ADDENDUM

PHASE IA ARCHAEOLOGICAL SURVEY REPORT

LaGuardia Airport Central Terminal Building Redevelopment

Queens Borough

New York City

Prepared for

Port Authority of New York & New Jersey 225 Park Avenue South New York, NY 10003

Prepared by

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AECOM

516 East State Street Trenton, NJ 08609

August 2013

Management Summary

SHPO PROJECT REVIEW NUMBER:

12PR05127

INVOLVED STATE AND FEDERAL AGENCIES:

FAA Port Authority of New York and New Jersey

PHASE OF SURVEY:

Addendum to IA Archaeological Survey, Definition of Vertical APE

LOCATION INFORMATION:

Location: New York City Minor Civil Division: Queens Borough County: Queens County

SURVEY AREA:

Length: 1.2 mi (2 km) Width: width varies depending on location Number of Acres Surveyed: 159 ac (64 ha)

USGS 7.5 MINUTE QUADRANGLE MAP:

Central Park, Flushing

SENSITIVITY ASSESSMENT:

N/A

ARCHAEOLOGICAL SURVEY METHODOLOGY:

Review of geotechnical data GIS modeling of land surfaces

RESULTS OF ARCHITECTURAL SURVEY:

N/A

RESULTS OF ARCHAEOLOGICAL SURVEY:

Definition of Vertical APE

REPORT AUTHOR:

John Lawrence and Brian M. Albright

DATE OF REPORT:

August 2013

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1.0 INTRODUCTION

This addendum report is in response to the 18 July, 2013 review letter from the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), Division of Historic Preservation (Appendix A). The letter was in turn a response to the submission of a draft Phase IA Archaeological Survey Report prepared by AECOM for the Port Authority of New York and New Jersey (Mikolic et al. 2013). The archaeological survey was conducted under Section 106 of the National Historic Preservation Act, which requires NYSOPRHP review the proposed LaGuardia Airport Central Terminal Building Redevelopment Project, sponsored by the Federal Air Administration (FAA) and the Port Authority of New York and New Jersey (PANYNJ).

The 18 July 2013 letter was in agreement with Mikolic et al.'s (2013) definition of an area of archaeological sensitivity ('Area 1') within the Area of Potential Effects (APE) for the proposed undertaking (Figure 2). However, the review letter requested specific information from PANYNJ when it was available. The information requested includes:

- 1) definition of the vertical APE within the area of archaeological sensitivity;
- 2) definition of the vertical APE in areas formerly pertaining to Flushing Bay, which were in-filled during the twentieth-century and;
- the relationship of the vertical APE to a possibly intact, Early Holocene land surface with the potential to contain archaeological deposits.

This document presents all currently-available information requested by NYSOPRHP. Design specification for elements of proposed construction with the capacity to impact the existing land surface are presented to define the vertical APE as accurately as possible. The same design features have also been brought into GIS to compare the vertical APE with the elevation of the possible Early Holocene surface, as requested.

2.0 PROJECT DESCRIPTION

LaGuardia Airport ranks among the busiest airports in the nation and around the world. More than 23 million airline passengers use the airport annually and approximately half the passengers are processed through the Central Terminal Building (also known as Terminal B or the CTB). The CTB was designed and built in the 1960s. Renovation and expansion projects over the years have enhanced the appearance and capacity of the terminal building; however, these improvements have not been sufficient to keep pace with changes in the airline industry or growing passenger demand.

The Central Terminal Building Redevelopment Program is needed to improve the safety, security, and efficient flow of passengers through LaGuardia Airport. Over the next ten years, the Central Terminal Building, airside apron, landside roadways, and parking garage, are scheduled to be replaced in-kind with new facilities designed and constructed to meet the latest Federal standards for safety and security, and to enhance the overall level of service for passengers and visitor alike.

The CTB Redevelopment Program is divided into three functional elements: airside, terminal, and landside. There is also a list of support project needed to implement the Program. The project description is summarized below. A more detailed description of the project is included in the Draft Environmental Assessment.

- Airside The terminal airside apron would be reconfigured to accommodate a 35-gate layout plan with dual (two-way) taxilanes for safer and more efficient aircraft movements within the limited space available. PANYNJ has determined that 35 gate positions must be provided to accommodate the proposed flight schedule for the airlines operating at the CTB.
- Terminal The existing CTB would be demolished and replaced with a new 1.3 million square foot passenger terminal building with two double-loaded concourses and one single-loaded concourse connected to Terminal C. A three-level terminal headhouse provides ticketing on the upper level, baggage claim in the

middle level, and ground transportation on the lower level. All interior spaces must meet the latest TSA requirements for screening passengers and bags.

- Landside Roadways and Parking The terminal area roadway system would be redesigned to accommodate the new passenger terminal building and to provide free-flowing traffic movements through the central terminal area including Terminals C and D. To make way for the new terminal, the existing parking garage would be demolished and replaced with a new West Garage with 2,900 spaces.
- Support Projects. The following list of enabling projects or actions would be undertaken to make space or otherwise allow the above-referenced airside, terminal, and landside projects to proceed: remove Hangars 1, 2, and 4; relocate the Central Heating and Refrigeration Plant (CHRP); relocate the East Field Lighting Vault; relocate the Taxi Hold Lot; and, provide for new or relocated in-ground utilities.

3.0 AREA OF POTENTIAL EFFECTS (APE)

The horizontal APE was established in the Phase IA Archaeological Survey Report in accordance with 36 CFR 800.16(d) and is illustrated in Figure 1; it represents the total area extent in which impacts to ground surfaces may be anticipated. The vertical APE represents the anticipated depth below existing grade of all impacts within the horizontal APE.

3.1 Defining the Vertical APE

Three elements in the construction of the proposed CTB, parking garages and associated access roads will require moving, excavating or otherwise impacting the existing land surfaces within the horizontal APE and determine the definition of the vertical APE:

- 1. surface grading of the landside area;
- 2. subsurface utility installation;
- 3. installation of deep pilings for foundation support for proposed buildings.

3.1.1 Grading plans

The proposed grading plan is controlled by maximum allowable grades on the airside apron, minimum floor elevations within the terminal building, vertical geometry based on roadway grades and vertical clearance requirements, and a site plan that would not preclude providing future rail access to the new terminal building. In addition, flood hazard mitigation has been a priority for the CTB Redevelopment Program because of the geography of its location with elevations just above sea level.

The resulting grading plan is presented in Figure 2. The proposed grading lines are measured in feet above mean sea level. The grading plan was brought into GIS, the contours converted into a surface using the Interpolation geostatistical tool in ARCMap and the resulting surface compared with a digital elevation model (NCGS n.d.). The resulting comparison shows areas of both cutting and filling, although in neither case is the proposed change in elevation greater than one (1) meter and across the majority of area to be graded, it is within 50 centimeters (cm) of existing grade. As will be discussed in greater detail below, majority of the APE within 50 cm to one meter of the surface consists of fill (Figure 3).

3.1.2 Subsurface Utilities

Utility plans and corridors are closely aligned with the landside roadways. Existing utilities would be used to the degree practicable, although many utilities must be relocated to service new facilities. Various options for routing utilities were investigated. PANYNJ determined the best option is to preserve a utility corridor that does not conflict with construction of the proposed roadways. The corridor runs from east to west and includes utility services for Terminals C & D. Utility installation requires removal of existing pavements, trenching, excavation, and other earthwork activities.

The location of proposed utility installations is shown in Figure 4. The average depth of each type of new utility line below proposed grade is presented in Table 1. The available information regarding the utilities with potential to impact potentially intact soils (sanitary and storm sewer, water) is presented below.

Utility	Depth Below Proposed Grade				
Storm Sewer	10 feet (72" line) others are 3-ft depth				
Sanitary lines	5 feet				
Water	4 feet				
Electrical/Communications	2.5 feet				
Gas/Steam	2.5 feet				

Table 1. Average Depth of Utility Installation

Storm Drainage System

The existing storm drainage trunk line runs from west to east and drains the vast majority of the existing landside. The pipe varies in size and increases as it moves further east until it becomes a 78" reinforced concrete pipe. This trunk line conflicts with proposed construction and needs to be relocated further south. The proposed roadway system would drain into the relocated trunk line until it ties back into the existing system near Terminal C (Figure 5).

The existing drainage system will be retained and utilized to the degree practicable. The proposed storm drainage system connects to the existing main storm trunk lines and is designed with capacity to relieve overloaded conditions. All storm drainage pipes will be checked to verify that they can handle existing and proposed peak discharges. In addition, it is proposed to harvest storm water from on-site roof areas to reclaim water for non-potable uses such as toilet flushing. Existing storm drainage pipes will only be removed to accommodate the construction of either the terminal building or other permanent landside/airside facilities. Existing storm drainage pipes to be abandoned in place will be capped.

Sanitary Drainage System

The existing sanitary sewer is a force main that originates in a pump station located in Parking Lot 3. The system flows from east to west before connecting to a NYC system west of 94th street. This sanitary system is in conflict with proposed construction and needs to be relocated further south. The new pump station will be located in Parking Lot 4. The layout of the sanitary sewer shall be along the landside perimeter of site (parallel to Grand Central Parkway) with a connection to the existing 18"-DIP Force Main located near Hangars 3 and 5 (Figure 6). The location of the sanitary sewers lines in relationship with the water mains will adhere to the following criteria:

- Sanitary sewers shall be laid in a separate trench a minimum of 10 feet (horizontally) from any water main or a minimum of 18 inches in a separate trench with fully restrained joints. If field conditions prohibit this, the sanitary sewer shall be laid with full concrete encasement.
- Where sanitary sewers cross water mains, the sanitary sewer shall be a minimum of 10 feet below the water main or a minimum of 18 inches below the water main with fully restrained joints.

Water

Both high pressure (HP) and low pressure (LP) water lines currently exist in the APE. The existing high pressure water system originates at the pump station in the west side of the airport. The system then runs east and provides fire protection for Hangars 1/3/5, the central Terminal Building, Hangars 2/4, and Terminals C and D. (Figure 7). The high pressure system conflicts with proposed construction and needs to be relocated to the south. Layout of the new HP water main shall be along the landside perimeter of site (parallel to Grand Central Parkway) with water supply from a Pump Station located near the fuel farm via a connection to the existing 24"-DIP HP Water Main located near Hangars 3/5.

The LP water system is fed by two feeds from NYC, one west of 94th street and the other over the 102nd St bridge. The existing low pressure lines conflict with proposed construction and need to be relocated further south. The layout of the new LP main shall also be along the landside perimeter of site (parallel to Grand Central Parkway) with a connection to the existing 24"-DIP LP Water Main located near Hangars 3/5.

3.1.3 Pier Foundations

Poor subsurface soil conditions result in pier design challenges. The existing soils within the project limits include compressible clay layers and loose soils susceptible to liquefaction from a seismic event. The deep foundations must be designed to account for these poor soil conditions at both the service and extreme event limits. Further design and cost consideration must be given the large depth to suitable bearing type soils and the rock. Glacial till and bedrock are roughly 125 feet and 150 feet, respectively below existing grade.

- Bridge Piers and Abutments Straight pile foundations consisting of 30" diameter pipe piles, driven to approximately 150 ft to rock. Drilled shaft foundations may be considered as the design progresses and a bridge specific geotechnical report is provided.
- Retaining Walls Straight and battered pipe piles of 14" diameter, driven approximately 150 ft to rock. Drilled shaft foundations may be considered as the design progresses and a bridge specific geotechnical report is provided.

A graphic illustration of a pier foundation is presented in Figure 8, the proposed design for the CHRP. A similar array of pilings will be employed for the West Garage. A plan view of the proposed foundation piers for the CTB and elevated road approaches to the CTB is presented in Figure 9.

3.2 Vertical APE

The proposed vertical APE for the CTB Project combines the subsurface impacts of grading, utility installation and building foundation pilings. It is limited to the footprint of:

- 1. Areas of proposed cutting of the existing land surface for purposes of grading;
- 2. Footprint of the proposed CTB, CHRP, West Garage and elevated roadway pilings;
- 3. An area five feet from centerline from all proposed subsurface utilities.

The depth of impacts and resulting vertical limits of the APE are as follows:

- 1. Grading: 1.0 meter below existing grade
- 2. Foundation pilings: 150 feet below existing grade
- 3. Utilities: variable (see Table 1)

4.0 COMPARISON OF VERTICAL APE AND SUBSURFACE SOIL HORIZONS

NYSOPRHP has requested an analysis of the relationship of the vertical APE with soil horizons that may have the potential to contain archaeological deposits. Specific concern was expressed for the area of archaeological sensitivity defined in the Phase IA Archaeological and Survey Report and previously submerged portions of the APE and the "Organic Silts and Clays" horizon recorded by geotechnical borings presented in Appendix B of the Phase IA Archaeological Survey Report (Mikolic et al. 2013).

4.1 Archaeological Sensitivity Area 1

Area 1 has been characterized as moderately to highly sensitive for both prehistoric and historic archaeological resources. There are geotechnical data for approximately half of this area (Figure 10). Borings for the proposed West Garage have been conducted and their results are presented in Appendix C. According to those logs, fills across this area range from as little as six feet below current grade (3-228) to as much as 17 feet (3-221), the average being approximately 15 feet (Table 2). The integrity of the underlying surface is unknown; in most cases the logs

record silts or sands. Only four of twenty tests in this area reported "slightly organic" clayey silt beneath fill (3-229; 3-231; 3-233; 3-239). These borings are discontinuous, suggesting isolated patches of possibly intact soils.

		/	0
Boring	Depth of Fill (ft)	Boring	Depth of Fill (ft)
3-221	18	3-232	13
3-222	17	3-233	12
3-223	18	3-234	10
3-224	15	3-235	25
3-225	15	3-236	8
3-226	8	3-237	10
3-227	8	3-238	17
3-228	6	3-239	12
3-229	12	3-240	10
3-230	17	3-241	17
3-231	10		

Table 2. Depth of Fill, West Garage

The vertical APE in the area of the West Garage is 150 feet below grade. Gas, storm sewer and both HL and LP water lines run through the area of sensitivity, with vertical impacts of 2.5 feet, 4 feet and 10 feet respectively. Proposed grading in the archaeologically sensitive area will extend up to one (1.0) meter below the existing ground surface (Figure 3). Grading has little to no possibility of affecting potentially intact soils in this area.

4.1.1 Evaluation

The vertical APE for the foundation of the proposed West Garage extends through what may be areas of isolated, intact soils with the potential to contain archaeological deposits. The vertical APE for proposed storm sewers (10 feet) may intersect intact soils, although there are no data currently available to pinpoint where this may occur. As stated above, most geotechnical borings reported fill below the 10-foot level, though in some cases it was no deeper than six to eight feet. None of these tests are in or proximate to the proposed utilities.

The vertical APE for all other proposed impacts in the Sensitivity Area 1 (grading, water or gas utilities) do not appear to have the potential to impact possibly intact soils.

4.2 Organic Clays and Silts Horizon

An undulating surface of "Organic Silts and Clays" has been reported from geotechnical borings conducted by the PANYNJ (2010) for the CTB, which can be found in Appendix B of this addendum. The surface elevation of this stratum was modeled in GIS from the available geotechnical data using the same Interpolation tool in ARCMap that was used to model the proposed grading plan. The resulting surface was then compared with the depths of proposed impacts across the formerly submerged portion of the APE for which data are available.

The organic silt and clay horizon was recorded in all except three geotechnical borings near the eastern end of the area sampled (S-3; 2-539; 2-541) but is present in almost all areas to be impacted by the installation of pilings for the CTB and CHRP (Figure 11). The surface of the organic silt and clay horizon was then compared with the variable depth of utilities to be installed. The relatively surficial (2.5 ft) impacts of electrical, communications and gas utilities do not intersect with the relatively small areas where the organic stratum may rise to the same elevation (Figure 12). When compared with the deeper (5 ft) impact depth of the proposed sanitary sewer and the HL and LP water lines, a relatively short segment (50 meters []) of these utilities may intersect the organic stratum (Figure 13). The proposed depth of installation of new storm sewers (10 ft) has the greatest potential to intersect the organic stratum where it lies within 10 feet of the ground surface (Figure 14).

4.2.1 Evaluation

Utility installation has the potential to intersect and impact the organic clay and silt stratum recorded in geotechnical borings, but this potential is limited primarily to the installation of storm sewers at 10 feet below grade; the installation of HP and LP water lines and sanitary sewer also has potential to intersect the stratum in question, although to limited extent.

Foundation piling installation for the CTB and CHRP will penetrate the entire package of organic clays and silts where they are present. However, it should be kept in mind that the same type of piling system was used in the construction of all existing buildings and elevated roadways at LaGuardia Airport. The organic clay and silt stratum within the vertical APE for proposed pilings, where it overlaps the footprint of existing buildings in the APE (Central Terminal Building, Garage P2; Concourse C; Hangar 2), has been compromised by existing pilings. A graphic illustration of the relationship between existing buildings and the proposed installation of new pilings is presented in Figure 15.

As requested in the 18 July 2013 NYSOPRHP review letter, a professional geomorphologist was consulted for their interpretation of the organic clay and silt horizon. Dr. Daniel Wagner of Geo-Sci Consultants was sent the relevant boring logs and illustrations of historic shoreline development of LaGuardia Airport. Dr. Wagner (personal communication, 2013) responded with two observations:

- 1) Generally, in topographic settings such as this, the original retreating upland is a little too sloping for preservative submergence. Landscapes like this tend to be laterally truncated by marine transgression rather than protectively inundated as sea levels rose during the Holocene;
- 2) The "Organic Clays and Silts" stratum recorded in the geotechnical borings is not a former land surface. Former surfaces are generally 20 to 30 ft thick, and would be typical for accreting estuarine deposits.

5.0 CONCLUSIONS

A proposed vertical APE for the LGA CTB Project has been established on the basis of all available information regarding the type and depth of impacts to ground surfaces within the horizontal APE. The vertical APE exhibits variable depths, ranging from approximately 150 feet below ground surface where pilings will be driven to 2.5 feet below ground surface where certain utilities will be installed. The vertical APE intersects soil horizons that may contain archaeological deposits in an archaeological sensitivity (Sensitivity Area 1). The vertical APE also intersects a stratum of organic clay and silt of interest to the NYSOPRHP, portions of which have been compromised by piling installation for existing buildings. In the opinion of a professional geomorphologist, the stratum of clay and silt does not represent a buried, intact early Holocene land surface.





LaGuardia Airport CTB Redevelopment Program

Proposed Grading Plan





Source: ESRI 2013a; SOM 2013 Prepared by: AEC OM

LaGuardia Airport CTB Redevelopment Program Figure 4

Proposed Utility Installations



CTB Redevelopment Program Environmental Assessment LaGuardia Airport THE PORT AUTHORITY OF NY & NJ

Proposed Storm Sewers



CTB Redevelopment Program Environmental Assessment LaGuardia Airport THE PORT AUTHORITY OF NY & NJ

Proposed Sanitary Sewers





Figure 8. Piling Plan for CHRP (Source: SOM 2013)



CTB Redevelopment Program Environmental Assessment LaGuardia Airport THE PORT AUTHORITY OF NY & NJ

Proposed Piling Plan, CTB



CTB Redevelopment Program

Archaeological Sensitivity Area 1



Environmental Assessment LaGuardia Airport THE PORT AUTHORITY OF NY & NJ **Boring Absent of Organic Clays and Silts**







6.0 SOURCES

- Mikolic, Frank, John Lawrence and Brian Albright
- 2013 *Phase IA Archaeological Survey Report*. Prepared by AECOM for FAA and PANYNJ for submittal to NYSOPRHP.

National Cartography & Geospatial Center (NCGS) – Natural Resources Conservation Service – United States Department of Agriculture

- n.d. *National Elevation Dataset 10 Meter 7.5x7.5 minute quadrangles* [raster digital data]. National Cartography and Geospatial Center: Fort Worth, Texas. Available online at <u>http://datagateway.nrcs.usda.gov/</u>.
- Port Authority of New York and New Jersey (PANYNJ)
- 2010 Central Terminal Building Modernization Geotechnbical Subsurface Data Review & Preliminary Foundation Design Alternatives. August 6, 2010/.

SOM

2013 LaGuardia Airport Development Program Central Terminal Building. CAD files. Prepared by SOM for FAA and PANYNJ.

Wagner, Daniel

2013 personal communication; August 2, 1013.

APPENDIX A

CORRESPONDENCE

Andrew M. Cuomo Governor

> Rose Harvey Commissioner

New York State Office of Parks, Recreation and Historic Preservation

Division for Historic Preservation P.O. Box 189, Waterford, New York 12188-0189 518-237-8643

18 July 2013

Mr. Edward Knoesel Manager, Environmental Services Aviation Department Port Authority of NY & NJ 225 Park Avenue South New York, NY 10003

Re: FAA, PA Central Terminal Building at LaGuardia Airport Borough of Queens, Queens County 12PR05127

Dear Mr. Knoesel:

The State Historic Preservation Office (SHPO) has reviewed the information submitted for this project (*Phase IA* Archaeological Survey Report, LaGuardia Airport Central Terminal Building Redevelopment, Queens Borough, New York City; dated June 2013; prepared by AECOM). Our review has been in accordance with Section 106 of the National Historic Preservation Act and relevant implementing regulations.

SHPO has the following comments and requests for additional information regarding this report.

- 1. We concur with the report's recommendations regarding the "Areas of Archaeological Potential" 1-4 (p. 32). Please provide details regarding the depth of planned excavation in Area 1 when these become available so that consideration may be given to the need for archaeological monitoring.
- SHPO requests additional information regarding the portions of the Area of Potential Effects (APE) encompassing areas that were open water prior to filling (Figure 8). During the early to mid Holocene much or all of this area would have been dry land. Post-glacial sea level rise would have gradually inundated this area, depositing sediments which could contain archaeological materials. These sediments appear to be represented by the "Organic Clays and Silts" described in the geotechnical report (Appendix B). Please provide a comparison of the vertical APE in these areas with the documented depths of the organic deposits. If the vertical APE intersects the organic deposits, please provide a geoarchaeological assessment of whether archaeological sites might be preserved in this context.

SHPO will continue consultation regarding this project once the requested information has been received.

If you have any questions please don't hesitate to contact me.

Sincerely Inão

Philip A. Perazio, Historic Preservation Program Analyst – Archaeology Unit Phone: 518-237-8643 x3276; FAX: 518-233-9049 Email: <u>Philip.Perazio@parks.ny.gov</u>

Cc: John Lawrence, AECOM (via email) Brian Albright, AECOM (via email)

APPENDIX B

CTB MODERNIZATION GEOTECHNICAL SUBSURFACE REVIEW

LAGUARDIA AIRPORT

CENTRAL TERMINAL BUILDING MODERNIZATION

GEOTECHNICAL SUBSURFACE DATA REVIEW

& PRELIMINARY FOUNDATION DESIGN ALTERNATIVES

August 6, 2010

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- 6. Subsurface Investigation
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Exhibit 4 - Boring Stick Log Cross Section C

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Exhibit 8 - Three-Dimensional Subsurface Soils Profile A + B

Exhibit 9 - Fill Materials - Thickness Contours

Exhibit 10 – Organic Clays and Silt - Thickness Contours

Exhibit 11 – Top of Bedrock Contours

Appendix B – <u>SUBSURFACE INVESTIGATIONS</u>

-Drawing # SL-LGA-290 - PROJECT LOCATION MAP, BORING LOCATION PLAN GENERAL NOTES, LEGEND, ABBREVIATIONS & SYMBOLS, SOIL CLASSIFICATIONS

-Drawing # SL-LGA-291 - PRESENTATION OF BORINGS

-Drawing # SL-LGA-292 - PRESENTATION OF BORINGS

-Table B – List of SL Drawings

-Consolidation Summary Report

-Strength Summary Report

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Figure 3 - NYCBC 2008 - Mapped Response Spectra

Figure 4 – Generic Soil Profiles for Site-Specific Analysis

Figure 5 – Input Parameters for Selected Soil Profiles

Figure 6 – Response Spectra for Generic Soil Profiles

Figure 7 – Response Spectra for Liquefiable Sand

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Appendix D – <u>URS LETTER REPORT – SEISMIC GROUND MOTION DEVELOPMENT</u>

Appendix E – <u>COMPARISON OF FOUNDATION TYPES</u>

Appendix F – <u>PRESENTATION OF 3D SUBSURFACE VISUALIZATION (DVD)</u>

1. Introduction

The Port Authority of New York and New Jersey is planning for the modernization of the Central Terminal Building (CTB) and other facilities at LaGuardia Airport. The construction cost of the overall program is expected to be between 3 and 4 billion dollars and is scheduled for project completion by the end of 2020. There are presently several modernization schemes under consideration. The approximate limit of the area within which the various schemes are located is shown by the outline in Exhibit 1 of Appendix A.

LaGuardia Airport has historically been one of the most difficult Port Authority facility sites in terms of foundation design and construction. The most significant reason for these difficulties is the presence of a deep deposit of soft organic clay and silt, which pervades the site. Most of the airport is constructed on land that has been reclaimed from the adjacent bay by placing up to 30 feet of incinerated refuse and miscellaneous fill over the tidal mud flats of the soft clay deposit. The result of this has been post-construction and continuing settlements of up to 8 feet in some areas. These settlements have caused significant structural and operational challenges over the years. These include some pile foundation issues due to "downdrag" loading (discussed in the Foundation Design section), flooding of portions of the airfield, buried utility ruptures due to differential settlements at building interfaces, and sidewalk and apron subsidence issues.

2. Scope of Geotechnical Effort and Report

The scope of this Pre-stage I Geotechnical effort was to compile and evaluate the existing subsurface information throughout the potential project areas of the facility, identify areas where additional Geotechnical data will be required, and provide some preliminary design criteria and foundation concepts consistent with the pre-Stage I planning state of the project design. A limited subsurface investigation was also conducted as described in a later section.

Also included in this Pre-stage I Geotechnical effort was an initiative for the development of a 2D crosssection generating tool and a 3D visualization instrument for presentation and analysis of selected subsurface geotechnical information residing in the EQUIS database.

3. Available Geotechnical Data

A review of all existing Geotechnical data was conducted, including the CAD database, the Soil Log (SL) Drawings, and the existing EQUIS database. The EQUIS database includes: a) test boring information, such as boring locations and subsurface stratigraphy and b) the results of field and laboratory tests. The SL drawings reviewed for this effort are listed in Table B, of Appendix B.

However, given the general similarity of soil strata across the entire airport, laboratory test data from borings from other areas of the airport was used to develop the general soil properties characterization of the subsurface strata presented herein. The results of laboratory tests available in the EQUIS database are also presented in the Consolidation Summary Report, Strength Summary Report and Index Property Summary Report included in Appendix B.

As a result of our review, we realized that many of the existing historic borings for the LaGuardia facility were not imported with full detail into the EQUIS data base. Some of the similar subsurface layers described on the actual field logs were combined into composite strata, losing continuity with the more recent boring entries. At the times of import this was done because of budgetary constraints. Therefore, the characterization of subsurface conditions based on the EQUIS data base must be supplemented with data from the original soil logs.

4. CAD 3D Visualization Effort

The effort undertaken in this initial phase of our pilot program was to develop the capability of connecting the AutoCAD Civil3D resource to the information contained in the existing EQUIS database and interrogating that database to drive the creation of Civil3D entities, such as points and surfaces. These products will be used to visualize the subsurface information from EQUIS in both a 2D cross-sectional and 3D visualization format.

As a result of this task completion, the ability now exists to select specific site boundaries, outlines, alignments, or series of borings and generate sets of "stick log" diagrams which are then used to produce the subsurface 2D cross-sectional profiles. From this subsurface profile base, the 3D visualizations and cutaway views can also be generated including the ability to rotate the subsurface model and also superimpose the proposed foundation outlines. The ability to generate contours of the top, bottom, or even the thickness values of any subsurface strata, within our selected site boundaries, is perhaps the most useful of the tools that have been developed as a result of this effort.

Some examples of the types of exhibits and design graphs or drawings that can be produced are included in Appendix A, entitled "Geotechnical Subsurface Exhibits". Exhibit 1 outlines the limits of the area within which the still active schemes are located, shows the locations of all previous borings drilled within the study area, and illustrates where our study cross-sections were taken in plan. Exhibits 2, 3, and 4, show the "stick log" diagrams of Cross Sections A, B, and C. Exhibits 5, 6, and 7, depict the subsurface soils profiles based on these same Cross Sections A, B, and C. Exhibit 8 is 3D visualization of the subsurface materials, based on Cross Sections B and C, and represents the CAD end product from the illustration point of view. Exhibits 9, 10, and 11, are contour maps which represent the Fill Materials Stratum thickness, the Organic Clay and Silt Stratum thickness, and the top of rock depth, respectively. These last three exhibits represent the most powerful of the AutoCAD development tools from a foundation design perspective. Additional, more specific profiles can easily be generated as required by the planning consultant.

These exhibits illustrate the general subsurface conditions within the limits of the project area and beyond. For example, review of Exhibit 10, Organic Clay and Silt Thickness Contours, indicates that the thickness of the organic stratum generally decreases from about 40 to 45 feet at the CTB to about 5 to 10 feet at the southern edge of the parking garage structure. Similarly, Exhibit 11, Top of Bedrock contours, indicates that the depth to the top of rock appears to vary vary from about 150 ft. at the western most extremity of the project outline, to about 190 ft. as we travel in a south-westerly direction.

An illustrative Presentation DVD has been provided, in Appendix F to this report to more completely demonstrate some of the capabilities of the 3D visualization tool that has been developed, to date.

5. Overview of Subsurface Conditions

LaGuardia Airport lies in a glaciated region north of the Harbor Hill Terminal Moraine. Pleistocene deposits consisting of glacial till, ground moraine, and glacial lake deposits directly overlie Precambrian crystalline rock (gneiss classification). The glacial soils were subsequently covered with a deposit of marine clay when the rise in sea level flooded the area and created the present bay environment. As previously stated, much of the airport resides on land which was reclaimed from the adjacent bays by filling with a partially incinerated refuse and miscellaneous fill.

The general idealized sequence of soil stratification at the LaGuardia site is as follows,

<u>Stratum A – Fill Materials</u>: This upper heterogeneous fill layer consists of coarse to fine sand, crushed rock and gravel, cinders, concrete, brick, glass, wood, and other forms of debris. This stratum extends essentially from existing grade to 10 to 30 feet below the surface. The compactness of this fill ranges from relatively dense within the top fifteen feet to loose, below that top zone.

<u>Stratum B – Organic Clays and Silts</u>: This layer immediately underlying the upper fill strata, consists of soft organic clay and silt materials with a thickness that varies mostly from 20 to 30 feet, with some isolated areas with as much as 50 feet. These strata component materials are still suspected to have significant consolidation potential in certain locations.

<u>Stratum C – Sand Materials</u>: This next layer consists of coarse to fine sand of medium density, ranging in thickness from about 10 to 20 feet.

<u>Stratum D – Varved Silt and Clays</u>: This approximately 50 to 60 feet thick deposit is composed primarily of varved silt and clay material, tending to be overconsolidated and stiff towards the upper portion of the strata and becoming softer with depth in some locations.

<u>Stratum E – Sand / Glacial Till Materials</u>: Below the varved silt and clay is a dense layer of glacial till, consisting primarily of sand, traces of inorganic silt, gravel, boulders and cobbles with thickness varying from 5 to 15 feet.

<u>Stratum F – Decomposed Rock</u>: There is a layer of decomposed or weathered rock, which generally consists of a very dense mixture of sand, silt and gravel. Its thickness can vary from 10 feet up to as much as 45 feet.

<u>Stratum G – Bedrock</u>: The bedrock is a sound quality gneiss, varying in depth from 150 to 190 feet below the ground surface within the project outline. This is as illustrated in the rock contour exhibit in Appendix A.

These layers occur typically in this order and these thicknesses, but with local gaps or intrusions occurring, depending on which geological area of the overall airport site is being considered. Note that there is a subtle delineation between the materials of Stratum E (Sand / Glacial Till Materials) and the decomposed rock classification of Stratum F.

As can be seen in the Subsurface Soils Profiles A and B in Appendix A, there are also significant intrusions of boulders at random depths, particularly in the upper sand strata just below the organic clays and silts, and in the sand / glacial till strata just above the decomposed rock. Red zones shown on the soil profiles indicate the presence of boulders. The presence of boulders in the upper strata would be considered more of a foundation issue from a standpoint of the installation of a pile foundation option.

The following table represents a summary of suggested average design parameters for the soil materials strata, based on the existing sample and testing information that resides in the Geotechnical database:

<u>Stratum</u>	Total Unit Weight (pcf)	Angle of Internal Friction (deg.)	Blow Counts (N)	CR	RR	p _c (psf)
Fill Materials	105	30	18			
Organic Clays & Silts	100		4	.25	.03	*
Sand Materials	120	35	56			
Varved Silt & Clays	125		35	.16	.04	*
Sand / Glacial Till Materials	135	38	70			
Decomposed Rock			85			

* p_c or Pre-consolidation Pressure (see Consolidation Summary Report of Appendix B for test values) **Notes:** CR or Compression Ratio = $C_c/(1 + e_0)$ RR or Recompression Ratio = $C_r/(1 + e_0)$

6. Subsurface Investigation

At this time, because of the early stage of the project, it was decided to perform only three borings along the existing Concourse A. That is where some of the thickest layers of the soft organic clay and silt

deposits are found. The borings are numbered 3-177 through 3-179, and the drilling operations included obtaining some undisturbed Shelby tube samples of the compressible stratum. These undisturbed samples are currently undergoing consolidation testing in the Port Authority Materials Engineering Geotechnical Laboratory. The boring locations and soil logs are shown in Appendix B.

The laboratory test results will be used to begin an evaluation of the consolidation potential and resulting downdrag phenomena that will occur with the deep foundation alternatives (discussed in the Foundation Design section). Of particular interest, and most pronounced in the areas where these new borings were taken, is the possibility that the fill beneath the existing gate fingers is hanging up on the piles and that the underlying clays have not felt the full weight of the fill causing underconsolidation. Underconsolidated soils are those that have not yet been fully consolidated under the existing overburden pressures and, consequently, are susceptible to significant additional settlement.

7. Seismic Design Discussion

To develop the required parameters for determination of seismic loads imparted to the anticipated structures, a first step evaluation of the subsurface conditions was undertaken to establish the project site class. A copy of Table 1615.1.1 of the 2008 New York City Building Code (NYCBC) giving the definitions of the various site classes is presented in Figure 1, Appendix C. For site classes up to and including Class E, a site specific analysis is not required. Parameters given in the NYCBC for the base rock acceleration and the code procedures given for development of the response spectra, considering soil amplification, may be used for each of those classes. If the site is characterized as Class F, however, a site-specific dynamic response analysis must be performed.

7.1 Site characterization:

As described in the Subsurface Conditions section of this report, the project site is covered with a layer of fill that varies in thickness from 10 to 30 feet. Beneath the fill, alternating layers of medium dense silty sand and silty clay are encountered down to the top of bedrock. In many areas, the fill layer is underlain by a 20 to 30 feet thick layer of soft organic clays and silts. Bedrock is encountered at a depth of 150 to 190 feet below grade.

The code gives ranges of several parameters that may be used to determine the appropriate site classification (see Table 1615.1.1). At our site, the most readily available parameter is the Standard Penetration Test or N value (representing hammer blows per foot) from the borings. In order to characterize the site class, it is necessary to calculate the average N value for a depth of 100 feet. Based on the existing borings at the site, the calculated average N value is in the range of 11 to 13 blows per foot (bpf). Since the average N value is less than 15 bpf, the site should be categorized as Class E.

Layers of sandy materials, however, with N values in a range of 4 to 7 bpf were found in some borings in both the fill layers and the sand layers underneath the organic clay and silt stratum. Sandy materials with this range of blow count near the surface and below the water table are susceptible to liquefy during earthquakes. In Figure 2 of Appendix C, entitled "Liquefaction Potential Assessment", the N values for boring 2-081 are plotted together with a liquefaction assessment diagram from the NYCBC (Figure

1813.1), indicating that the N values for the layers of sand above and below the organic clay will have the potential to be liquefied. Additionally, in most of the borings in which organic soils were encountered, the thickness of the organics was greater than 10 feet. The presence of liquefiable soils or organic soils having a thickness greater than ten feet, automatically defines the site as Class F and, consequently, a site specific analysis is required.

In order to perform a site-specific analysis, rock outcrop ground motions are required as input to a computer program, such as PROSHAKE. This program does a one dimensional wave propagation analysis to determine how the shears, accelerations, and ground motions are amplified in the selected soil profile. From this analysis, a site-specific response spectrum is developed.

7.2 Input ground motion:

The 2008 NYCBC only provides ground accelerations for Class B rock at 0.2 sec and 1 sec and the procedures to develop a response spectrum for soil Classes A to E. Since the site for the terminal is classified as Class F and is underlain by Class A rock, rock motions for Class A rock are required in order to develop the soil response spectrum needed by the Structural Engineering Discipline to calculate the seismic forces. Since the codes do not provide the ground motions for the rock, synthetic ground motions that match the Class A rock spectrum (Figure 3) which is obtained from the code, need to be developed. These synthetic motions were generated by our consultant, URS Corporation, and are shown in Figures 2 through 4 of their report. The procedures used to match the target spectrum are presented in the URS letter report and included as an Appendix D.

7.3 Selected soil profile:

Four generic soil profiles were used to represent the site, as shown in Figure 4 of Appendix C. Soil Profile A represents the area with all sands. Profile B and C represent the areas with a thick organic layer underlain by a layer of sand for B and silty clay for C. Profile D represents an area where the organic clay is underlain by a layer of sand over the clay and silt. The top layer of sand for both soil Profiles B and D and the layer below the organic clay for soil Profile D were changed to liquefiable sand for the ground softening analyses.

The PROSHAKE program requires input of shear wave velocity data for each of the soil strata. The shear wave velocity for each soil stratum was determined using empirical equations that relate the shear wave velocity to the N value, as shown below:

 $G = \gamma/g Vs^2$ and $G = 120N^{0.8}$ Then $Vs = 2780(N^{0.8}/\gamma)^{0.5}$ ft/sec

The input soil parameters used to generate the site-specific spectrum for 5% damping are shown in Table 1 (Figure 5 of Appendix C). The site-specific response spectra for the selected profiles are shown on Figure 6, Appendix C.

The long period of the response spectra were modified to account for possible soil softening due to cyclic loading during the earthquake due to liquefaction. The approximate method for considering the effects of liquefaction on the response spectrum was provided to us by Dr. Ricardo Dobry of Rensselaer Polytechnic Institute for work on another project. The method involves reducing the shear wave velocity

used in the PROSHAKE analysis for the liquefiable soils. To develop the response spectrum shown in Figure 7, Appendix C, we reduced the shear wave velocity for the liquefiable soils to 150 fps. The effect of the liquefaction is to reduce the spectral accelerations in the short period range and increase them in the long period range.

7.4 Conclusion:

The maximum points, i.e. the envelope that encompasses the spectral accelerations for all the analyses are shown in Figure 8, Appendix C, together with the NYCBC Soil Class D and E response spectra. Figure 8 indicates that for a structural fundamental period between 0 to 1 second, the spectral accelerations are close to the NYCBC Soil Class E and for long period structures (T > 1.0 second), the spectral accelerations were impacted by soil softening due to liquefaction and the values are close to those of Soil Class D. Therefore, for this preliminary design stage, we recommend using the Soil Class E spectrum of the NYCBC for the fundamental period of the structure at T < 1.0 second and the Soil Class D spectrum for T > 1.0 seconds.

7.5 Recommendations for Further Study:

As the project phases advance and design efforts continue, there is a need for additional subsurface investigation not only to support the foundation design alternatives which are described in the following sections, but also for better definition of this seismic design issue. While carrying out the prescribed boring and sampling program, cross-hole measurements would be recommended to determine actual site-specific shear wave velocities for the various soil strata.

8. Considerations for Foundation Design

The existing CTB is a six-block long structure consisting of a four-story central section, two three-story wings, and four radiating concourses with a total of 40 aircraft gates. The building was expanded in both the 1990's and early 2000's. For this primary airport structure, the foundation design was based on end-bearing steel pipe piles founded on either the glacial till or decomposed rock as the bearing layer. The Parking Garage, the other major structure at the terminal proper, utilizes the same foundation design.

The top Fill and upper organic Clay and Silt layers are considered either too loose or relatively too soft to ultimately support the column loads for either a new terminal or parking garage. These planned structures would most likely need to be founded on a deep seated foundation system, below the soft organics at about a probable minimum depth of about 50 feet. The 10 to 20 foot medium dense sand layer encountered at that point might be considered a capable bearing stratum, but is sometimes to thin and erratic in nature, particularly in the area near Parking Lot #3. Below the sand layer is a stiff varved silt and clay, which might have been an adequate bearing stratum but is inconsistent with interbeds and some softer zones with depth.

Ultimately, either the glacial till or decomposed rock layer or the bedrock surface at probable depths of from 150 to 190 feet, will be the founding strata for a steel pipe pile or deep caisson design. The medium dense sand stratum below the soft organics could be suitable bearing layer for a tapered type

pile foundation. These foundation types are among those discussed in the following Section 9, entitled "Foundation Alternatives".

The deep pile foundation alternatives will be subject to a negative skin friction or "Downdrag" effect caused by the continued consolidation of the soft organic clay and silt stratum. While the soils move downward around the pile shaft, a downward force is transferred from the soil, through the shaft, and into the pile tip at the bearing elevation. Based on past experience at the LaGuardia site in this project area, as much as 50 to 250 tons of downdrag force per pile might be anticipated depending on the type, diameter, and length of the piles as well as the thickness of fill and organic soils at any particular location. There are some techniques such as bitumen coatings which can be explored to reduce this downdrag effect. However, there is relatively little data to support the long term effectiveness of these techniques. The ultimate solution is to design the foundation system to withstand and accommodate the anticipated dragdown forces.

9. Foundation Alternatives

Due to the presence of the compressible clay layer of significant thickness, deep foundation alternatives will be the primary foundation types considered for support of major structures. Based on our Pre-Stage I level of design considerations, the suitable foundation types and anticipated capacities that can be considered are:

Steel Pipe Piles (with straight shaft):

Driven concrete filled steel pipe piles of 10 to 14 inch diameter with a length of about 120 feet at a tip elevation of approximately -100. These can provide an anticipated load capacity of 80 to 120 tons which would then have to be reduced by the amount of downdrag quantified at specific locations.

Steel Tapered Tube / Monotube Piles:

Driven concrete filled steel tapered tube piles or monotube piles with 14 to 18 inch diameter tapering to a 8 to 12 inch diameter, for a length of about 60 to 120 feet. These may provide a greater anticipated load capacity of 120 to 150 tons due to additional resistance provided by the taper in the bearing stratum, and a higher potential set-up value that might develop. This set-up additional load capacity, if any, tends to be site specific and would have to be investigated before use in the final foundation design. In areas where the sand layer underlying the organic clays is sufficiently thick, it may be feasible to achieve capacities 60 to 100 tons at significantly shallower depths. However, an assessment of the potential settlement due to compression of the clays below the sand layer would be required.

Drilled Caissons (bearing on or socketed into bedrock):

Auger installed 18 to 36 inch diameter caissons resting on the top of bedrock at a depth of from 150 to 180 feet below grade, providing a large end bearing capacity. Each caisson might provide a load capacity of 180 to 400 tons depending on the caisson diameter, also then subject to a reduction due to downdrag.

Auger installed 18 to 36 inch diameter caissons socketed into the bedrock at the same depths of 150 to 180 feet below grade with an additional 5 to 10 feet for socketing. The same large end bearing capacity is provided along with an additional substantial value of side friction between the caisson shaft and the

rock. Each of these socketed caissons might provide a load capacity of 400 to 750 tons or greater, depending on the caisson diameter, the length of the socket and the structural capacity of the caisson, also then subject to a reduction due to downdrag.

All pile and caisson capacities would need to be verified with pile load testing. The table presented in Appendix E, represents the results of a preliminary comparison between the foundation types considered to be most appropriate, at this stage of the project design, for the existing subsurface conditions at LaGuardia.

10. Conclusion

At this very preliminary stage in the LaGuardia Modernization Project, it is our recommendation, based on the existing subsurface data and our knowledge of past site foundation behaviors, to utilize the dense till/decomposed rock as the bearing stratum for a deep foundation system, thereby minimizing any potential settlement issues. Advancing the foundations deeper to the top and possibly even into the bedrock might be a preferred version of the deep foundation design, dependent on an analysis of the cost trade off between additional length and installation difficulty vs. increased capacity.

When a given design depth for optimum bearing has been more or less established, a further cost-benefit analysis will then need to be performed for the most effective diameter of the foundation elements (pile size vs. caisson). Ease of construction, amount of site disturbance, and relative reliability of the installations also need to be considered, along with the price. In view of the potentially large downdrag forces that are anticipated, it is likely that smaller diameter foundation elements may prove to be more economical.

ADDENDIX A

GEOTECHNICAL SUBSURFACE EXHIBITS

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 BORING STICK LOG CROSS SECTION B	Contract Number 09744000 PID Number	Workorder Number Drawing Number EXHIBIT 3

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320 El:12	2- El:	996 2- 15.8 FI	-995A :15.5	2-994 EI:14.2	2-993A EI:13.2	S-3 FI:10	2-991A 2-9 El:12.5 El:11	190 E
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-100 - 16 - 35 - 110 - 20 - 20 - 120	34 5) 61 33 58 17 52 15 171 15	SLT C-F SMO DECOMPOSED ROCK	SMD	22 41 47 32 43 116 24 76 24 104 25	24 40 33 32 62 32 63 23 103 21	99 27 5ANO 32 99 27 5ANO 26 62 33 24 100 21 22 28	58 58 58 58 58 58 58 58 58 58 58 58 58 5	-100
LEGEND: 310 BOREHOLE NUMBER EL:16 BOREHOLE TOP ELEVAT D (11 SPI NL) (ALLE					LAGUARDIA	Discipline	8/6/2010	<u> </u>
B/ftSPT N VALUE0150300W%WATER CONTENT (%)HORIZ. SCALE IN FEETHAHAND AUGER		THE I D.CAVALII Designed	PORT AUTHOR ERE R.YIN	S.LEIFER	AIRPORT	BORING STICK LOG CROSS SECTION C	8/6/2010 Date Contract Number 09744000 PID Number	4 of 11 Workorder Number Drawing Number EXHIBIT 4

				1							-1 -1 -1
SAND	116 24 70 24 104 26	SAND	62 32 63 23	SWO	82 33		24	SAND 148 60 CLAY & SILT			E -1
	22 41 32 43	2	25 48 24 40 33 35		77 ži 99 27 1	SAND	37	59 96	49	25	E-1
	28 28		26 32 20 34	CLAY	40 37		23 37 28	35 SEL & CLAT	4 28 34	30 25 M-F SAND 24	<u>-</u> -9
SAND	26 33 30 34	CLAY & SET	26 32 19 33	1	26 37 28 39	SILT & CLAY	23	100/4** 25	13	CLAY & SILT	-E -8
SILT	16 54 22 38		41 25 28 30	SAND SELT & CLAY	46 28		⁷⁵ ⅓ ⊟ sand 23	48 16 SAND	WOR/78	38 19 SWD	-7
SMD	14 50 12 43	SETY CLAY	28 22 12 31	CLAY & SLT	5 36 43 30	SELTY CLAY SAND	11 85 NX 87	WOR/18 WOR/18 WOR/18	WOH/18	73 61 ÅJ	-e
SULT	42 18 35 24	CLAYEY SLT	56 22	SAND	WOR/18 85 WOR/15 90 WOR/18 44		7 76 AND PEAKS	WOR/18	2	79 78	Ē -5
CLAYEY SILT	WDH/18 43 WOH/18 68 190 14		WCH/18 59 20 14	GRAVEL	PRESSED 72 WOR/18 83	ORGANIC CLAY	7 69 74 8 71 74 8 76 76 76	WOR/18 ORGANIC CLAY WOR/18	2	79 82	
ORGANIC CLA	24 25 16 7 63 PRESSED 33	WOOD	62 woh/18 72 woh/18 89		WOR/18 81 WOR/18 74		6 67 72 12 75 XX 72 13 75 XX 57	WOR/18 PRESSED	1/12	71	-2
	9 23 23 18 25 17 20 21 20 23	6	5 28 4 37 WOH/18 58 PRESSED 60		10 29 5 36 WOH/18 64 WOR/16 77	-	9 23 50 9 23 34 7 25 70 7 57 € ORGANIC	8 SILTY CLAY 17 SAND 9	7	38 MISC-FEL 31 53	[-1
mu.	2 24 2 26 2 29	FILL	10 21 13 33 10 26 11 25	C PLL	HA 8 29 23 19 22 17 19	nu	16 15 47 16 15 47 14 SAND 54 15 23 26	16 FLL 10 MISC-FILL 8 17 SAND	50 153 10 5 7	20 MISC-FILL 12 FILL 23 MISC-FILL 24 FILL 29	Ē
	HA 7 HA 8 HA 8 .2 19		HA 8: HA 11 HA 20 10 16		EI:8.	4	87 8/11 WX 7111 11 2 2 4 19 13	B//12 HA HA HA 12 MISC-FEL	B/0 PA HA 55	15 4 FRL 10	E 10
El:15.5	ĒI:	14.2	Êl:1	3.2	2-9	92	EI:10 E	1:12.5	EI:1	2.3	E 20

APPENDIX C

WEST END GARAGE GEOTECHNICAL BORING LOGS

AS-DI	RILLED BO	RING LOC	ATIONS
BORING NO.	NORTHERLY	EASTERLY	SURFACE ELEV.
3-221	221056.7	1018710.3	12.9
3-222	221047.6	1018764.1	13.0
3-223	221117.0	1018859.4	12.6
3-224	221151.5	1018913.9	12.7
3-225	221157.7	1019013.2	12.6
3-226	220946.4	1018652.7	14.3
3-227	220943.1	1018758.9	12.5
3-228	220964.9	1018804.7	12.5
3-229	221029.1	1018914.6	11.7
3-230	221082.4	1019072.9	13.0
3-231	220852.4	1018658.6	14.9
3-231A	220856.4	1018662.5	14.8
3-232	220870.1	1018779.7	14.0
3-233	220891.1	1018864.9	13.4
3-234	220935.6	1018985.0	12.2
3-235	220947.7	1019113.3	10.4
3-236	220712.8	1018655.1	18.4
3-237	220760.6	1018741.3	16.2
3-238	220775.3	1018856.9	14.1
3-239	220827.4	1018958.8	12.9
3-240	220823.3	1019077.6	11.6
3-241	221078.2	1018557.5	12.8

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E 1015		ы м N 221400									
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	8		CHIE	r GEU	JIEC	ΠΝΙCΑ	L ENGI	NEEK			
		N 221200									
	TERMINAL BL	N 221000 * *									
		N 220800									
			1	7/9/1	13 F	Revise	d Scale	e for	3LP	N.Y	
		00861	No.	Date	e	Revisi	ion			Appro	ved
		Э N 220600	EN	GINE	ERI	ING	DEPA	RTM	ENT		
4			LA	١G	U,	AF	IDI	A			
			A	RF	PC	R	T				
			GEC	OTEC	CHN	IICAL					
			Title								-
SURFACE DATA F IGS DRAWINGS A	REPORTED ON THE PRESEN ND THE FORMS ENTITLED	NTATION OF BORING			١	NEST	END G	GARAG	E		
RI, DRILLING REI ' CONDITIONS EN PARTICULAR POIN	COUNTERED AND OBSERVE	SAMPLES D ONLY AT MPLES.									
CORE AND SUB TIME THE TEST E	SURFACE DATA WERE OBT BORING WAS MADE.	AINED AT		Ρ	RC)JE(CT SI		ЛАF)	
LE NUMBERS DE	SIGNATED AS 'UA' AND 'U	B'	[BOF	RIN	GL	OCA	TION	N PL	ÂN,	
BY TUBE BOTTOM	(UBOT) RESPECTIVELY.		G AF	iENI RRR	ER/ FV	ΑL Γ ΙΔΤΙ		ES, L ເ	.EG YM	end Roi), S
NGS NUMBERED PLETED IN CONJU -121 201 "WFS	3–221 THROUGH 3–241 JNCTION WITH CHARGE COI T FND GARAGE"	WERE DE NUMBER		SO		CLA	SSIF		TIO	NS	,
,			This dra	awing sul	bject t	o conditi	ons in con	ntract. All	invention	s, ideas,	
			designs be used All recip not bid	and me d without pients of and the	thods its wi Contro ir pros	herein ar ritten cor act docur spective s	re reserved isent. ments, incl subcontract	l to Port i luding bidd cors and s	Authority lers and uppliers	and may those wh who may	not no do
			make e Contrac containe method	very effo t docume ed in the s of doc	ents to ents to docu ument	ensure the prevent ments. destructi	further di Secure and ion such a	and appro sclosure o appropri s shreddir	priate di of the in ate dispo ng or ar	sposal of formation sal inclue rangement	the des ts
			with ref to the Docume Desk or	fuse hand documen ents may n the 3rd	dlers ti nts'cor also l d Floor	hat ensu ntents eil be return r, 3 Gate	re that this her before ed for dis way Center	rd persons , during, posal purp r, Newark	s will not or after oses to NJ 0710	the Cont the Cont or the the Flor	ract
			New Yo It is a unless register	rk NY 10 violation acting u ed arch	of la nder t nitect.	w for an the direct If this	ion of a docume	to alter a licensed p nt bearin	docume profession g the	ent in an nal engine seal c	y way, eer or of an
			enginee the doo signatur the alte	r/archite cument t re and t eration.	ect is o their so the dat	altered, t eal and te of suc	he altering the notation ch alteration) engineer, on "altered on, and a	/archited d by"fc specific	t shall a Ilowed by descript	ffix to their ion of
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			Date	9	-			JU	<u>NE 1</u>	9, 2	013
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NOTE: FO	R PRESENTATION OF I E DRAWINGS LGA-SI-	BORINGS, ·316		ישפו	•			<u>~'</u>		• •	_
TH	ROUGH LGA-SL-323.		Drav Num	ving nber		<u>G</u> /	-/	<u>SL</u>		<u>31</u>	5
								PI)#	NUM	IBER

	BORING	g no. -22		ATE 01-2	3-1	PROJECT		WEST END GARAGE		BORING NO. DA 3-222 0
	,					BLOWS PER 6 IN.		LOCATION N 221056.7 E 1018710.3		
	ត	TERS)	z	R I		1 3/8 ID SPOON 140 LB. HAMMER		SURFACE 100 WL 47 BY: K.L.	୦ୟ	
	Ē	E S		E E	MBOL	30" FALL ROCK CORE	APLE MBER	ELEVATION 12.9 ELEVATION 4.7 CHECKED BY: N.Y.	DRAT	
	G	3	35	≸ 8	8	REPORT	<u>3</u> 5	SAMPLE CLASSIFICATION	3 E	
)	0	^{-12.9}							$0 \qquad 0 \int^{13.0}$
	Ξ			9		POST HOLE DIGGER	01	FILL-BROWN M-F SAND, LITTLE GRAVEL, TRACE SILT, ROOT FIBERS	and the second second	
		1		10		POST HOLE DIGGER	02	FILL-BROWN M-F SAND, LITTLE GRAVEL, SILT FILL-TAN FINE SAND		1
		-2		14		WL 3-2-2-2	04	FILL-TAN FINE SAND, LITTLE SILT		 2
10)	<u> </u>		33 30		₩ 4-2-2-2 2-2-2	05	FILL-TAN FINE SAND AND SILT		10
	=	4		37		2-2-2	07	SAME		4
		5		25		2-1-3	08	SAME		E
			-4.0	22	ĥĥ	8-9-5	09	GRAY SILT, TRACE FINE SAND		
20)	0		31		6-6-6	10	SAME		206
		7	-12.1	20		7-18-13	11	GRAY BROWN SILT, TRACE FINE SAND		
		8		13		5-6-9	12	TAN M-F SAND, SOME SILT, LITTLE GRAVEL		
	、二	9	-17.1							
3	, <u> </u>	10		11		26-31-29	13	BROWN GRAVEL, LITTLE M-F SAND, SILT		30
		- 10	-22.1							10
	Ξ	11		12		20-37-31	14	BROWN FINE SAND, LITTLE SILT, TRACE GRAVEL		<u>11</u>
4()	- 12		17		16-20-19	15	GRAY M-F SAND TRACE SHT		40
		13				10-20-10				— 13
		14	-32.1	21		21-22-22	16	RED SILT		14
		15								
50)			22		11-10-15	17	GRAY SILT, LITTLE FINE SAND		50 15
	=	16								16
	-	- 17		24		14-18-24	18	RED BROWN SILT, TRACE FINE SAND		17
60)	18								60
		19		18		16-14-18	19	GRAY SILT, LITTLE TAN M-F SAND		- 19
	_	20		21		17-21-23	20			
	-	21								-55.0
7()	- 21		32		8-10-16	21	GRAY CLAYEY SILT, TRACE FINE SAND		70
	Ξ	22	-62.1							22
		- 23		17		15-26-40	22	BROWN M-F SAND, LITTLE SILT, TRACE GRAVEL		
		24								24 -67.0
	_	25		18		23-32-33	23	BROWN M-F SAND, TRACE GRAVEL		
	_	26								
		20		12		24-30-33		BROWN M-F SAND, LITTLE GRAVEL		
90)	27	-77.1	26	100	8-16-17	25			90 27
	=	28			W					28
	_	- 29		32	W	15-16-21	26	SAME		2982.0
		30			W	1				
1	00			31	W	10-14-18	27	SAME		100
		70			W	1				
		- JZ		37	Wł	11-15-19	28	SAME		<u> </u>
1	10		-97.1	 	ĮĮĮ	1 <u></u>				110
ľ		34		31	W	14-13-21	29	UNT SILIT ULAT		
			-102.1	31	H	8-12-17	30	GRAY CLAYEY SILT, TRACE FINE SAND	┝──┤	35
	_	36			Wł	1				
1	20			32	W	12-15-19	- 31	SAME		120
	_	70	-112.1		W				·	
		70		31		9-14-17	32	GRAY SILTY CLAY, TRACE FINE SAND		
1	30—		-117.1		Ŵ	17 00 07				130
		40		24		13-20-2/	33	utat fine Jaind, Irace Sili		40
		41		16		19-27-30	34	GRAY GREEN C-F SAND. LITTLE SILT. GRAVEL		41
	-	- 42						· · · · · · · · · · · · · · · · · · ·		42
1	40	43		16		29-44-50/0"	35	GRAY GREEN C-F SAND, SOME GRAVEL, LITTLE SILT		140
			-131.1	 	in the second					
					KXX	REC=100% ROD=100%	R1	GRAY GNEISS		
		- 45	-136.1	<u> </u>	E	1	L			45
										46
						, ,				47

NOTE: FOR PROJECT SITE MAP, BORING LOCATION PLAN, LEGEND, GENERAL NOTES, ABBREVIATIONS, AND SOIL CLASSIFICATIONS, SEE DRAWINGS LGA-SL-315.

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(d):

ATE 1-2	5-1	PROJECT		LGA WEST END GARAGE	
		BLOWS PER 6 IN.		LOCATION N 2210476 F 1018764 1	-
(X		1 3/8"ID SPOON 140 LB. HAMMER			ž
EN	ಸ್ಥ	30" FALL	5	ELEVATION 13.0 VL ELEVATION 2.8 CHECKED BY: N.Y.	NG RATC
WATE	SYME	ROCK CORE REPORT	SAMF NUM	SAMPLE CLASSIFICATION	LABO TEST
3	No. 24	POST HOLF DIGGER	01	FILL-TAN BROWN M-F SAND LITTLE CRAVEL TRACE SILT	
3		POST HOLE DIGGER	02	FILL-TAN BROWN M-F SAND, LITTLE GRAVEL, TRACE SILT	
6		POST HOLE DIGGER	03	FILL-TAN BROWN M-F SAND, TRACE GRAVEL, SILT	
14		1-2-1-2	04	FILL-TAN BROWN M-F SAND, TRACE SILT	,
28 31		$\nabla WL^{2-1-3-4}$	05 06	FILL-TAN BROWN M-F SAND, TRACE SILT (STRONG PETROLEUM ODOR) FILL-TAN GRAY FINE SAND, SOME SILT	
29		- 2-1-2	07	FILL-TAN FINE SAND, TRACE SILT	
30		2-1-2	08	FILL-TAN FINE SAND, LITTLE SILT	
34		2-2-2	09	GRAY TAN SILT. TRACE FINE SAND	
41		2-4-6	10	GRAY SILT AND SLIGHTLY ORGANIC CLAY, TRACE FINE SAND	n
11	4	40-25-11	11	TAN M-F SAND, LITTLE GRAVEL. TRACE SILT	
7	649 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	11-20-19	12	TAN C-F SAND, SOME GRAVEL LITTLE SHIT	
	8., 3., 4	10 11 11			
		12-11-11	-13	BROWN M-F SHID, LITTLE SILT, GRAVEL	
		17 10 00			
19		13-19-22	14	THE GRAT FIRE GARD, SUME SILI	
		00 74 70		CALIF	
21		22-31-32	15		
		AA 84			
20		20-32-37	16	SAME	
					ĺ
18		19-28-37	17	SAME	
					ì
20		21-28-23	18	RED GRAY FINE SAND, LITTLE SILT	
19		18-26-29	19	RED GRAY SILT, SOME FINE SAND	
07		17 70 10			
23		17-30-19		SAME	
70		E 0 11	01		
52	18	5-9-11			
70		9-12-15			
53		0-12-13		GRAT SILI AND SLIGHTLT OKGANIC CLAT	
	μ	10-21-21	- 23		
		10-21-21		OIVI M-I JANG, IIVIGE JEI	
12		36	24		
12		JO-+0-+0		BROWN C-F SAND, LITTLE GRAVEL, INACE SILT	
10		27-34-37		BROWN C-F SAND, TRACE GRAVEL, SILT	,
		A 44 46			ļ
20		4-11-15 PRESSED	26	GRAT CLATET SILI, IRACE FINE SAND	
L	μ <i>Υ</i>	TREADE TA	2/0		
10		162530		BROWN C-F SAND, TRACE GRAVEL, CLAYEY SILT	
15		20	- 20	BOWN CLE SAND TRACE OPAVEL OUT	l
10		2 0 -22-20	<u>- 29</u>	DIGHT UTT JANU, INAUE GRAVEL, SILI	I
0		22-24-27	- 20		I
3.		66-6 9- 61		DIVERT OFT STATU, LITTLE UNAVEL, HAGE SILI	
15		162126	- 71		
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15		19-20-22	32	SAME	
					· ·
31	~	20-23-28	33	GRAY SILT AND CLAY, TRACE GRAVEL	
24		13-16-24	34	GRAY FINE SAND, TRACE SILT	
					. У
19	1	12-20-27	35	GRAY FINE SAND, TRACE GRAVEL. SILT	
9		17-25-25	36	GRAY C-F SAND, SOME GRAVEL. LITTLE SILT	
10		13-21-22	37	BROWN C-F SAND, SOME GRAVEL, LITTLE CLAY AND SILT	
		100/4"	-(38)	NO RECOVERY	
17		38-100/3"	-39-	BROWN M-F SAND, SOME SILT, LITTLE GRAVEL	
			-		L

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ſ	BORIN	G NO.	DA	TE		PROJECT		
ļ	3.	-22	3 .0	2-0	1-1			
		S)		R		1 3/8"ID SPOON		LOCATION
	(E)	ETER	NOL		۲.	140 LB. HAMMER 30" FALL	щщ	SURFACE ELEVATION
	EPTH (F	3	LEVA FEET	ATER	MB	ROCK CORE	AMPI 4UMB	
l				× 0	0,	REFORT	<i>v, z</i>	
C)	0			·- >			
	3	1		12 9		Post Hole Digger	01	FILL-BROWN
	_			8		POST HOLE DIGGER	03	SAME
	3	2		21		6-6-7-8	04	FILL-TAN C-
10) — <u>∃</u>	3		26 44	، سنېد د په مور د	7-5-4-4 <u>ZWL</u> 2-2-3	05	FILL-TAN M
	=	4		30	1.9 4.9 ···	₩ 4-4-4	07	FILL-TAN M
		5	4.0	30		5-6-6	08	FILL-TAN M
	. 3			24		2-7-6	09	TAN SILT, LI
20)	0	-9.9	24		PRESSED	100	BROWN CLAY
	Ŧ	-7	-12.4	11		6-15-13		tan m-f si
	Ξ	8		10		8-12-29	12	GRAY GRAVE
7/	、 =	9	-17.4					
3(, <u> </u>	4.0		19		13-17-19	13	tan c-f si
		10						
	4	11		18		15-13-16	14	BROWN M-I
4(_	12				01		DDOWN M.
		13		14		21-14-27	15	
			-32.4	20		14-14-15	16	RED GRAY
	Ξ			20		14-14-10		
50	⊳	15		20		14-17-24	17	SAME
	-	16		·				
		17	-42.4	18		16-22-30	18	RED BROWN
	Ξ	18						
60)	10		21		19-19-30	19	RED GRAY
	Ξ	19						
	_	20		20		22-29-34	20	SAME
70	n	21	-57.4					
~		22		31		7-10-15		GRAY SILTY
	_					6 10 10		CAME
	Ξ	25		30		6-10-19		SAME.
8	o	24		30		6-9-17	23	SAME
	Ξ	25				0-3-17		Crunc.
		26	-74.4	15	μ	22-22-35	24	GRAY C-F
		07			m			
90	o— <u>−</u>	21		24		17-16-25	25	GRAY M-F
	-	28		- :		•		
			-82.4	16	Ŵ	12-23-28	26	GRAY CLAYE
					W			. .
100	0			10	111′	14-17-32	27	TAN SILT, S
	_		· .					
		32		14	W	17-22-42	28	TAN CLAYEY
1 1 /	<u> </u>	33			111		-	
		34	,	16		17-17-30	29	GRAY BROW
		35		14		88-100/3	-30-	GRAY BROW
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		38	-112.4	28	TPP	16-31-41	32	GRAY CLAYE
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130	0	40	-117.4	22		17-23-25	33	GRAY M-F
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17(-	52			XXX	REC=94% RQD=70%	R2	GRAY GNEIS
			-161.4	1	1~	1	1 .	1

	Sheet 2 of 9
WEST END GARAGE	
N 221117.0 E 1018859.4	OF NY & NJ
12.6 WL 1.5 BY: K.L. CHECKED BY: N.Y.	TING ORATO
SAMPLE CLASSIFICATION	E E E E E E E E E E E E E E E E E E E
n m-f Sand, little gravel, trace silt, root fibers I-F Sand, little gravel, trace "silt	Maril 1.
-F SAND, LITTLE WOOD, TRACE GRAVEL, SILT	CHIEF CENTECHNICAL ENCINEED
I-F SAND, TRACE SILT I-F SAND, LITTLE SILT	UNEF GEUTEUNNUAL ENGINEEK
I-F SAND, TRACE SILT	
I-F SAND, LITTLE SILT	
AY AND SILT	AL,UU,CO,SG
AND, LITTLE GRAVEL, TRACE SILT	
EL, SOME C-F SAND, TRACE SILT	
AND, TRACE GRAVEL	
F SAND, TRACE GRAVEL	
f sand, trace sea shells	
SILT, TRACE FINE SAND	
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N C-F SAND	
SILT, TRACE FINE SAND	
56 -	No Deta Pavision
CLAY	
	ENGINEERING DEPARTMENT
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SAND, SOME GRAVEL, TRACE SILT	
SAND, TRACE GRAVEL	
ey silt, little gravel, C-F sand	
SOME GRAVEL, LITTLE C-F SAND	GEOTECHNICAL
	Title
Y SILT, LITTLE GRAVEL, C-F SAND	WEST END GARAGE
VN SILT, SOME GRAVEL, LITTLE C-F SAND	
TT VATEL OFF, OUTE OUTEL, LITTLE OFF OUTU	
SAND, TRACE GRAVEL	
FY SHIT. TRACE FINE SAND	
SAND, LITTLE SILT	
SAND, TRACE SHT	This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent.
	All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and suppliers who may receive all or a part of the Contract documents or copies thereof, shall make any officient to contract documents or copies thereof, shall
VN GRAVEL, LITTLE C-F SAND, TRACE SILT	Contract documents to prevent further disclosure of the information contained in the documents. Secure and appropriate disposal includes methods of document destruction such as shredding or arrangements
	with refuse handlers that ensure that third persons will not have access to the documents' contents either before, during, or after disposal. Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor. 3 Gateway Center. Newark NJ 07102 or the
	office of the Director of Procurement, One Madison Avenue, 7th Floor, New York NY 10010. It is a violation of law for any person to alter a document in any way
SS, BOULDER	unless acting under the direction of a licensed professional engineer or registered architect. If this document bearing the seal of a engineer/architect is altered, the altering engineer/architect shall affix t the document their seal and the notation "altered by" followed by their
N C-F SAND, LITTLE GRAVEL, TRACE SILT C-F SAND, LITTLE GRAVEL. TRACE SILT	signature and the date of such alteration, and a specific description of the alteration.
	N. TAKUBOV A. COFRANCESCO N. YAKUBOV Designed by Drawn by Checked by
M-F SAND, LITTLE GRAVEL, ROCK FRAGMENTS, TRACE SILT	Date JUNE 19. 2013
SAND, LITTLE GRAVEL	Contract
	Number
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	Number LUA-JL-JIO
	PID# NUMBER

PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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ハ	<u></u>		BLOWS PER 6 IN.		LOCATION N 221157.7 F 1019013.2	
The second second second	T (%)		1 3/8"ID SPOON 140 LB. HAMMER		SURFACE 12.6 WL 7.1 BY: K.L.	TORY
And the second se	ATER DNTEN	MBOL	JU FALL ROCK CORE	MPLE UMBER	ELEVATION 12.0 ELEVATION 1.1 CHECKED BY: N.Y.	ABORA
	ŝŌ	۵ ا	REPORT	ςΛ Ż		<u>э</u> Е.
	13		HAND AUGER	01	FILL-BROWN SILT, LITTLE GRAVEL, M-F SAND	
STREET, STREET	9		HAND AUGER	02	FILL-BROWN SILT, SOME F SAND, LITTLE GRAVEL	
	15 15	Ħ	<u>- 1-1-1-2</u>	03 04	FILL-TAN SILT, SUME FINE SAND, TRACE GRAVEL FILL-TAN SILT, LITTLE FINE SAND, TRACE GRAVEL	
	23 21		1-1-2-3 2-2-4	05 06	FILL—TAN SILT AND FINE SAND, TRACE GRAVEL FILL—TAN M—F SAND, SOME CLAYEY SILT. TRACE GRAVEL	
	20		1-1-1	07	FILL-TAN N-F SAND, SOME SILT, TRACE GRAVEL	
	25		2-2-3	08	GRAY M-F SAND, LITTLE SILT	·
	34	Ц	1-1-2	10	GRAY SILI, LITTLE, TRACE GRAVEL, FINE SAND GRAY SLIGHTLY ORGANIC CLAYEY SILT, TRACE GRAVEL, FINE SAND	-
The second s	29	\	2-2-5	11	SAME	
	24	((1-2-1	12	BROWN SILT & SLIGHTLY ORGANIC CLAY & M-F SAND, LITTLE GRAVEL	
	12	2000 2000 2000	12-6-4	13	BROWN GRAVEL, SOME C-F SAND, TRACE SILT	
	-					
	5		6-5-7	14	BROWN GRAVEL, LITTLE C-F SAND, TRACE SILT	
-	21	000	5-7-8	15	BROWN M-F SAND, TRACE SILT	
	47		0 44 44	-		,
	1/		9-11-11	10	DRUMM M-F JANU, IRAUE GRAVEL, SILI	
-	21	ÎÎÎ	10-9-10	17	RED BROWN SILT, TRACE FINE SAND	
	34	μ	5-6-8	18	GRAY SILT AND SLIGHTLY ORGANIC CLAY	
	35 16	((PRESSED	19UA 19UB	GRAY SLIGHTLY ORGANIC CLAY AND SILT GRAY BROWN SILT AND CLAY, TRACE FINE SAND	UU,SG AL
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	12		14-16-17	27	GRAT M-F SAND, SOME GRAVEL, LITTLE CLAYEY SILT	
-	14	2000	26-8-9	28	gray tan gravel, trace m-f sand, silt	
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	18		17-17-21	31.	SAME	
	-19-	H	22-50/4*	1 32	GRAY CLAYEY SILT, LITTLE FINE SAND, TRACE GRAVEL	
_	-10-		66-50/3*	-33-	GRAY M-F SAND, SOME SILT, LITTLE GRAVEL	
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	21		23-51-44	34	GRAY M-F SAND, LITTLE CLAY AND SILT, TRACE GRAVEL	
	13		28-29-32	35	GRAY C-F SAND, LITTLE GRAVEL, TRACE SILT	
	16		47-46-49	36	SAME	1 I
	24		65-55-50	37	SAME	
	15		21-19-19	38	GRAY C-F SAND, LITTLE SILT AND CLAY, TRACE GRAVEL	
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		Sheet	3	of	9		
WEST END GARAGE		THE	POR	rau	HOR	ITY	
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14.3 WL 5.1 BY: KL	ATORY						
SAMPLE CLASSIFICATION	ABOR						
	- J F						
IN M-F SAND, LITTLE GRAVEL. TRACE SILT, ROOT FIBERS		-	¢		-		
IN M-F SAND, SOME GRAVEL, TRACE SILT		Mu		Ma	n/h	~	
IN TAN M-F SAND, LITTLE GRAVEL, TRACE SILT TAN SILT, TRACE FINE SAND		CHIEF GEOT	ECHNICAL	ENGINE	ER		
CLAYEY SILT, TRACE FINE SAND						2	
SAND, LITTLE GRAVEL TRACE SHT	GS						
SAND AND SILT	-						
SAND, SOME GRAVEL, LITTLE SILT							
M-F SAND AND GRAVEL, TRACE SILT							
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YEY SILT, TRACE FINE SAND							
Y CLAY, TRACE GRAVEL]						
SAND, TRACE GRAVEL							
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y clay, trace fine sand	├ ──┤				· .		
Y CLAY, TRACE FINE SAND, GRAVEL	¶						
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Y CLAY, LITTLE FINE SAND		No. Date	Revisi	on		Approv	/ed
RAY M-F SAND AND CLAYEY CHT SOME ODAVEL (THI)	ļ	ENGINE	RINC	DEPAR	TMENT	, 1	
WIT IN A GRAND AND OLATEL SILL, SUME GRAVEL (IILL)						+	
C-F SAND, SOME GRAVEL, LITTLE SILTY CLAY	[]						
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-F SAND, LITTLE GRAVEL		GEOTEO	HNICAT				
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F SAND, LITTLE GRAVEL			WEST	CINU GA	a MUE		
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RAY SILTY CLAY	┠╧──┤					·	
F SAND, TRACE GRAVEL		This drawing sub designs and met	ject to conditi hods herein a	ons in contra re reserved +/	ct. All inventio > Port Authorit	ns, ideas, y and may	not
EN C-F SAND, SOME GRAVEL, TRACE SILT		be used without All recipients of not bid and thei	its written con Contract docu r prospective s part of the	ment. ments, includi subcontractors	ing bidders and and suppliers tents or or off	d those wh who may thereaf	o do shall
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F SAND, SOME GRAVEL, LITTLE SILT		Desk on the 3rd office of the Dir New York NY 10 It is a victor	Floor, 3 Gate ector of Procu 010. of law for	way Center, I irement, One	Newark NJ 071 Madison Avenu alter a dati	102 or the 1e, 7th Floo	or, / Way
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20 -7.5 23 3-3-6 09 BROWN CLAYEY SILT, LITTLE GRAVEL, FINE SAND -10.0 13 9889 8-13-17 10 BROWN GRAVEL, SOME SILT, LITTLE M-F SAND -10.0 11 8-9-10 11 BROWN M-F SAND, LITTLE GRAVEL, SILT	206
9 -17.5	
19 7-10-16 13 BROWN RED SLIGHTLY ORGANIC CLAYEY SILT, TRACE GRAVEL, FINE SAND	
-22.5 11 27 8-14-23 14 GRAY TAN SUIT TRACE FINE SAND	
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16 2 11-9-14 19 GRAY SLIGHTLY ORGANIC CLAY AND SILT, SOME C-F SAND	
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16 12-21-36 21 GRAY TAN SILT AND CLAY, LITTLE GRAVEL, TRACE FINE SAND	70
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16 18-23-23 24 BROWN C-F SAND, LITTLE GRAVEL, TRACE SILT	
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19 20-28-28 35 GRAY M-F SAND, LITTLE GRAVEL, SILT	
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	<u> </u>	PROJECT	220-11-01-0-1-0-0-0		
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6 12		HAND AUGER HAND AUGER	01 02	FILL-GRAY BROWN C-F SAND, SOME CRUSHED ROCK, GRAVEL, TRACE SILT, BRICK, ASPHALT, RECYCLED CONCRETE AGGREGATE FILL-BROWN C-F SAND, TRACE SILT, GRAVEL	
14		WL HAND AUGER	03	SAME	
18 19		- 4-3-4-5 5-4-6-6	04 05	BROWN GRAY M—F SAND, SOME SILT BROWN GRAY M—F SAND, SOME CLAYEY SILT	
18		2-3-2	06	BROWN GRAY C-F SAND, SOME CLAYEY SILT, TRACE GRAVEL	
16 17		6-7-7	07	BROWN GRAY C-F SAND, LITTLE SILT, TRACE GRAVEL	
13	197 .C 4 	9-8-13	09	BROWN M-F SAND, SUME CLAY & SILI BROWN GRAY C-F SAND, LITTLE SILT, TRACE GRAVEI	
15		5-3-3	- 10	BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL	
13		8-13-14	11	SAME	
14		13-13-13	12	BROWN C-F SAND, TRACE SILT, GRAVEL	
19		10-15-17	13	RED RROWN M_E SAND SOME SHIT	
		10-17			
19		11-14-17	14	RED BROWN M-F SAND, LITTLE SILT	
19		9-10-13	15	SAME	
19		20-24-31	16	SAME	
20		20-22-28	17	SAME	
		40.00.70			
20		19-22-32	18	SAME	
25		7-9-15	- 19	gray slightly organic clay & silt, trace fine sand	
45 22	《	PRESSED	20UA 20UB	GRAY BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN VARVED SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND	AL,UU,SG
35	«	8-8-9	21	SAME	
30	2	7-10-15	22	SAME	
	\mathbf{x}				
17		12-20-25	23	GRAY BROWN C-F SAND, LITTLE SILT, GRAVEL	·
14		12-26-37		BROWN C-F SAND, SOME CLAY & SILT, GRAVEL	
16		202839	25	BROWN C-F SAND, TRACE GRAVEL, SILT	
15		13-24-25	26	BROWN C-F SAND, SOME SILT, GRAVEL	
12		29-26-32	27	BROWN C-F SAND, SOME GRAVEL, TRACE SILT	
18		21-25-33	- 28	SAME	
40		or or 			
16		21-24-33	29	SAML	
16		19-24-31	30	SAME	
31		20-15-18	31	GRAY SILTY CLAY	
29		10-12-19	32	SAME	
25		19-25-28	33	GRAY SILTY CLAY, LITTLE BROWN M-F SAND	
21		18-25-29	- 34 -	druwn grat m-t sand, little silt	
14		25-22-28	35	BROWN GRAY C-F SAND, LITTLE SILT, GRAVEL	
14		25-28-29	36	BROWN GRAY C-F SAND, SOME GRAVEL, LITTLE SILT	
13		323330	37	SAME	
22		45–67–75	38	DARK BROWN GRAY M-F SAND, LITTLE SILT	
		50/0*	-39-	NO RECOVERY	

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-143.5

Sheet 4 of 9 **THE PORT AUTHORITY** OF NY & NJ CHIEF GEOTECHNICAL ENGINEER No. Date Revision Approved ENGINEERING DEPARTMENT LAGUARDIA AIRPORT GEOTECHNICAL Title WEST END GARAGE PRESENTATION OF BORINGS This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written consent. All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and suppliers who may receive all or a part of the Contract documents or copies thereof, shall make every effort to ensure the secure and appropriate disposal of the Contract documents. Secure and appropriate disposal of the Contract documents or copies thereof, shall make every effort to ensure the secure and appropriate disposal of the Contract documents of documents. Secure and appropriate disposal includes methods of document destruction such as shredding or arrangements with refuse handlers that ensure that third persons will not have access to the documents' contents either before, during, or after disposal. Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor, 3 Gateway Center, Newark NJ 07102 or the office of the Director of Procurement, One Madison Avenue, 7th Floor, New York NY 10010. It is a violation of law for any person to alter a document in any way, unless acting under the direction of a licensed professional engineer or registered architect. If this document bearing the seal of an engineer/architect is altered, the altering engineer/architect shall affix to the document their seal and the notation "altered by" followed by their signature and the date of such alteration, and a specific description of the direction. N. YAKUBOV A. COFRANCESCO N. YAKUBOV Designed by Drawn by Checked by Date JUNE 19, 2013 Contract Number NOTE: FOR PROJECT SITE MAP, BORING LOCATION PLAN, LEGEND, GENERAL NOTES, ABBREVIATIONS, AND SOIL CLASSIFICATIONS, SEE DRAWING LGA-SL-315. LGA-SL-318 Drawing Number PID# NUMBER

									Teat						
1000000000000000000000000000000000000	<u>)</u>	<u>2-2</u>	0-1	3 PROJECT		WEST END GARAGE		<u> </u>	02	2-2	0-1	3		WEST END GARAGE	
Q		R		BLOWS PER 6 IN. 1 3/8"ID SPOON		LOCATION N 221029.1 E 1018914.6	_ ≿	<u> </u>		(X)		BLOWS PER 6 IN. 1 3/8"ID SPOON		LOCATION N 221029.1 E 1018914.6	≿
Merer Merer	NOTA (T	RM M	ಶ	140 LB. HAMMER 30" FALL	ا الله الله الله الله الله الله الله ال	SURFACE 11.7 WL NE BY: K.L.O. ELEVATION NE CHECKED BY: N.Y.		(METE)		EM (2	140 LB. HAMMER 30" FALL	BER	SURFACE 11.7 WL NE BY: K.L.O. CHECKED BY: N.Y.	ING DE
	ELEN (FEE	WATE	SYNE	ROCK CORE REPORT	SAMF NUM	SAMPLE CLASSIFICATION	N N			WATTE CONT	SMME	ROCK CORE REPORT	SAMF	SAMPLE CLASSIFICATION	
0 0	$\int_{\Gamma}^{11.7}$					√ 0.0'-0.5' ASPHALT		150 _1	138.3						
		12		POST HOLE DIGGER	01	FILL-BROWN M-F SAND, SOME GRAVEL, LITTLE SILT		46		19		47-50/3"	F38 /	BROWN GRAY C-F SAND, LITTLE SILT, TRACE GRAVEL	
		18		POST HOLE DIGGER	02	FILL-GRAY TAN M-F SAND, LITTLE GRAVEL, TRACE SILT		47		19		67-65-70	39	SAME	
		15 27		5-11-14-13 15-10-10-11	04	FILL—BROWN TAN M—F SAND, LITTLE GRAVEL, SILT FILL—GRAY FINE SAND, SOME GRAVEL, TRACE SILT									
	-0.8	30		2-3-5	06	FILL-GRAY FINE SAND, LITTLE SILT				23		21-27-32	40	SAME	
		29	$ \mathcal{Y} $	2-3-5	07	GRAY SLIGHTLY ORGANIC CLAYEY SILT, LITTLE FINE SAND		50		42		27_22_34	L	DROWN CRAY MEE SAND LITTLE SILT TRACE DECOMPOSED ROCK (RAVE)	
		40 37	$ \rangle\rangle $	2-4-5	00	GRAY SILT & SLIGHTLY ORGANC CLAY, LITTLE GRAVEL, TRACE FINE SAND		51		13		Z/ZZ34		KOWN GRAI M-F SAND, LITTLE SILI, INALE DECOMPOSED NOCK, GRAVEL	
206	8.3	17		14-12-14	10	BROWN M-F SAND, TRACE SILT		170 - 52		15		45-100/4"	-32=	SAME	
		13		13-8-7	11	BROWN M-F SAND, SOME GRAVEL, TRACE SILT		53		14		81_100/3°	L-73-	CAME	
		20		4-7-10		BROWN C-F SAND, TRACE SILT		<u>- 54 -1</u>	166.3			81-100/3			
309		14		17-31-34	13	BROWN M-F SAND, LITTLE SILT		180			XX	REC=62% RQD=26%	R1	GRAY GNEISS	
10								56				REC=93%	R2	SAME	
		9		26-35-41	14	BROWN M—F SAND, LITTLE SILT, GRAVEL		57				RFC=93%			
40-12	•	9		29-31-29	15	BROWN M-F SAND, LITTLE GRAVEL, TRACE SILT	,	190	179.3		XXX	RQD=90%	R3	SAME	
	-33.3	33	Ŵ	4-6-9	16	GRAY SLIGHTLY ORGANC CLAYEY SILT	1								
50		77	ISS	<i>A</i> _7_0	17			BORING NO.	DAT	TE		PROJECT			
16			$ \langle $	- 7-3		DIGHA GIVE MAYED SEGMET ONOMING SELL OPA, HAVE THE SHAD		3-230	04	4-0	4-1		1	WEST END GARAGE	``
17		35	$ \langle C $	4-6-11	18	SAME			-	Ŕ		1 3/8"ID SPOON		N 221082.4 E 1019072.9	Ж
60 - 18			121	-				(METE		TENT	BOL	30" FALL	PLE	ELEVATION 13.0 VL 2.2 CHECKED BY: N.Y.	ORATC
		34	$ \rangle$	5-4-8	19	SAME				N S	<u>گ</u>	REPORT	32	SAMPLE CLASSIFICATION	32
		33	$ \mathcal{M} $	6-7-9	20	SAME		o <u>o</u>	13.0						
-21			$ \langle \langle $							12 14		POST HOLE POST HOLE	01	FILL-BROWN C-F SAND, LITTLE GRAVEL, SILT, TRACE BRICK, ASPHALT SAME	
22		34 48	$ \mathcal{X} $	8-11-14 PRESSED	21 22UA	SAME SAME				13		POST HOLE	03	SAME	
23		24 31	2	6-6-8	<u>2208</u> 23	GRAY SILTY CLAY, TRACE FINE SAND, GRAVEL SAME	00,9			13 12		4-5-5-5 3-6-6-7	04	SAME	
- 24			$\left \right\rangle$			•				16			06	SAME	
		35	$ S\rangle $	9-10-12	-24	GRAY BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND				31		2-3-3 1-2-5	08	FILL-BLACK GRAY C-F SAND, LITTLE CLAY & SILT, TRACE GRAVEL, SILT	
	-73.3	16		18-22-30	25	BROWN C-F SAND, TRACE GRAY SILTY CLAY, GRAVEL, SILT			-4.5	33	W	2-2-3	09	BROWN CLAY & SILT, TRACE FINE SAND	
= 27				•				20	-9.5	35	W	2-3-4	10	BROWN VARVED CLAY & SILT, SOME FINE SAND	
90		14	0000 000 000 000 000	36-59-76	26	BROWN C-F SAND AND BROKEN ROCK, GRAVEL, LITTLE SILT				20 13		2-1-2		BROWN C-F SAND, LITTLE SILT, FRAGMENTED ROCK, GRAVEL	
	-83.3	<u> </u>		100/5"	=-27=	GRAY FRAGMENTED ROCK, GRAVEL									
				÷ ♥				30-9		16		5-4-6	13	SAME	
	-88.3	10	<u>000</u> 0	24-35-63	28	BROWN C-F SAND, SOME GRAVEL, SILT, GLACIAL TILL				40					
32										19		44		BRUWN C-F SAND, INACE SILI, GNAVEL	
		13	0000	30-41-38		BROWN C-F SAND, SOME GRAVEL, LITTLE SILT		40 - 12		18		6-10-13	15	RED BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL	
		18		16-20-17	30	BROWN C-F SAND, TRACE GRAVEL, SILT								• • •	
								14		20		11-11-15	16	RED BROWN FINE SAND, SOME SILT	
		15		17-20-25	31	SAME		50		22		15-18-22	17	BROWN C-F SAND, TRACE SILT, GRAVEL	
	-108.3	25		19-15-23	32	GRAY CLAY & SILT. TRACE FINE SAND		- 16							
37	4 4 92 92			10 10 20						24		17-23-21	18	BROWN M-F SAND, LITTLE SILT	
	-113.3	22		25-32-34	33	GRAY BROWN M-F SAND, LITTLE SILT		60-18		16		14-22-26	19	BROWN M-F SAND, TRACE SILT, GRAVEL	
	-118.3	11	0000	16-25-26	34	GRAY FRAGMENTED ROCK GRAVEL SOME BROWN CF. SAND TRACE SILT		- 19							
40				10 20 20						21		17–22–25	20	RED BROWN M-F SAND, TRACE SILT, GRAVEL	
		10		47-50/2*	-35-	GRAY DECOMPOSED FRAGMENTED ROCK, GRAVEL, TRACE CLAYEY SILT		70 - 21		20		12-19-30	21	RED BROWN FINE SAND, SOME SILT	
		19	200 0 200 0 200 0	50/4"	-<36>-	GRAY BROWN DECOMPOSED ROCK, SAND, GRAVEL, SILT SIZE		22							
43	4 mg mg mm							23		21	11	10-16-22	22	RED BROWN FINE SAND AND SILT	
	-133.5	23		38-36-44	37	BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL		80	<u>-67.0</u>	22	ų	R_11_12	207		
	-138.3				L			25		58 34	$ \mathcal{U} $	PRESSED	24UA 24UA 24UB	SAME	
	• •						UNTINUED	···· 26		38	$ \rangle$	15-50/3"	F25	GRAY BROWN VARVED SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND	
								on 27			1))		· .		
	- -									22	$ \mathcal{K} $	9-8-7	26	GRAY BROWN SLIGHTLY ORGANIC CLAY & SILT, SOME GRAVEL, LITTLE C-F SAND	
							r		82.0				L		

NOTE: FOR PROJECT SITE MAP, BORING LOCATION PLAN, LEGEND, GENERAL NOTES, ABBREVIATIONS, AND SOIL CLASSIFICATIONS, SEE DRAWING LGA-SL-315.

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PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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	boring no. 3-23	0	date 04-0)4-1.	PROJECT		WEST	END GARAG
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	(FEET) H Meter	NOITA	R (<u>_</u>	140 LB. HAMMER 30" FALL		surface 13.0	WL ELEVATION 2.
	DEPT (ELEV (FEE	WATE	S	ROCK CORE REPORT	SAMF	SAN	IPLE CLASSIFICATION
•		-82.0						
	ZS	/	17		10-15-17	27	BROWN C-F SAND, TRACE	GRAVEL, SILT
10	0)	20		12-15-20		BROWN GRAY C-F SAND, T	RACE GRAVEL, SILT
		2 -93.(0 17			294	SAME	a Ratanan managana kata ana da Guine (ana ang ang ang ang ang ang ang ang ang
		3	30	m			GRAT BLACK SILIT CLAT	
11(0	ŀ	30	600	5-7-12	30	GRAY SILTY CLAY	
	35	5	24		12-17-20	31	SAME	
120		<u>–107.</u>	.0	222	12-14-21	32	BROWN GRAY C-F SAND. T	RACE GRAVEL, SILT
					¥66a ¥77 66a }			a a an
		<u>, -112</u> ,	21	Ŵ	13-26-42	33	GRAY BROWN VARVED SILTY	CLAY, TRACE FINE S
13	0 39) 117.	.0		A 40 A 4 40 A			
	40)			4/-41-34		GRAT BROWN C-F SAND A	NU PRAGMENTED ROG
	- ----4 1		9		34-39-45	35	SAME	
4 4 4	42	2						
1444	43	5	50		23-27-29	36	BROWN GRAY M-F SAND, I	JITLE SILT
		Ļ	19		25-35-37	37	BROWN GRAY C-F SAND. T	RACE SILT. GRAVEL
		5				<u> </u>		
15		-137	5 27	M	15-23-35	38	GRAY SILTY CLAY, SOME BI	ROWN M-F SAND, FR
	damps and a statements	in and the second states		Text (feedfine)				

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	G	TERS)	ĸ		п (x)		BLC 1 14	DWS PER 6 IN. 3/8"ID SPOON 0 LB. HAMMER 30" FALL		LOCATION
Contraction of the local data	E (FE		ELEVAN		CONTED	SYMBOI		ROCK CORE REPORT	SAMPLE	ELEVATION
	ו ז	<u>-</u>	14.9 ∫13	.9						-ASPHALT
•			<u> </u>		6		-PO	DST HOLE DIGGER	-01-	FILL-BROWN GRA
		- 1			9		P	DST HOLE DIGGER	02	FILL-BROWN C
	607460/050040 940540			1	1		P(OST HOLE DIGGER	03	SAME
	-	-2		!	9.			7-7-5-6	04	FILL-BROWN C
1(0 ——	-3-	4.9		2 7	-		6-5-4-5	05	FILL-BROWN M
		-4		22	2	$ \mathcal{X} $		PRESSED	07UA 07UB	BROWN SLIGHT
			-0.1		5			11-12-10	08	FINE SAND 4/19/ BROWN C-F S
		- 3		1	2	,		12-10-10	09	SAME
2(0	- 6		1	8			17-17-14	10	BROWN C-F S
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	erente interier									
3(0 —	9	<u> </u>	$\frac{1}{2}$	5	-		7-11-15	13	GRAY SLIGHTLY
	-	10								
		49	<u> </u>	$\frac{1}{1}$	7	-11	<u> </u>	10-15-18	14	BROWN GRAY
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	40000000000000000000000000000000000000	- 14		2	!1	$\left \right\rangle$		10-12-14	16	GRAY SLIGHTLY
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	etecno exception exception	20	•	1	2			28-5/-40	24	BROWN C-F S
9(0 —	- 27	-75.	1	2	100		11-17-26	25	GRAY SI ICHTI V
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		-29	<u>-80.</u> <u>-81</u> .	6 2	2			15-26-27	26	BROWN C-F S

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PROJECT		WEST END GARAGE		
LOWS PER 6 IN.		LOCATION 221082.4 E 1019072.9		
40 LB. HAMMER	e	SURFACE 13.0 WL 2.2 BY: M.O. CHECKED BY: N.Y.	ATORY	OF INY & INJ
ROCK CORE REPORT	SAMPLE	SAMPLE CLASSIFICATION	LABOR	
l Vinor			-	
10-15-17	27	BROWN C-F SAND, TRACE GRAVEL, SILT		
				1.1 Manallar
12-15-20	20	BROWN GRAY C-F SAND, TRACE GRAVEL, SILI		CHIEF GEOTECHNICAL FNGINEER
	- <u>29</u> A -29B/	SAME CRAY BLACK SILTY CLAY	<u> </u>	
40				
5-7-12	-30	GRAY SILTY CLAY		
12-17-20	31	SAME		
14 54				
12-14-21	32	BROWN GRAY C-F SAND, TRACE GRAVEL, SILI		
13-26-42	33	GRAY BROWN VARVED SILTY CLAY, TRACE FINE SAND		
19 41-24		TOTAL STOLEN OF SAME AND EDACHENTED DOCK CRAVEL LITTLE SILT		
4/~ ₽1~⊍т		GRAY BRUWN G-T SAND AND FRAMEWILD MOON, STATLE		
34-39-45	35	SAME		
~~ ^7_9 <u>0</u>	76			
23-61-60	- 30	BROWN GRAY M-1 DAND, LITTLE SILT		
25-35-37	37	BROWN GRAY C-F SAND, TRACE SILT, GRAVEL		
15-23-35	-38_	CRAY SILTY CLAY SOME BROWN M-F SAND. FRAGMENTED ROCK		
PROJECT	996790000	WEST END GARAGE		
LOWS PER 6 IN.		LOCATION N 220852.4 E 1018658.6		
140 LB. HAMMER 30° FALL	ш (б	SURFACE 14.9 WL NE BY: M.O. CHECKED BY: N.Y.	LATORY NG	No Date Revision Approved
ROCK CORE REPORT	SAMPI	SAMPLE CLASSIFICATION		
		/ASPHALT		ENGINEERING DEPARIMENT
POST HOLE DIGGER	or-	/FILL-BROWN GRAY C-F SAND, SOME CRUSHED ROCK, GRAVEL, TRACE SILT, ASPHALT, RECYCLED		
POST HOLE DIGGER	02 03	FILL-BROWN C-F SAND, TRACE SILT, GRAVEL SAME		
7-7-5-6	04	FILL-BROWN C-F SAND, SOME CRUSHED ROCK, GRAVEL, TRACE SILT		AIRPORT
2-1-2	06	FILL-BROWN M-F SAND, ITALE SILT BROWN GRAY SLIGHTLY ORGANIC SILTY CLAY, SOME M-F SAND, TRACE SHELLS		
PRESSED	TO	THAT OLD THE ADALLIA OUT A AN TRACE FINE CAND		
11 40 40		BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.)	UU,CO,SG	
11-12-10 12-10-10	<u>0708</u> 08 09	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.) BROWN C-F SAND, SOME SILT, TRACE GRAVEL SAMF	UU,CO,SG	
11-12-10 12-10-10 17-17-14	<u>0708</u> 08 09 10	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.) BROWN C-F SAND, SOME SILT, TRACE GRAVEL SAME BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, TRACE SILT	uu,co,sg	
11-12-10 12-10-10 17-17-14 15-14-20	08 09 10 11	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.) BROWN C-F SAND, SOME SILT, TRACE GRAVEL SAME BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, TRACE SILT SAME	UU,CO,SG	GEOTECHNICAL
11-12-10 12-10-10 17-17-14 15-14-20 14-12-15	<u>0708</u> 08 09 10 11 12	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.) BROWN C-F SAND, SOME SILT, TRACE GRAVEL SAME BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, TRACE SILT SAME SAME	UU,CO,SC	<i>GEOTECHNICAL</i> Title
11-12-10 12-10-10 17-17-14 15-14-20 14-12-15 7-11-15	0708 08 09 10 11 12 13	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND GRAY BROWN SLIGHTLY ORGANIC CLAYEY SILT (BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND 4/19/13 M.O.) BROWN C-F SAND, SOME SILT, TRACE GRAVEL SAME BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, TRACE SILT SAME SAME GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND	UU,CO,SC	GEOTECHNICAL Title WEST END GARAGE
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$ \begin{array}{r} 11-12-10 \\ 12-10-10 \\ 17-17-14 \\ 15-14-20 \\ 14-12-15 \\ \end{array} $ $ \begin{array}{r} 7-11-15 \\ 10-15-18 \\ 3-4-8 \\ 10-12-14 \\ 14-18-23 \\ 7-7-7 \\ 7-9-13 \\ 15-15-15 \\ 12-66-49 \\ 29-55-46 \\ 37-55-68 \\ 28-37-40 \\ 11-17-26 \\ \end{array} $	070B 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND SAME AND A MATS LOOP AND CLAY AND A MARKED AND A MARKED AND A MARKED BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, TRACE SILT SAME SAME SAME SAME SAME SAME GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND BROWN GRAY C-F SAND, TRACE SILT, GRAVEL GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND GRAY SLIGHTLY ORGANIC SILTY CLAY, SOME BROWN C-F SAND, TRACE GRAVEL BROWN GRAY C-F SAND, TRACE SILT, GRAVEL SAME BROWN GRAY VARVED SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND GRAY SLIGHTLY ORGANIC SILTY CLAY, SOME BROWN C-F SAND, TRACE GRAVEL BROWN GRAY VARVED SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND BROWN C-F SAND, SOME GRAY SLIGHTLY ORGANIC SILTY CLAY, TRACE GRAVEL, SILT BROWN C-F SAND, SOME GRAVEL, SILT SAME BROWN C-F SAND, SOME GRAVEL, SILT SAME BROWN C-F SAND AND FRAGMENTED ROCK, GRAVEL, LITTLE SILT BROWN C-F SAND, FRAGMENTED ROCK, GRAVEL, LITTLE SILT BROWN C-F SAND, FRAGMENTED ROCK, GRAVEL, TRACE SILT GRAY SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND		GEOTECHNICAL Title WEST END GARAGE Applied to the second state of the second second state of
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27							27
28	27		8-11-21	01	GRAY CLAY & SILT, TRACE FINE SAND		28
	15		15-18-21	02	BROWN C-F SAND, TRACE SILT, GRAVEL	1	
100					· · · · · · · · · · · · · · · · · · ·		<u> </u>
	14		16-22-24	03	SAME		31
	12		15-19-25	04	SAME		- 32 -91.0 93.0
110 33		w	7-12-18	05	GRAY CLAY & SILT. TRACE FINE SAND	<u> </u>	110
- 34							34
	29	H	10-15-21	06	SAME		
	33	W	7-13-17	07	SAME		120
	20		11-16-25	08	BROWN C-F SAND, SOME GRAY RED BROWN CLAY & SILT, TRACE GRAVEL	1	
	21		15-17-24	09	BROWN GRAY M-F SAND, LITTLE SILT		
							41
	14		23-26-25		BROWN GRAY C-F SAND AND FRAGMENTED ROCK, GRAVEL, LITTLE SILT		42
140	18		17-17-23	11	SAME		140
44			47 00 40				44
45	14		17-20-18	12	SAME		- 45
150 46 	16		10-11-15	13	SAME		
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PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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13		HAND AUGER	01	FILL-GRAY SILT, LITTLE GRAVEL, M-F SAND	
13		HAND AUGER	02	FILL-BROWN SILT, LITTLE GRAVEL, M-F SAND	
5		HAND AUGER	03	FILL-BROWN C-F SAND, TRACE GRAVEL, SILT	
9 19		3-4-3-2	04	SAME	
24		3-2-3	06	FILL-BROWN BLACK M-F SAND, SOME SILT	
22		1_2_2			
		1-2-2		DROWN SILI, IRACE FINE SAND	
14		6-7-10	80	BROWN C-F SAND AND GRAVEL, TRACE SILT	
12	.	6-9-9	09	SAME	
17		2-4-6	10	BROWN C-F SAND, LITTLE GRAVEL, SILT	
22		9-12-16	11	BROWN M-F SAND, LITTLE SILT	
21		14-17-20	12	SAME	
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20		18-10-22	-12		
20		10-13-22		BROWN C-F SHAD, LITTLE SILI, INACE GROVEL	
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21		14-15-17	<u>14</u>	RED BROWN FINE SAND AND SILT	
13		6-24-22	15	GRAY C-F SAND, SOME GRAVEL, LITTLE SILT	
16		14-18-22	16	BROWN C-F SAND, TRACE FINE GRAVEL, TRACE SILT	
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47		04 05 00			
13		24-23-26		BROWN C-F SAND, IRACE FINE SAND, GRAVEL	
23		8-5-8	18	GRAY SLIGHTLY ORGANIC SILTY CLAY, SOME BROWN M-F SAND	
				·	
34	11	4-6-9	19	GRAY BROWN VARVED SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND	
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27	11	6-9-16	20	BROWN GRAY VARVED SLIGHTLY ORGANIC SILTY CLAY, LITTLE FINE SAND	· · · ·
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30	\cdot	6-7-14	21	SAME	
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-20-		100/5	F227	BROWN C-F SAND, LITTLE SLIGHTLY ORGANIC SILTY CLAY, TRACE GRAVEL	
15		13-11-10	23	BROWN C-F SAND, LITTLE GRAVEL, SILT	
17		24 19 10			
10		24-10-10	- 24	BROWN GRAT C-F SHAD, SOME FRAMENTED RUCK, GRAVEL, LITTLE SILI	
			-		
15		18-21-22	25	BROWN GRAY C-F SAND, TRACE GRAVEL, SILT	
17		141825	26	SAME	
19		15-10-14	27	BROWN GRAY C-F SAND, TRACE GRAVEL, SILT, GRAY SLIGHTLY ORGANIC SILTY CLAY	
33		3-9-13	28	GRAY SLIGHTLY ORGANIC SILTY CLAY TRACE FINE SAND	
-32-	Ħ	PRESSED	29UA	GRAY CLAYEY SILT, TRACE FINE SAND	
33	W		29UB	SAME	
35	Ŵ	8-11-16	30	SAME	
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36	W	7-11-16	31	SAME	
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46	\mathcal{M}	6-11-16	32	SAME	
	XX				
26	<u> </u>	12-18-22	33	GRAY FINE SAND, TRACE SILT	
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17		18-22-25	34	GRAY M-F SAND, TRACE SILT	
16		34-29-40	35	GRAY C-F SAND, LITTLE GRAVEL, TRACE SILT, DECOMPOSED ROCK	
15		20-19-23	36	GRAY C-F SAND, LITTLE GRAVEL, SILT, DECOMPOSED ROCK	
12		18-14-12		SAME	۰. ۱
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$\frac{-50 - 151.6}{-51} = \frac{-156.6}{-156.6} = \frac{-156.6}{-50} = \frac{-156.6}{-50$	160·)	16	:	25-29-49	40	SAME
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-156.6 XXX REC=78% R1 GRAY		50	-151.6		1. 3 m 3 m		- 41-	NO RECOVER
-156.6		-51			KXX	REC=78%	R1	GRAY GNEISS
	170·		-156.6		R			L

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N 220)18864.9		OF NY & NJ
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I M-F SAND, LITT	LE GRAVEL. SILT			
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i m—f sand, litti I m—f sand, som	WE GRAVEL, LITTLE SILT			CHIEF GEOTECHNICAL ENGINEER
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ND, TRACE SILT				
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ILY ORGANIC CLAY	TEY SILT, UTTLE SHELLS, 1	IRACE FINE SAND	 	
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Y CLAY AND SILT,	TRACE FINE SAND		ALJUU	ENGINEERING DEPARTMENT
SAND, LITTLE SILT	IY CLAY, GRAVEL			
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f Sand, little gi	RAVEL, TRACE SILT			
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CAMP CIAN		• • • • • • • • • • • • • • • • • • •		This drawing subject to conditions in contract. All inventions, ideas, designs and methods barein are reserved to Bart Authority and may bet
SAND, LITTLE GRAV	WEL, SILT			be used without its written consent. All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and subpliers who may
				receive all or a part of the Contract documents or copies thereof, shall make every effort to ensure the secure and appropriate disposal of the Contract documents to prevent further disclosure of the information
SILT, LITTLE M-F	r sand, gravel			with refuse handlers that ensure that third persons will not have access to the document's either before, during, or after disposal
Y M-F SAND, LIT	TLE GRAVEL, TRACE SILT		╂───┨	Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor, 3 Gateway Center, Newark NJ 07102 or the office of the Director of Procurement, One Madison Avenue, 7th Floor, New York NJ 10010
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Y M-F SAND, TR/	ACE GRAVEL, SILT			engineer/architect is altered, the altering engineer/architect shall affix to the document their seal and the notation "altered by" followed by their signature and the date of such alteration, and a specific description of
Y M-F SAND. LIT	TLE GRAVEL, TRACE SILT	· · · ·		N. YAKUBOV A. COFRANCESCO N. YAKUBOV
ur u varg tatë				Designed by Drawn by Checked by
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	2.2 -0.3	MATER MATER 10 11 10 12	SYMBOL.	BLOWS PER 6 IN. 1 3/8"ID SPOON 140 LB. HAMMER 30" FALL ROCK CORE REPORT	SAMPLE NUMBER	LOCATION N 220935.5 E 1018985.0 SURFACE 12.2 WL ELEVATION NE BY: M.O. CHECKED BY: N.Y.	ATORY IG		<u></u> ©		,,	BLOWS PER 6 IN. 1 3/8"ID SPOON		LOCATION N 220947.7 E 1019113.3	T
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$0 \\ 0 \\ -1 \\ -2 \\ 0 \\ -3 \\ -2 \\ -4 \\ -5 \\ 0 \\ -6 \\ -7 \\ -8 \\ -8 \\ -8 \\ -1 \\ -7 \\ -8 \\ -8 \\ -1 \\ -7 \\ -8 \\ -8 \\ -7 \\ -8 \\ -8 \\ -7 \\ -8 \\ -8$	2.2 -0.3	10 11 10 12				SAMPLE CLASSIFICATION	38			, IM 8	N.S.	REPORT	N S	SAMPLE CLASSIFICATION	3
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$ \begin{array}{c} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 6 \\ 7 \\ 8 \\ 8 \\ 8 \\ 8 \\ 8 \\ $	<u>2.2</u> -0.3	11 10 12		HAND AUGER	01	FILL-BROWN GRAY C-F SAND, SOME GRAVEL, CRUSHED ROCK, TRACE SILT		-		21		HAND AUGER	01	FILL-BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL, TOP SOIL	-
0 	<u>2.2</u> -0.3	12		HAND AUGER HAND AUGER	02	FILL-BROWN C-F SAND, TRACE GRAVEL, SILT FILL-BROWN C-F SAND, TRACE GRAVEL, CRUSHED ROCK, SILT, BRICK, WOOD, RECYCLED			- 1	12		HAND AUGER	-02	FILL-BROWN C-F SAND, TRACE SILT, GRAVEL	
0	<u>2.2</u> -0.3			3-5-5-5	04	FILL-BROWN C-F SAGATE AS A CRUSHED ROCK, CONCRETE, GRAVEL, TRACE SILT, BRICK, ASPHALT, RECYCLED CONCRETE AGREGATE			- 2	11		- WI 2-2-2-3	04	SAME	
	-0.3	17		3-1-4-3	05	FILL-BROWN M-F SAND, LITTLE SILT, TRACE CONCRETE, GRAVEL, CRUSHED ROCK	ļ	10	- 3	12	900	2-2-3-2	05	SAME	
0		20	ĽΥΥ	1-2-1	07	BROWN WEF SAND LITTLE SUIT	ļ		- 4	18		2-2-1	06	FILL-BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL	
0 		15		18-13-19	08	BROWN C-F SAND. SOME GRAVEL LITTLE SILT			-	10	100	J-4-4 3-7-8		FILL-GRAT BROWN C-F SAND, SOME CRUSHED ROCK, GRAVEL, LITLE SILT	
06 7 8		- 10		1-1-1	09	SAME			- 5	16		21-4	8	FILL-BROWN GRAY C-F SAND & CRUSHED ROCK CRAVEL, INVE SILT	
7 8		16	2	15-9-5	10	BROWN C-F SAND, TRACE GRAVEL, SILT		20	- 6	15	.00	17-40-47		FILL BROWN C-F SAND LITTLE SHT TRACE CRAVEL	
8		14	و به میده . محمد نشر . و .	10-10-14	11	BROWN C-F SAND, LITTLE GRAVEL, TRACE SILT			-7	9	5600	8-7-21	11	FILL-FRAGMENTED ROCK, GRAVEL, LITTLE BROWN C-F SAND, TRACE SILT	
		18	70 - 11 y - 1 . y - 1 - 1 - 1	6-6-9	12	BROWN C-F SAND, TRACE GRAVEL, SILT			<u> </u>	<u>5</u> 17	2000	6-4-2	12	BROWN C-F SAND. LITTLE GRAVEL. SILT	
									U						
0 9		16	ان هېر دن. سره در ور	6-10-14	13	SAME		30	-9	24		478	13	BROWN M-F SAND, TRACE SILT	
10			ا هم ان را اهر بیک				4		- 10						
<u> </u>		19		8-12-14	14	SAME			- 11	16		5-8-12	14	YELLOW TAN C-F SAND, TRACE GRAVEL, SILT	
a = 12									- 10	ŀ					
		18		12-15-19	15	BROWN C-F SAND, TRACE GRAVEL, SILT, RED BROWN CLAY & SILT SEAMS		40	- 12	21		4-6-5	15	BROWN YELLOW C-F SAND, TRACE GRAVEL, SILT	
									- 13						
14		17		11-14-18	16	BROWN C-F SAND, TRACE GRAVEL, SILT			- 14	25		5-9-15	-16	BROWN M-F SAND, LITTLE SILT	
0 15									- 15						
16		23		13-16-16	17	RED BROWN M-F SAND, LITTLE SILT & CLAY SEAMS		30	16	23		9-13-17	17	BROWN M-F SAND; TRACE SILT	
	-42.8								- 10						
		- 58 - 57	//	5-7-11 PRESSED	18 19UA	GRAY VARVED SLIGHTLY ORGANIC SILTY CLAY, TRACE BROWN M-F SAND SAME			- 17	17		27-29-32	18	BROWN M-F SAND, TRACE SILT, GRAVEL	
0		37 36		FRE33ED	19UB	GRAY VARVED SILTY CLAY, TRACE BROWN M-F. SAND	AL,UU	60	- 18						
19		50		0-7-11		GRAT VARVED SLIGHTLT ORGANIC SILT CLAT, SUME BROWN M-F SAND			- 19	20		7-8-22	19	BROWN YELLOW C-F SAND, TRACE SILT, GRAVEL	
	-52.8	31	\mathcal{H}	4-6-12	21	GRAY VARVED CLAYEY SILT	 		- 20	22		7-12-17	20	BROWN C-E SAND TRACE SHT CRAVEL	
21												/-12-1/		DRAWN C-T SAND, HAGE SILI, GRAVEL	
0		34		3-5-8	22	SAME		70	- 21 _59.6	<u>6</u> 27	100	13-20-21	21	RED BROWN CLAYFY SILT AND FINE SAND	
22			M						- 22		X				
23		41	W	4-5-11	23	GRAY CLAY AND SILT, TRACE FINE SAND			- 23	35	XX	4-6-12	22	BROWN GRAY VARVED CLAY & SILT. TRACE FINE SAND	
24								· -	- 94	62		PRESSED	23UA	SAME	
0		32		6-9-50/3*	24	GRAY SILT AND CLAY, TRACE FINE SAND		80	6 T	36		2-3-6	24	SAME	
25				-					- 25		HP -			1	
<u> </u>		22		13-15-29	25	GRAY SILT AND CLAY, LITTLE GRAVEL, M-F SAND			- 20 -/4.6	14		19-25-40	- 25	BROWN C-F SAND, LITTLE GRAVEL, SILT	
27									- 27		3				
28		2		19-23-29	26	GRAY CLAYEY SILT AND M-F SAND, LITTLE GRAVEL		90	<u> </u>	14	2000	20-20-21	26	BROWN GRAY FRAGMENTED ROCK, GRAVEL, LITTLE C-F SAND, CLAY & SILT	-
									-84.6	6	6.69				
		9		50-30-52	27	GRAY CLAYEY SILT, SOME M-F SAND, LITTLE GRAVEL			-29	14		19-10-11	27	BROWN GRAY C-F SAND, SOME SILT, GRAVEL	+
	-87.8								- 30						
31		12	9	15-18-46	28	GRAY C-F SAND, SOME CLAYEY SILT, LITTLE GRAVEL			- 31	13		12-19-21	28	SAME	
32		12	ا میں میں ا کی میں میں ا	233047	- 20	SAME			- 32						
		12		23-30-47	-29	SAME				13		14-23-22		SAME	
0		12		22-50/3°		BROWN GRAY C-F SAND, SOME GRAVEL, LITTLE SILT, GLACIAL TILL		110	- 33	1.5		14 10 15			
34									- 34	15		14-10-13	30	GRAT BROWN C-F SAND, SOME SILI, GRAVEL	
		16		22-40-46	31	BROWN GRAY C-F SAND, SOME GRAVEL, LITTLE SILT			- 35 _{-105.}	6 10			31	GRAY BROWN C-F SAND, SOME FRAMENTED ROCK, GRAVEL, SILT	
			2.57						- 36				-210-	GRAT SILIT CLAT	
0		11		21-29-31	32	SAME		120	- 37	23	W	29-39-31	32	GRAY SILTY CLAY, LITTLE BROWN M-F SAND, FRAGMENTED ROCK	I
- 38									70		100				
		12		23-29-30	33	GRAY BROWN C-F SAND AND GRAVEL, LITTLE SILT			- 30	30	1 Sec	8-12-17	- 33	gray silty clay	
0 39									- 39						
40		13		21-21-25	34	SAME			- 40	26		6-11-16	34	SAME	
41									- 41						
- 40		17		25-32-24	35	GRAY BROWN C-F SAND, LITTLE SILT, GRAVEL				27		12-19-27	35	GRAY RED BROWN CLAY & SILT	
0		07							- 42		100				
43		23		Jo-20-20/0"	مد ا	UMAN DRUWIN GRAT U-P SAND, LITTLE SILT, TRACE GRAVEL			- 43	22		12-21-33	36	SAME	
44		10		28-26-25	27				<u>- 44 -134.</u>	.6			<u> </u>		
45		13		20 20 20	<u> </u>	UNT DIVIT M- CONTU, LITLE OLI			- 45	18		22-30-33		BRUWN GRAY M-F SAND, LITTLE CLAY & SILT	
0		17		6-18-20	38	GRAY BROWN C-F SAND, SOME CLAYEY SILT, LITTLE GRAVEL		150	<u> </u>	6				NO RECOVERY-	
						and another of white work owned only Little OWNEL			- 40		<u>xxx</u>	REC=98%	R1	GRAY GNEISS	
47		14		14-18-18	39	BR. GR. C-F SAND, LITTLE GRAVEL, SILT, DECOMPOSED FRAGMENTED ROCK			- 47 -144.	6	R			L	
48	147.6													•	
	0.\+1				R		L	J							

PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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ſ	BORING NO.	6 0	ATE 2-1	8-1	PROJECT					
ł	0 20				BLOWS PER 6 IN.		LOCATION			
	ET) TIERS)	NO	п (%)		140 LB. HAMMER	ec	SURFACE			
	(FE (ME	LEWIN	ATER ONTEN	MBOL	ROCK CORE	AMPLE	ELEVATION			
l	5	⊡ £ 18.4	¥0	S.	REPORT	ωz	<u>-</u> 0.0'0.5			
C		1 [-17.9	0		POST HOLE DIGGER	01	FILL-BROW			
	<u> </u>		12		POST HOLE DIGGER	02	FILL-BROW			
	2		13 15		POST HOLE DIGGER	03 04	SAME FILL-BROW			
10		10.4	20	ŤŤ	3-6-6-9	05	BROWN GR			
		5.9	19		2-4-6	06	BROWN GR			
		<u> </u>	27		5-6-8	08	BROWN GR			
	<u> </u>		17		5-9-14	09	BROWN C-			
20) 6		16		5-12-33	10	BROWN GR			
	7		12		14-22-16	11	BROWN C-			
	8		11 .		17-30-41	12	SAME			
30	99		10		24-32-84	13	SAME			
			10		21-26-36	14	SAME			
)				-	·			
4(•	14		12-14-15	15	BROWN C-			
		•	45		15	16	CAME			
	14	• •	15		13-20-24	- 10	JTWIL .			
50) 15	-33.1	16		18-19-15	17	BROWN C-			
	16	;)						
	17	2	32		6-11-13	18	gray sligh			
60)18	-41.6	25	44	10-12-16	10	TAN CLAYE			
	<u> </u>)	25		10-12-10					
		-46.6	10	XX	22-33-34	20	BROWN C-			
70	, [⊒] 21									
Λ	, 		.12		13-20-21	21	SAME			
	2	- 	15	- (× - 	12-16-14	22	BROWN C-			
					12 10 14					
80)	•	18		8-12-13	23	SAME			
	25 									
)	19		9-10-12	24	SAME			
9()27	,					0445			
•••	28	3	16		7-10-12	25	SAME			
)	17		12-13-13	26	BROWN GR			
	30	-81.6								
1(01.0	40	X	4-5-6	27	GRAY CLAY			
	<u> </u>		70		7-10-16	28	SAME			
	33	5	32		/=10=10		JAME .			
1	10		32		8-12-16	29	SAME			
		r S								
			33		13-10-13	30	SAME			
12	20	•	27		8-15-17	31	SAME			
		408.6								
	38	-100.0	23		20-28-32	32	BROWN GR			
4)		. S	r.					
1.	40)	23		15-18-23	33	BROWN GR			
	41	-116.6	10		16-10-29	24	BRUMH CP			
	⊒ — 42				10-13-20		UNUMIT ON			
14	40	5	15		15-19-16	35	SAME			
		•		iii						
			17		18-21-27	36	SAME			
1	50	•	14		21_21_20	37	SAME			
	46	,	'		£1-21-2V	– "–				
		-137.6	15		17-95-100/0*	38	SAME			

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NOTE: FOR PROJECT SITE GENERAL NOTES, A SEE DRAWING LGA

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	j	Sheet 7 of 9
	· · · · · · · · · · · · · · · · · · ·	OF NY & NJ
WEST END GARAGE N 220712.8 E 1018655.1		
18.4 WL NE BY: M.O. CHECKED BY: N.Y.	ATORY 4G	
SAMPLE CLASSIFICATION	LABOF	
s' Asphalt		the there this
IN GRAY C-F SAND, SOME CRUSHED ROCK, GRAVEL, TRACE SILT IN C-F SAND, LITTLE CRUSHED ROCK, GRAVEL, TRACE SILT	- -	CHIEF GEOTECHNICAL ENGINEER
IN C-F SAND, LITTLE SILT, TRACE GRAVEL, WOOD		
an silt, some fine sand, hade gravel My silt, little fine sand		
AY C-F SAND, SOME CLATEY SILI, LITTLE GRAVEL AY CLAY & SILT, TRACE FINE SAND		
-F SAND, SOME CLAYEY SILT, TRACE GRAVEL MAY C-F SAND. LITTLE SILT. GRAVEL		
-F SAND, LITTLE SILT, TRACE GRAVEL		
Å	· · ·	
TO SANNU, TRAVE SILI, TRAVE URAVEL		
-F SAND, LITTLE GRAVEL, SILT		
HTLY ORGANIC CLAY & SILT, TRACE FINE SAND		
Y SILT SOME M-F SAND	ļ	
I SILI, SUME M-F SMAD		No. Date Revision Approved
-F SAND, SOME GRAVEL, TRACE SILT		ENGINEERING DEPARTMENT
	,	
-F SAND, TRACE SILT, GRAVEL		LAGUARDIA
		AIRPORT
RAY M-F SAND, TRACE SILT		GEOTECHNICAL
r & Silt, trace fine sand	 	Title WEST END GARAGE
		PRESENTATION
		BORINGS
RAY M-F SAND, LITTLE SILTY CLAY		
TT INT UTING WITLE JILT VEAT		This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not
RAY M-F SAND, LITTLE SILT		be used without its written consent. All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and suppliers who may receive all or a part of the Contract documents or copies thereof, shall
RAY DECOMPOSED ROCK, GRAVEL, SAND, SILT SIZE		 make every effort to ensure the secure and appropriate disposal of the Contract documents to prevent further disclosure of the information contained in the documents. Secure and appropriate disposal includes methods of document destruction such as shredding or arrangements with refuse handlare that that that approximate approximate and with an event of the secure s
		to the documents' contents either before, during persons will not nave docess to the documents' contents either before, during, or after disposal. Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor, 3 Gateway Center, Newark NJ 07102 or the office of the Director of Procurement, One Madison Avenue. 7th Floor.
		New York NY 10010. It is a violation of law for any person to alter a document in any way, unless acting under the direction of a licensed professional engineer or registered architect. If this document bearing the seal of an
		engineer/architect is altered, the altering engineer/architect shall affix to the document their seal and the notation "altered by" followed by their signature and the date of such alteration, and a specific description of the alteration.
		N. YAKUBOVA. COFRANCESCON. YAKUBOVDesigned byDrawn byChecked by
		J Date JUNE 19, 2013
		Contract
TE MAP, BORING LOCATION PLAN, LEGEND, ABBREVIATIONS AND SOIL CLASSIFICATIONS		Number
A-SL-315.	,	Drawing LGA-SL-321
		PID# NUMBER
and an		

BORING	no. 237	DAT	ге 2—С)6-1	PROJECT		WEST END GARAGE		BORING NO. DATE PROJECT WEST END GARAGE							
	Ť	Ī		T	BLOWS PER 6 IN.	Γ	LOCATION N 220760.6 F 1018741.3						BLOWS PER 6 IN.	T		
E .	N ERS)	.	R		1 3/8"ID SPOON 140 LB. HAMMER			ž	L C	7	E		1 3/8"ID SPOON 140 LB. HAMMER			ž
	(MET	6	NTEN	BOL	30° FALL ROCK CORE	IPLE MBER	ELEVATION 10.2 ELEVATION 3.8 CHECKED BY: N.Y.	ORAT	(veci 14 (veci		REN EN	BO	30" FALL	L L L L L L L L L L L L L L L L L L L	ELEVATION 14.1 WE ELEVATION NE CHECKED BY: N.Y.	DRATC
<u>S</u>	Ë	E	¥ ô	3 E	REPORT	N N	SAMPLE CLASSIFICATION	ES CB	DE DE	ELE)	EXN OS	SYM	REPORT	NA NA	SAMPLE CLASSIFICATION	LABC TEST
0	$0 \int^{10}$	6.2					[-ASPHALT			$\int_{-13.8}^{-14.1}$				T		
	<u> </u>	5.0	-5-		POST HOLE DIGGER	51-	FILL-GRAY C-F SAND, LITTLE CRUSHED ROCK, GRAVEL, TRACE SILT				7	يعوز ندر ا	HAND AUGER	01	FILL-BROWN GRAY C-F SAND, LITTLE GRAVEL, SILT	
	- 1		8		POST HOLE DIGGER	02	FILL-BROWN C-F SAND, LITTLE GRAVEL, TRACE SILT				3		HAND AUGER	02	FILL-BROWN GRAY C-F SAND, TRACE SILT, GRAVEL	
	-2		9		10-5-4-3	03	FILL-BROWN C-F SAND, TRACE GRAVEL, SILT FILL-BROWN C-F SAND, SOME CRUSHED ROCK GRAVEL LITTLE SILT				5		HAND AUGER	03	FILL-BROWN C-F SAND, TRACE SILT, GRAVEL	
	6	5.2	4		5-4-3-3	05	SAME				9 19		4-5-7-7 5-3-2-2	05	SPUNE FILL-BROWN GRAY M-F SAND, SOME CLAYFY SILT, TRACE GRAVED	
		T	20		₩L 3-2-2	06	BROWN M-F SAND, LITTLE SILT	10420-00-00-00-00-00-00-00-00-00-00-00-00-0			16		WOH-WOH-WOH	06	FILL-BROWN GRAY C-F SAND, SOME CLAYEY SILT, TRACE GRAVEL	
	- 4		14		₩ <u></u> 4-2-1	07	BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL	,	4		54		2-1-1	07	MISC-FILL-BROWN M-F SAND, LITTLE BLACK CLAYEY SILT, TRACE GRAVEL, GLASS, WOOD, BROWN PEAT	
	- 5		17		2-1-1	08	GRAY BROWN C-F SAND, LITTLE SILT, GRAVEL, TRACE SHELLS		5	-3.4	84		7-2-4	08	MISC-FILL-BROWN GRAY M-F SAND, SOME GRAY SILTY CLAY, TRACE BROWN PEAT, GRAVEL, WOOD	
20	- 6		18		4-2-2	09	GRAY BROWN C-F SAND, LITTLE SILT, TRACE GRAVEL		206		87		6-3-4	09	BROWN PEAT AND GRAY SLIGHTLY ORGANIC SILTY CLAY	
	- 7		18		3-5-6	10	BROWN C-F SAND, TRACE SILT, GRAVEL			8.4	31		2-1-1	10	GRAY SLIGHTLY ORGANIC SILTY CLAY, SOME M-F SAND, TRACE GRAVEL	
_	- /		18		10-14-19		SAME				14		4-12-16		BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, SILT	,
	- 8	1.8	18		12-13-13		SAME		8		11		14-16-17	12	BROWN C-F SAND, SOME FRAGMENTED ROCK, GRAVEL, LITTLE SILT	
30	- 9		26		6-6-9	- 17	DROWN VARVED SHOLITIY ORGANIC SHITY CLAY TO SINE SAND SEAMS		30 - 9							
	-10 -1	6.8	<u>40</u>	$ \mathcal{N} $	PRESSED	TAUA	GRAY BROWN VARVED SLIGHTLE ORGANIC SILTY CLAY, TRACE FINE SAND			<u> </u>	-24-		6-9-13 PRESEED	13 14UA	BROWN M-F SAND, SOME CLAY & SILT BROWN GRAY CLAY AND SILT, TRACE M-F SAND	AL
	_ 44		12		12-19-27	15	GRAY C-F SAND, SOME GRAVEL, LITLE SILT BROWN C-F SAND SOME CRAVET TRACE SILT	65,00,56			19	$ \mathcal{U} $		JAUB	BROWN GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE M-F SAND	UU,SG
	- 11		1 46				BROWN OF SHAD, SOME GROVEL, HAGE SILI				20		0-8-11	15	BROWN GRAT SLIGHTLY ORGANIC CLAT & SILT AND M-F SAND	
40	- 12		12	2.0.3	15-9-30	16	SAME		40	2	07	 ((0 40 47			
	- 13			ن به و می می ه به می می می م به می می		<u> </u>			13	5	23	12	6-10-13		SAME	
	- 14		16		15-16-18	17	BROWN C-F SAND, TRACE GRAVEL, SILT			1	28		5-7-0	L-17	CRAY RECAINS VARIAND SHOUTHY ORGANIC CLAY & CILT. TRACE THE SAND	
										r	20		5-7-5		GRAT BROWN VARVED SLIGHTLT URGANIC CLAT & SILT, TRACE FINE SAND	
50	- 15		11		13-16-19	18	SAME		50 - 15	5	36	//	4-4-7	18	SAME	
	- 16								16	5 5						
	- 17		11		11-13-18	19	BROWN C-F SAND, SOME GRAVEL, SILT, GLACIAL TILL		17	,	35		3-6-9	19	SAME	
	<u> </u>	<u>41.8</u>	ana an ta Èina	2880			2			1		//	,			
60	10 -4	16.3	1	0000	22-100/1"	-20-	FRAGMENTED ROCK, GRAVEL, TRACE BROWN C-F SAND, SILT		60	•	36	$ \mathcal{N} $	5-7-13	20	SAME	l
	-19					1		 								
	- 20		12		15-14-21	21	BROWN C-F SAND, TRACE GRAVEL, SILT		20)	37		4-6-9	21	SAME	l
	- 21											$ \mathcal{N} $				l
	- 22		16		13-17-22	22	SAME			•	34	 ((3–5– 8	22	SAME	I
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	- 23		13		15-21-28	23	SAME			5	20	N	4-9-17	23	GRAY BROWN VARVED SLIGHTLY CLAY & SILT, SOME M-F SAND	1
80	- 24								80 - 24	-65.9						1
	- 25		18		13-19-24	24	SAME			5	15		18-21-31	24	BROWN GRAY C-F SAND, LITTLE SILT, FRAGMENTED ROCK, GRAVEL	
	- 26		14		16-18-18	25	SAME			5			40.40.04			l
	07	ľ	14		10-10-10	-20							19-18-21	25	BROWN C-F SAND, IRACE GRAVEL, SILT	Ì
90	- 21		15		19-21-31	26	SAME		90		17		10 45 40		SHIF.	
	- 28								28	3 .	17		12-13-18	20	SPANE	· · · ·
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					PRESSED	29U	GRAY GRAVEL, LITTLE C-F SAND, SILT	GS								I
	-32		35	Ŵ	10-12-17	30	GRAY SILTY CLAY, TRACE FINE SAND	<u> </u>		-90.9	29	000	8-11-17	29	gray clay & silt, trace fine sand	•••••••
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	- 35			11												l
			62		12-17-32	32	SAME			2	38	222	8-10-14	31	GRAY CLAY & SILT, SOME M-F SAND, TRACE SHELLS	l
120	- 36			W						5						i i
	- 37 _1	06.8	21		10-13-19	33	GRAY SILTY CLAY, SOME FINE SAND		37	7	28		9-9-13	32	GRAY CLAY & SILT, TRACE FINE SAND	l
	- 38			; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	14 00 70				1	3					· · · · ·	l
	- 39		25		14-22-52	→	GRAT DRUWN M-T SAND, SUME SILLY CLAY				21	LEB .	10-14-20		GRAY CLAY & SILT, LITTLE FINE SAND	l
130	40		20		18-28-32	35	BROWN GRAY M-F SAND LITTLE SHT			-115.9	- 75	W	12.45 00			
	- 40					٣		I.)	25		13-13-29	-34	DRUWN U-T SMNU, SUME GRAT SILIT CLAY, TRACE GRAVEL	
	- 41		13		24-22-59	36	BROWN GRAY C-F SAND, SOME GRAVEL, LITTLE SILT		41		16		32-68-62	35	GRAY BROWN C-F SAND. SOME SHIT LITTLE CRAME	
	- 42 _1	22.8					2		42	2						
140	- 43			KXX	REC=92%	R1	GRAY GNEISS		140	5	22		69-48-58	36	BROWN GRAY C-F SAND, LITTLE SILT, TRACE GRAVEL	1
		27.8	et automatic de la companya de la co	Ř	₹δ\=∪⊮π			L	J I .	1						, N
									44	-132.4	14		100/3"	=37=	GRAY C-F SAND, LITTLE SILT, FRAGMENTED ROCK, GRAVEL	

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	boring no. 3-23		me)2-2	8-1	3 PROJECT		· · ·
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	r) ERS)	7	E		1 3/8"ID SPOON 140 LB. HAMMER		SURFACE
	METE (FEE	ίο Έλλου Έλλο Έλλο	a la	ğ	30" FALL	PLE BER	ELEVATION
	DEPI		ILW NOO	STM	ROCK CORE REPORT	NUN	×
L		<u>12.9</u>					<u>-0.0'-0.3'</u>
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	Ξ.,		4		HAND AUGER HAND AUGER	01	FILL-BROWN
			2		HAND AUGER	03	SAME
	<u>-</u> 2		13	~ *	65512	04	FILL-BROWN
10-	3		13		21-23-15-16	05	MISC-FILL-BI SAME
		0.9	20	08 V.O	2-2-2	07	GRAY BROWN
			42		2-2-2	08	GRAY BROWN
	5	-4.1	72		WOH-WOH-WOH	00	GRAY SLIGHTI
20		-6.6	20	4		10	GRAY C-F S
]_7		31	16	1-2-1	11	GRAY C-F S
	<u> </u>	-11.6	22	-	2_3_4	12	BROWN SILT
		-15.1	43	11	PRESSED	TINA	BROWN GRAY
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		6	16		13-19-22	26	BROWN C-F
	3-2	7					
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	= 20	3					
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		+ -100.1					
		5	25		10-14-42	32	GRAY CLAY &
		5					
120		<u> </u>	13		20-19-24	33	BROWN GRAY
		/					
		3	12		35-40-65	34	BROWN GRAY
		9					
130		1	14		22-22-35	35	GRAY BROWN
		5			· · · · · · · · · · · · · · · · · · ·		
		1	18		47-41-52	36	BROWN C-F
	4	2		1.	-		
140		3	27		18-21-32	37	BROWN GRAY
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		5					
150		6	14		37-22-58	39	
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NOTE: FOR PROJECT SITE GENERAL NOTES, A SEE DRAWING LGA-

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		THE PORT AUTHORITY
	e .	OF NY & NJ
WEST END GARAGE		
N 220827.4 E 1018958.8		
12.9 WL 4.1 BY: M.O. CHECKED BY: N.Y.	RATOR NG	
SAMPLE CLASSIFICATION	LABO	Mal Mene 160
' ASPHALT		CHIEF GEOTECHNICAL ENGINEER
N GRAY C-F SAND, LITTLE GRAVEL, TRACE SILT N C-F SAND, TRACE GRAVEL. SILT		
n grat c—f Sand, little Silt, gravel Brown gray c—f Sand, little Silt, trace gravel, cinders	•	
N M-F SAND, LITTLE SLIGHTLY ORGANIC SILTY CLAY, TRACE SHELL FRAGEMENTS		
N M-F SAND, SOME SLIGHTLY ORGANIC SILTY CLAY, TRACE SHELL FRAGEMENTS		
ITLY ORGANIC SILTY CLAY, TRACE M-F SAND, SHELLS		
SAND & SLIGHTLY ORGANIC SILTY CLAY, TRACE SHELL FRAGEMENTS		
& SLIGHTLY ORGANIC CLAY, SOME FINE SAND, TRACE FINE SAND		
AY SILT & CLAY, LITTLE FINE SAND M-F SAND, SOME SLIGHTLY ORGANIC CLAYEY SILT	uu,co,sg	
n Fine Sand, some silt		
NLY ORGANIC CLAY & SILT IN SILTY CLAY IN SILTY CLAY		
IN VARVED SLIGHTLY ORGANIC CLAY & SILT		
		No. Date Revision Approved
		ENGINEERING DEPARTMENT
	, , , , , , , , , , , , , , , , , , ,	
F SAND, SOME SILT, LITTLE FRAGMENTED ROCK, GRAVEL		
F SAND SOME ERACMENTER DAVE CHAVEL SHIT		
F SAND, TRACE GRAVEL, SILT		
· · · · ·		GEOTECHNICAL
		litle WEST END GARAGE
. ~ .		
		DRECENITATION
; · ·		BORINGS
& SILT, LITTLE BROWN FINE SAND		
AY C-F SAND, LITTLE GRAVEL, TRACE SILT		
AY C-F SAND AND FRAGMENTED ROCK, GRAVEL LITTLE SUIT		This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to Port Authority and may not be used without its written concent
		All recipients of Contract documents, including bidders and those who do not bid and their prospective subcontractors and suppliers who may receive all or a part of the Contract documents or copies thereof, shall
IN C-F SAND, LITTLE FRAGMENTED ROCK, GRAVEL, SILT		make every effort to ensure the secure and appropriate disposal of the Contract documents to prevent further disclosure of the information contained in the documents. Secure and appropriate disposal includes methods of document destruction such as shredding or arranements
F SAND, TRACE SILT, GRAVEL		with refuse handlers that ensure that third persons will not have access to the documents' contents either before, during, or after disposal. Documents may also be returned for disposal purposes to the Contract Desk on the 3rd Floor 3 Category Conter Manager 10 27202
		verse on une ora ribor, a Gateway Center, Newark NJ 07102 or the office of the Director of Procurement, One Madison Avenue, 7th Floor, New York NY 10010. It is a violation of law for any person to alter a document in any way.
AY C-F SAND, LITTLE SILT		unless acting under the direction of a licensed professional engineer or registered architect. If this document bearing the seal of an engineer/architect is altered, the altering engineer/architect shall affix to
		the document their seal and the notation "altered by" followed by their signature and the date of such alteration, and a specific description of the alteration.
ay m—f sand, some silt		N. YAKUBOV A. COFRANCESCO N. YAKUBOV
AY C-F SAND, SOME CLAYEY SILT, FRAGMENTED ROCK, GRAVEL		Designed by Drawn by Checked by
		Date JUNE 19, 2013
SS		Contract
ABBREVIATIONS, AND SOIL CLASSIFICATIONS,	•	Drawing $ G\Delta - S - 272$
A-SL-315.		

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BORING NO.	D	TE	ananya wasan ku ku ku ku ku	PROJECT	, ROIC IN MERICINA		BORING NO.		DATE		PROJECT			
3-24	40 03-18-13 WEST END GARAGE				3-241 04-19-1				1 m	WEST END GARAGE				
ELS)	z	(x)		1 3/8"ID SPOON 140 LB. HAMMER		SUBFACE 11 0 WILL EX KI			E		BLOWS PER 6 IN. 1 3/8 [*] ID SPOON 140 I B HAMMER		LOCAHON N 221078.2 E 1018557.5	Ē
(MET) (MET)	WATIO	IER	VIBOL	30" FALL ROCK CORE	APLE MBER	ELEVATION 11.6 ELEVATION 3.1 CHECKED BY: N.Y.		Nom ₹	TENT	ы Во	30" FALL	BER P.F.	SURFACE 12.8 WL ELEVATION 4.9 BY: M.O. CHECKED BY: N.Y.	S SNE
B		WA: CO	ß	REPORT	<u>S</u> Z	SAMPLE CLASSIFICATION			₩Š	₩S	REPORT	3 Ž	SAMPLE CLASSIFICATION	312
00	Γ ^{11.2}						00) [12.8	Ļ			<u> </u>		
		6 10	×** 8	POST HOLE POST HOLE	01 02	FILL-BROWN M-F SAND, LITTLE GRAVEL, TRACE SILT SAME			11		HAND AUGER HAND AUGER	01	FILL-BROWN C-F SAND, LITTLE GRAVEL, SILT FILL-BROWN C-F SAND, TRACE GRAVEL, SILT	
		12 0		POST HOLE	03	SAME EN L-PROMON MALE SAND LITTLE CRAVEL SUIT		•	15		HAND AUGER	03	FILL-BROWN M-F SAND, TRACE SILT	`
10	1.6	18		7 WL 3-2-2-2 	05	FILL-BROWN G-F SAND, LITTLE GRAVEL, TRACE SILT		•	24 22		<u>₩L</u> 3-2-2-2 2-1-1-1	04	FILL-BROWN M-F SAND, LITTLE SILT SAME	
	-0.9	18 35	1	8-6-5	06	DARK GRAY C-F SAND, TRACE SILT		•	27		1-1-1	06	SAME	
	-3.4	23		1-1-2	08	DARK GRAY C-F SAND, TRACE SILT			29 30		2-2-2 2-3-3	07	SAME FILL-BROWN M-F SAND, LITTLE SILT, TRACE GRAVEL	
206		19		2-2-1	09	DARK GRAY C-F SAND, LITTLE GRAVEL, TRACE SILT		<u>-4.7</u>	42	111	2-2-3	09	BROWN CLAY & SILT, SOME M-F SAND	
	-10.9	22 63		2-1-1	10	DARK GRAY C-F SAND, TRACE SILT, GRAVEL		7	15		3-3-3	10	BROWN RED C-F SAND, SOME CLAYEY SILT, TRACE GRAVEL	
		55	$ \mathcal{X} $	WOH-WOH-WOH	12	GRAY SLIGHTLY ORGANIC CLAY AND SILT, LITTLE F SAND, TRACE SHELLS		,	13		6-14-18 14-18-19	11	BROWN RED C-F SAND, LITTLE SILT, TRACE GRAVEL BROWN C-F SAND, LITTLE SILT, GRAVEL	
		62 38	$\boldsymbol{\mathcal{Y}}$	PRESSED	13UA 13UB	GRAY SLIGHTLY ORGANIC CLAY & SILT, LITTLE SHELLS, TRACE FINE SAND GRAY CLAY AND SILT, LITTLE SHELLS, TRACE FINE SAND	,sg							
		20	\mathbb{X}	3-3-6	14	GRAY SLIGHTLY ORGANIC CLAYEY SILT, TRACE SHELLS	30		12		11-8-10	13	BROWN C-F SAND, SOME GRAVEL, SILT	
		23	\mathbb{S}	5-5-9	15	TAN SLIGHTLY ORGANIC CLAYEY SILT. TRACE FINE SAND		U	15		44 00 70			
		20				THE SLOTTLY CRANIC CLATET SILL, HAVE FILL SMAD		1	15		14-22-52	14	BROWN RED TAN C-F SAND, LITTLE SILT, TRACE GRAVEL	
		35	$ \mathcal{U} $	3-5-7	16	SAME	40 1	2	17		11-18-14	15	BROWN RED TAN C-F SAND, TRACE SILT, GRAVEL	
			\rangle	•				3						,
		41	\mathbb{S}	2-2-5	17	GRAY TAN SLIGHTLY ORGANIC SILTY CLAY	1	4	17		19-27-28	16	GRAY BROWN C-F SAND, TRACE SILT, GRAVEL	
50 15		40	$\langle \langle $	1-3-3	18	SAME	50 1	5	16		19-26-28	17	SAME	
16							1 = 1	6						
		39	\mathcal{Y}	1-3-5	19	SAME		7	18		18-26-27	18	SAME	
60 - 18		48))	2-2-4	20	SAME	60 1	8			27 Jaj 30			
19		10	\mathbb{S}	~ ~ ~			1 =-1	9	20		53-4/-3/	19	GRAY BROWN C-F SAND, LITTLE FRAGMENTED ROCK, TRACE SILT	
20		42		2-1-2	21	SAME		20	16		22-27-25	20	GRAY BROWN C-F SAND, TRACE SILT, GRAVEL	
70 - 21			\mathcal{X}					21 -57.2				- -		
- 22		27	$\boldsymbol{\mathcal{Y}}$	3-6-11	22	GRAY SLIGHTLY ORGANIC CLAYEY SILT, TRACE FINE SAND		22	33	\mathbf{N}	6-16-22	21	GRAY SLIGHTLY ORGANIC CLAY & SILT, TRACE FINE SAND	
	-63.4	14	8303	9-11-24	23	GRAY M-F SAND AND GRAVEL, LITTLE SILT	2	23	45	$ \rangle$	7-14-24	22	GRAY BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND	
80 - 24	60 4						2	24	47 33	ISSI	PRESSED	23UA 23UB	GRAY BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND, GRAVEL GRAY BROWN SLIGHTLY ORGANIC SILTY CLAY, TRACE FINE SAND	
25	-09.4	13		12-41-29	24	GRAY CLAYEY SILT AND GRAVEL, SOME M-F SAND (TILL)		25	32	$ \langle \langle $	9-11-15	24	SAME	
		11		10-15-17	25	GRAY CLAYEY SILT AND GRAVEL, LITTLE M-F SAND (TILL)		-72.2	14	//	24-33-37	25	BROWN GRAY C-F SAND, TRACE SILT, GRAVEL	``
on27								27						
28		15		19-18-24	26	SAME	90	28	15		29-50/4*	-26-	BROWN GRAY C-F SAND, SOME CLAYEY SILT, GRAVEL, GLACIAL TILL	
		15		15-20-38	27	SAME		9 -82.2	17		26-43-51	27	BROWN CLAY & SILT SOME BROKEN BOOK CRAVEL OLE SAND	
30					i and a second		3	50			20-40-01	<u> </u>	DROWN CERT & SIET, SOME BROKEN ROCK, GROVEL, C-F SAND	
100		14		12-18-24	28	SAME		51	13		24-35-34	28	BROWN GRAY C-F SAND, TRACE GRAVEL, SILT	
	-93.4	13		37-49-52	20	CRAY C-E SAND AND CRAVEL LITTLE SHT (THIL)	3	52					и, 	
33								33	15		zu-25-28	29	SMME.	ļ
110		16		52-41-35	30	SAME	110	54	18	(4. 1 H) 4. 1 H (1 H)	27-32-31	30	SAME	
								5 -102.2						
								6	30	H	6-16-24	31	GRAY CLAY & SILT, TRACE FINE SAND	_
120		14	00.0	21-23-26	31	GRAY GREEN C-F SAND, LITTLE GRAVEL, SILT	120	57	35		9-16-19	32	RED BROWN GRAY SILTY CLAY	
								<u>112.2</u>						N.
39		13		70-81-69	32	GRAY GREEN C-F SAND, SOME GRAVEL, LITTLE SILT		10	20		13-24-26	33	GRAY BROWN C-F SAND, SOME GRAVEL, LITTLE SILT	
130		23		17-24-40	33	GRAY GREEN C-F SAND, LITTLE GRAVEL, TRACE SILT	130	<u>-117.2</u>	-20-		57-50/3*	3	DARK BROWN GRAY DECOMPOSED ROCK, GRAVEL, SAND, SILT SIZE	
41		20		En /1*		SAME								
42		22		50/4	1	ONME.		-124.2	26	Ň	46-50/2*	-35	SAME	
		20		19-22-24	35	SAME	140	3		KXX	REC=100%	R1	GRAY GNEISS	
44								-129.7	L			<u> </u>		
		22		17-22-25	36	GRAY M-F SAND, TRACE GRAVEL, SILT								
	-138.2				<u>_</u>							*		
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PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

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		CHIEF GEOTECHNICAL ENGINEER
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		PRESENTATION
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		BORINGS
	. , .	
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·		registered architect. If this document bearing the seal of an engineer/architect is altered, the altering engineer/architect shall affix to the document their seal and the notation "altered by" followed by their signature and the date of such alteration, and a specific description of
		N. YAKUBOV A. COFRANCESCO N. YAKUBOV
		Designed by Drawn by Checked by
•		Date JUNE 19, 2013
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	л. А.	Number LUA JL JZJ PID# NUMBER

NOTE: FOR PROJECT SITE MAP, BORING LOCATION PI GENERAL NOTES, ABBREVIATIONS, AND SOIL CI SEE DRAWING LGA-SL-315.