11.5 FT.	12					OLD CITY HOSPITAL  EAST RIVER (EAST CHANNEL)
	13					
	14					
	15					
	16					TIME BEGIN: 12:45 TIME END: 3:15 P.M. 2:00 - 2:50 (HAND-SHOVELING TO EXPLORE BRICK AND DRAIN PIPE)
	17					