Kingston Waterfront Resiliency Project Site Reconnaissance Report



November 16, 2018

Prepared for: City of Kingston, NY

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Section I. Introduction

McLaren Engineering Group (McLaren) was retained by the City of Kingston in April, 2017 to design shoreline improvements on the Kingston Rondout Waterfront that will address extreme hazards from flooding, seek to protect important facilities and the historic Cornell Building, and help stimulate economic development and water-related and water-dependent activities. Over the last 100 years, the waterfront has experienced flooding from at least 12 hurricanes and tropical storms. Today, some portions of the project area, such as low points along East Strand, frequently flood when high tides coincide with a few inches of rain. Stakeholders have observed flooding from the street-side as a result of overflowing storm sewers. The goal of the project is to promote resiliency on the waterfront through hard and soft shoreline treatments that will mitigate the impacts of future flooding.



Project Location

McLaren is performing several tasks as part of the project design process. The Project Advisory Group (Task 1) has been formed and has as of July 18, 2018 met on two occasions, once by conference call and the other time in person. The Project Kickoff meeting, Task 2, was held with McLaren and City and Department of State representatives on March 13, 2018 to launch the project and gain a clear understanding of the project goals and objectives and review the City's requirements and expectations. Task 3A of McLaren's scope of work, Site Reconnaissance, includes the identification and mapping of features and facilities in the project area that are outlined and described in this report





A Design Workshop, part of Task 3B, was held on May 25, 2018 with key project stakeholders to review project objectives and obtain input from stakeholders on existing site conditions, future plans and infrastructure option preferences. The information gathered at the Design Workshop helped guide the development of schematic design alternatives.

Section II: General Description of the Proposed Project

The project area extends approximately 1,200 feet along the Rondout Creek waterfront from the east side of the overhead Route 9W Bridge to the Cornell Building. The waterfront consists of a combination of different existing bulkhead treatments, riprap and vegetated bank, an abandoned ferry slip and severely deteriorated bulkhead. A brick promenade runs adjacent to a portion of the waterfront. Several buildings are located in the project area along the waterfront, offset varying distances from the edge of bulkhead or top of bank.

At the Design Workshop, a desire was expressed to make the bulkhead more uniform and as resilient as possible. There was also a general recognition of the tradeoffs between resiliency and risk. At a minimum, stakeholders expressed that improvements should reflect a common theme, retain as much natural shoreline as possible and increase public access to the waterfront by extending the promenade and installing a hand launch for canoes and kayaks.



Project Area





Section III: Site Reconnaissance

PROPERTY OWNERSHIP

The 1,200-foot project area consist of three separately owned properties:

Hudson River Maritime Museum 50 Rondout Landing Kingston, NY 12401

This property consists of three parcels 56.43-6-1.100, 56.43-6-1.200 and 56.43-6--2 that house Maritime Museum facilities and comprise approximately half of the project area. There is a public access easement (Appendix A) with the city to accommodate the waterfront promenade.

JKJ Properties, LLC 88-94 Rondout Landing Kingston, NY 12401 C/o 7 Quail Ridge Road Hyde Park, NY 12538

This property consists of two parcels, 56.43-6-3 that contains the abandoned Kingston-Rhinecliff ferry slip and 56.43-6—4 which houses the Ole Savannah Restaurant.

Historic Kingston Waterfront#1, LLC 108 East Strand Kingston, NY 12401 325 Gold Street #4 Brooklyn, NY 11201

The Cornell Building is located on parcel 56.43-6-5. Parcel 56.43-6-6 is also owned by Historic Kingston, but the project limits do not extend to this parcel.

STRUCTURES, BUILDING AND FACILITIES ADJACENT TO SITE

The following structures, buildings and facilities are adjacent to the site:

Route 9W overhead bridge: the eastern edge of the NSDOT right-of-way under the bridges forms the western edge of the project limits.

Hudson River Maritime Museum: Consists of a recently constructed barn, the Maritime Museum building and the Riverport Wooden Boat School building. These buildings vary from approximately 15 to 30 feet from the top of bulkhead. There is a great deal of maritime activity in the area between these buildings and the bulkhead.

Gazebo: There is a gazebo located along the promenade between the Maritime Museum barn and the Maritime Museum.





Ole Savannah Restaurant: The restaurant building extends to the top of riprap shoreline embankment. A cantilevered deck attached to the building extends to above the toe of the embankment at low tide.

Cornell Building: The southern edge of the building lies between 5 and 10 feet from the top of riprap and deteriorated concrete bulkhead.

Docks: In summer season wood floating docks offset from the bulkhead and shore line most of the shore.

Wastewater Treatment Plant: Located on the north side of East Strand across from the Ole Savannah and Cornell Building.

Auto Parking: Diagonal parking lines both sides of Rondout Landing near the Maritime Center and the abandoned ferry slip area. There are several additional parking spaces in front of the Ole Savannah.

Trolley and Train Tracks along East Strand: There are active trolley tracks in front of the Maritime Museum as well as old train tracks. The tracks cross East Strand diagonally across from the Ole Savannah restaurant.

ABOVE AND BELOW GROUND INFRASTRUCTURE

Sewer lines are shown on the project map. Sewer infrastructure in the project area includes:

- Storm sewer terminating in the bank of old ferry slip cove area. Associated manholes located in Ole Savannah patio area and street. Stakeholders report that this drainage structure is the first to back up and flood the street during high water events.
- 4' x 6' combined outfall pipe under the Maritime Center. A 2007 report was shared with McLaren by the City Engineer, outlining the results of a dive investigation of the pipe from a manhole in front of the Maritime Museum building. The report findings are consistent with comments from Maritime Museum Stakeholders that flooding often starts with a backup of the outfall pipe due to obstructions.
- A 20' wide easement to the Town of Esopus Sewer District crosses the Maritime Center property approximately 20 feet west of the Maritime Museum Building.

Power poles and lines run adjacent to the north site of East Strand with service lines extending across the road to the individual buildings. Pedestrian scale streetlamps line the south side of the street.

Several power hookups for boats along the Maritime Museum bulkhead.

TRANSPORTATION CIRCULATION SYSTEM

Vehicular Traffic

- Rondout Landing/ East Strand. A city street that runs along the north side of the properties in the project area. The site is accessed by motor vehicle from this roadway.
- Broadway. Leads to Rondout Landing/ East Strand from downtown Kingston.
- Route 9W. A state roadway passing perpendicular over the Rondout forming the western edge of the project area.





Bicycle and Pedestrian Traffic

- A sidewalk along the north side of Rondout Landing/ East Strand for pedestrians. A crosswalk across the roadway leading from the Trolley Museum parking area to the end of the promenade adjacent to the Ole Savannah.
- Brick shoreline promenade extending from beyond the western limit of the project at the Route 9W Bridge to the street side of Ole Savannah. There is an interruption in the promenade adjacent to the eastern end of the Maritime Museum Building and behind the Riverport Wooden Boat Building School.
- Proposed extension of the Empire State Trail would run from the northwest along abandoned rail/trolley tracks and ending at the trolley museum. The trail would then extend to the east either a) along East Strand or b) parallel to the active trolley tracks toward the Point.

Transit

- Citibus Route A runs down Broadway and along Rondout Landing/ East Strand. Stops at the Mariner's Harbor on Broadway and in front of the Maritime Museum.

Trolley

- Excursion trolley operated by the Trolley Museum runs from the Maritime Museum, crosses Rondout Landing/ East Strand and extends to the Point.

ADJACENT LAND AND WATER USES

Land:

- Hudson River Maritime Museum (50 Rondout Landing): A recently constructed barn, the Maritime Museum building and the Riverport Wooden Boat School building. These buildings vary from approximately 15 to 30 feet from the top of bulkhead. There is a great deal of maritime activity in the area between these buildings and the bulkhead. A large tugboat is stored on the grounds.
- Trolley Museum (88 East Strand): Museum building on north side of road. Trolley rides departing from in front of the Maritime Museum building along East Strand to the point at the Hudson River.
- Sewage Treatment Plant (103-193 East Strand) Sewage treatment tanks and pond. Generates odors in adjacent area.
- Valley Landing Apartments (Valley Landing Road north of East Strand). Townhome apartment complex.
- Ole Savannah Restaurant (100 Rondout Landing): The restaurant is housed in a brick building that abuts the waterfront. An attached deck at the back of the building cantilevers over the shore slope.
- Cornell Building Historic brick buildings between the road and waterfront. Several large, old vessels are stored on the property.

Water:

- Wood floating docks line most of the shore in the project area. The docks are privately owned.
- Various size vessels utilize the floating docks.





Rowing club dock between Maritime Center barn and Museum building.

HISTORIC AND ARCHEOLOGICAL RESOURCES

The City of Kingston was settled by the Dutch in the 1600's and soon after established as New York State's first capital. As such, this city is rich with historical and archeological resources that provide character and a sense of place. It is crucial that these resources are protected and enhanced so their legacy may continue.

According to the National Register of Historic Places, four historic properties are located in proximity to the project site. Of these four, only one, the Cornell Steamboat Company Machine Shop Building, is located within the boundaries of the propose work area. The Cornell Steamboat Company was the main towing company on the Hudson River from the 1880's to the 1930's. This historic waterfront building was used as a shop to build and repair ship boilers. In present day, shop has been converted into the Ole Savannah restaurant, which kept much of the original character of the building and provides waterfront views of what used to be one of the most important ports in New York State.

The other three historic properties, the Rondout-West Strand Historic District, the CATAW++ ISSA (Coastal Tugboat), and the Brooklyn & Queens Transit Trolley No.1000, are located near, but not within, the site boundaries. Located several hundred feet west of the project site is the Rondout-West Strand Historic District, which includes historic commercial, residential and religious architecture. The proposed shoreline protection system will not impact surrounding areas aside from flood resiliency. The CATAWISSA, which used to be stationed near the site is no longer in commission and was scrapped in 2008. Thus, this historic recourse is not vulnerable to construction impacts. Finally, the Brooklyn & Queens Transit Trolley No. 1000 is approximately 300 feet north of the project site. This vintage trolley car was built in the 1930s by Clark Equipment to be used in New York City. Its aluminum body and standee windows make it unique.

Due to Kingston's rich history, the project site is listed as an archeologically significant area. Artifacts dating back 12,000 years to the Native American's who inhabited the area or the Colonial-Era Dutch and English Settlers from the 1600's may be present at the project site. While it is unlikely that new artifacts will be uncovered by the proposed project as the site has been previously disturbed, there is a possibility of a new discovery. Special care will be taken during construction to ensure that no archeological resources are impacted by the proposed project. Should any resources be uncovered, construction will cease until the appropriate authorities are notified to commence examination of the artifact.

SITE STABILITY: SOIL AND CORE SAMPLING

A Geotechnical investigation was conducted by SMV Engineering. The geotechnical report is attached in its entirety in Appendix A.

TOPOGRAPHY AND HYDROLOGY

Topographic and hydrographic surveys were conducted and compiled into a survey base plan which is provided in Appendix B.

In addition, McLaren conducted a dive survey to investigate existing conditions of subaqueous features. An underwater inspection report has been prepared and is included in its entirety in Appendix C.





NATURAL RESOURCES

Natural resources in or near the project site include the Rondout Creek and a NYSDEC regulated freshwater wetland. Rondout Creek is a freshwater tributary of the Hudson River that is ideal for small vessels. It is a class C waterbody as determined by the New York State Department of Environmental Conservation (NYSDEC), meaning that the best usage of the waterbody is fishing but it may also be suitable for primary and secondary contact recreation. The waterbody can be identified by its NYSDEC regulation ID 855.4-1.

A portion of the project site is located in the vicinity of a regulated freshwater wetland. The NYSDEC wetland ID is KE-11. While the project site is not directly within the freshwater wetlands, there is a 100-foot buffer line surrounding the wetland that the easternmost portion of the site falls into. Wetlands are classified by how much benefit they provide, with class 1 providing the highest benefit and class 4 providing fewer benefits. The freshwater wetland located near the project site is a class 2 wetland. A description of each of the categories can be found in Title 6. Official Compilation of Codes, Rules and Regulations of the State of New York 664.5.

ZONING AND OTHER APPLICABLE DESIGNATIONS

The project area is zoned RF-R, Rondout Creek District. The purpose of the district is to afford priority to water dependent uses, achieve public access to the coastal area, control development, and create distinct Hudson River and Rondout Creek waterfront districts and to implement the policies and purposes of the City of Kingston Local Waterfront Revitalization Program. Further, it is the purpose of the district to provide opportunities for permanent public views and access to the Hudson River and Rondout Creek and to encourage the phase out of certain uses which are incompatible with and detract from the Hudson River and Rondout Creek waterfront areas. See the Kingston Zoning Code for more information https://ecode36o.com/6727872.

The project area is also within the City of Kingston's Local Waterfront Revitalization Program (LWRP) boundary. The City of Kingston LWRP refines and supplements the State's Coastal Management Program and provides a comprehensive framework within which critical waterfront issues can be addressed and planned waterfront improvement projects can be pursued and implemented. The approval history of City of Kingston LWRP was published in a <u>final public notice</u> in 1993.

VIEW CORRIDORS

East:

There are open views extending to the mouth of the Rondout Creek and Hudson River, as well as the point and lighthouse.

West:

Views of the Rondout Creek, route 9w and old 9w overhead bridges. The property has a visual relationship, albeit partially obscured by the route 9w Bridge and piers, with the nearby west strand historic district, which is listed on the national register of historic places. The Rondout creek harbor, also partially visible, to the west, was the terminus of the former Delaware and Hudson canal, a national historic landmark.





NORTH:

Views of east strand, sewage treatment plant, trolley museum and trolley cars, valley landing apartments, wooded hill leading to Hasbrouck Park.

SOUTH:

Views across Rondout Creek with remains of several submerged vessels. Across the Rondout in Port Ewan there is a view of abandoned waterfront facility and toward the Hudson a boat ramp is visible

ANALYSIS OF CONSTRAINTS, NEEDS, AND OPPORTUNITIES

Constraints

There are several constraints that may impact the design and/ or construction of the project:

- Wood floating docks line most of the shore and the tie arms connecting the docks to the existing bulkhead walls. Shoreline improvements will need to be constructed in the non-navigation season when the docks and ties are removed.
- Ramps/ gangways for between the bulkhead and docks. Shoreline improvements will need to be constructed in the non-navigation season when the docks and ties are removed. Gangways will need to be accommodated in the shoreline improvement design.
- Marine electric service along some of the bulkhead. Electric lines and service will be identified and maintained during construction.
- Deteriorated remains of old ferry slip and pylons in water. Stakeholders expressed an interest in removing the old pylons, which they said are hazardous to canoes and kayaks.
- The properties in the project area are privately owned. Easements or agreements will be needed with the property owners to allow for the improvements and satisfy DOS requirements.
- The location of the Ole Savannah building and deck in relation to the shore. The deck poses a potential obstacle to shoreline improvements and will be a factor in designing shoreline improvements at that location.
- BOA Opportunity Area. DEC recommended cleanup area at Cornell Steamboat Company. This will need to factored in the design through the Cornell Building area.
- Private ownership of project area.

Needs

- Stabilize shoreline. Stakeholders have identified shoreline stabilization as a major priority of the project. Improvements will need to result in a more stable shoreline.
- Accommodate increased landside public access. There is widespread agreement among stakeholders that a public promenade be constructed as close to the water's edge as possible.
- Prevent seepage and undermining of bulkhead walls. Maritime Museum representatives have said that water thee is water in their basements due to seepage through the existing bulkhead. Improvements that could possibly stop this seepage would be desirable.
- Continuity in the shoreline. There is currently a variety of different types of bulkhead walls and shoreline types in the project area. Creating more continuity, both in infrastructure and thematically is desirable.
- Easements/ agreements with private property owners.





Opportunities

- Stable and resilient shoreline is a priority.
- Continuous shoreline promenade. There is a potential for a continuous shoreline promenade through the project area. Constructability, cost and permitting will be factors in whether it is possible.
- Improved access for canoes and kayaks. There is an interest and opportunity for a canoe/ kayak launch at the old ferry slip. This would require some modifications and removal of the old pylons.
- Improved aesthetics. The is an opportunity to improve the aesthetics of the waterfront through consistent design treatments and materials.
- Increased economic development along waterfront. Shoreline improvements and increased public access with result in more people using the Rondout waterfront. Waterfront businesses will benefit from this increase in activity. This will also be attractive to new businesses that may choose to be located in the waterfront area.





Appendix A:





GIFFORD ENGINEERING

Geotechnical and Geoenvironmental Services

GEOTECHNICAL ENGINEERING REPORT NEW WHARF WALL

located at Rondout Creek Waterfront Kingston, NY

prepared for:
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July 2018
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GEOTECHNICAL ENGINEERING REPORT

New Wharf Wall Rondout Creek Waterfront Kingston, NY

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INTRODUCTION:

This is a report on a subsurface investigation for the proposed new Wharf Wall to be located at the Rondout Creek waterfront in The City of Kingston, NY. Two soil borings have been completed by SJB Services, Inc, located in Malta, NY under contract to others. A location diagram has been prepared by the client and is included with the boring logs in the appendix.

It is understood that the proposed project will include a new wharf wall to replace a dilapidated wall approximately as shown on the location diagram. The present day wall is approximately 1200 feet long and comprised of wood, steel, and concrete. The wood wall is toward the west end of the wall. There are wood piles with horizontally placed wood timbers behind the piles. Further east the wood timbers are self supporting with rock pieces placed on the water side for support. East of this is a soldier pile and wood lagging section of wall. The eastern most section of wall is concrete and appears to be precast blocks that are stacked up to provide the wall.

There is a floating dock adjacent to the wall which provides adequate water depth for the draft of boats using the facility. There are wooden and aluminum gangways providing access to the floating dock. The new wall will be placed in the location of the existing wall and provide about as much freeboard as the current wall, no more than a few feet. A sheet pile wall is a likely replacement and is the focus of this report. There may be the need for piles or some other foundation system to support a boardwalk and deck at a nearby restaurant.

Environmental issues are beyond the scope of this report and should be addressed by a qualified environmental firm.

This report is intended to; 1) present the findings obtained during the investigation, 2) discuss the analysis of the data gathered during the investigation, and 3) make recommendations for the design and construction of the feasible wall systems, foundation systems, as well as the earthwork requirements of the project.

SUBSURFACE INVESTIGATION PROCEDURES:

The borings were advanced with a truck-mounted drill rig advancing a 4.25-inch inside diameter hollow-stem auger. Samples were obtained at 5 foot increments by the split-spoon sampling technique in conjunction with standard penetration testing as specified by ASTM D 1586. The number of blows required to advance the sampler two feet, in six-inch increments is recorded on the boring logs. The blow count or N value (blows per foot) is numerically equal to the summation of the middle two.

These samples were examined at the boring site, sealed in jars or tubes, and transported to the laboratory. The samples were then visually classified and subjected to appropriate testing.

The water level within the borehole was measured at various times during the investigation. The depth to the water level is affected by boring procedures and may require some period of time to equilibrate. The measurements of water level are given on the boring logs along with the time. All

boreholes were filled with cuttings and one with grout prior to leaving the site. There may be minor settlement of the boreholes with time; the client must repair this settlement.

The site was also visited by the geotechnical engineer. The borehole locations had been assigned by and had been laid out by SMV Engineering. A representative of SMV observed drilling operations.

LABORATORY WORK:

In addition to the field identification recorded by the drillers, all samples were examined by a geotechnical engineer. The samples were visually classified using the Unified Soil Classification System as specified by ASTM D 2487. The resulting classification symbol and description are indicated on the soil boring logs. Because the visual classification technique is approximate, variations of a few percent of a particular grain size can result in an inaccurate classification. When inaccurate classification would have a large impact on the recommendations reported herein, further testing was performed or is recommended.

Grain size distribution was measured on samples of granular material by washed mechanical techniques as specified by ASTM D 421, D 422, and D 1140 and the results are included in the appendix.

SITE EVALUATION:

The site is located on the north shore of the Rondout Creek immediately east of where the Route 9W bridge passes over the creek. The present day wall is approximately 1200 feet long. It extends about 4 feet above the water level, during the site visit. It is understood that the water level is influenced by the tides in the Rondout, with about 4 to 5 feet of change.

The present day wall is comprised of different materials. The western approximately half of the wall is constructed of large wood timbers (12 by 12 inch) that are laid horizontally and stacked one on top of another. Part of this wood wall is supported with wood piles. Where there are no piles for support, there is little freeboard as the wall is backfilled on the creek side with stone and rock pieces up to near the water surface. There was a lawn area along this section of the wall where a sinkhole had developed behind the wall. This was likely due to a hole in the wall allowing raveling of soil thru the hole into the creek.

To the east there is a section of wall comprised of soldier piles with wood lagging. The steel soldier piles are evenly spaced and situated vertically with horizontal wood planks spanning between the piles. The freeboard in this section is estimated as a few feet.

Further to the east, there is a section of wall with an architectural concrete face, mimicking a cobblestone wall. The type of wall is unknown, but may be a precast concrete block retaining wall system.

SUBSURFACE EVALUATION:

The boring logs indicate the specific subsurface conditions at each boring location. The subsurface conditions can vary significantly between locations. To aid in the evaluation, a general description of the subsoil conditions has been prepared.

The subsurface conditions identified at the borings include a layer of fill comprised of wet slag with brick fragments. This fill extends to a depth of 8 feet. Based on blow counts this material is medium dense.

Subjacent to the fill is a layer of probable wet native sand with little silt and trace gravel. This layer had an organic odor and extends to a depth of 14 feet. Based on blow counts, this layer is loose.

Subjacent to this is a thick stratum of wet varved silt with trace clay and occasional fine sand layers. This stratum is common in the Hudson River Valley, having been deposited under glacial Lake Albany about 10,000 years ago. This stratum extends to a depth of at least 67 feet, the maximum depth of boring. Based on blow counts this silt stratum is soft to very soft.

At a depth of 60 feet in boring B-2, water and gas bubbled up through the hollow stem auger from the borhole. The boring was abandoned and was backfilled with grout to block the gas and water from exiting the ground.

Based on the testing performed and experience with similar soils, the following design parameters are recommended.

	Unit Weig	ht (pcf)	Friction	Unc. compressive		
Material	Moist	Saturated	angle (degrees)	strength (psf)		
Fill Slag	100	110	32			
Sand	110	120	30			
Silt	115	125	26			

SUBSURFACE WATER:

The water level measurements taken during the boring investigation are presented on the boring logs. This information is coupled with the estimated degree of saturation of the samples to yield an approximate groundwater level. The depth to groundwater is about 7 feet on the day of the borings. This groundwater level will vary as it is affected by the tides.

Low permeability soils may result in perched water tables at elevations above the phreatic water surface. The flow rates and quantity of water associated with these water tables will however be small. Seasonal changes in the phreatic water surface and perched water tables are expected due to variable precipitation and runoff.

GEOTECHNICAL CONSIDERATIONS:

This section addresses the geotechnical considerations for the sitework, foundations, and construction procedures which are recommended. Professional services for this investigation are reported and recommendations made in accordance with generally accepted geotechnical engineering practice. An attachment entitled "Important Information about Your Geotechnical Engineering Report" is prepared by the ASFE, Association of Engineering Firms Practicing in the Geosciences should be reviewed and understood. It contains guidelines and outlines the context in which the report should be used.

It should be understood that this report is based on information provided to us and the results of a limited number of borings and/or test pits. The borings were advanced at specific locations and the overburden soils sampled at limited and specific depths. Conditions are known at these locations to the depths investigated. Conditions may vary at other locations and depths and the differences may impact the conclusions reached and recommendations made. For these reasons it is strongly recommended that we be retained to provide construction observation and testing services. No warranty, expressed or implied is made.

As the design progresses and plans become finalized, we should be afforded the opportunity to review them and evaluate the effects that changes made during the design may have on the recommendations made herein.

The subsurface conditions revealed during this investigation are adequate to support the proposed construction. An interlocking sheetpile wall is a feasible solution for the new wharf wall. Individual wood, steel, of helical piles can be used to support vertical loading from a deck or boardwalk. The vertical loading could also be supported by conventional reinforced concrete footing and piers.

Per Chapter 16 of the New York State Building Code, the site class is E, soft clay soil. The following values are provided at the USGS website, confirmed in Section 1615 of the Code, and are recommended for design. The soils are not considered liquefiable in the event of an earthquake.

	Short Period (0.2 Sec)	Long Period (1.0 Sec)
Mapped Spectral Response Acceleration	17.4%g	6.4% g
Site Coefficient	2.5	3.5
Maximum Earthquake Spectral Response	43.4%g	22.6%g
Design Earthquake Spectral Response	28.9%g	15.0%g

Sitework:

Prior to placement of the wall, the following actions are recommended to ease installation of the wall. The proposed areas of construction should be stripped of all wall materials and obstructions that may impede installation of the new wall.

Controlled Fill:

A controlled fill can be constructed of granular fill in horizontal lifts not exceeding 9 to 12 inches in loose thickness. If hand operated compaction equipment is used, lift thickness should be limited to 4 to 6 inches. All lifts should maintain a minimum density of 95 percent modified Proctor density, as specified by ASTM D 1557. A material that meets the requirements of NYSDOT 203-2.02 type B or C is recommended.

203-2.02 Select Materials and Subgrade Area Material Requirements. The requirements for select materials and subgrade area materials are described below. All removal of oversize material, blending, or crushing operations shall be completed at the source of the material. The procedure for acceptance or rejection of these materials shall be as described in the appropriate Soil Control Procedure (SCP) manual.

A. Subgrade Area Material. Subgrade area material shall consist of any suitable material having no particles greater than 6 inches in maximum dimension.

- B. Select Borrow and Select Fill.
 - 1. Gradation. Material furnished for these items shall be suitable material having no particles greater than 3 feet in maximum dimension. Of the portion passing the 4 inch square sieve, the material shall have the following gradation:

1	Percent Passing by Weight
Sieve Size	
No. 40	0 to 70
No. 200	0 to 15

- 2. Soundness. The material shall be sound and durable. When the State elects to test for the soundness requirement, a material with a Magnesium Sulfate Soundness Loss exceeding 35 percent will be rejected.
- C. Select Granular Fill and Select Structural Fill. Materials furnished under these items shall be suitable and conform to the following requirements:
- 1. Gradation. The material shall have the following gradation:

Sieve Size	Percent Passing by Weight
4 inch	100
No. 40	0 to 70
No. 200	0 to 15

2. Soundness. The materials shall be substantially free of shale or other soft, poor durability particles. Where the Sate elects to test for this requirement, a material with a Magnesium Sulfate Soundness Loss exceeding 30 percent will be rejected.

Backfill which has been designed to resist structural loading such as pavements, sidewalks, or lateral forces should also meet the compaction requirements above. The requirements of compaction for fill beneath ancillary areas or green space can be lessened to 90 to 92 percent of the cited standard, if desired.

The native fill slag is suitable for use as backfill provided it meets the requirements above and can be readily compacted or is approved for use by the geotechnical engineer.

A Quality Assurance, Quality Control, and Special Inspection program should be developed and overseen by the geotechnical engineer of record. Conductance of this quality assurance program is required for proper execution and confirmation that the recommendations contained in this report are followed. Conductance of this program does not relieve the contractor of his responsibility to construct the project in accordance with the plans and specifications, Building Code, and normal industry standards.

Wharf Wall Recommendations:

It is recommended that the replacement wall be a steel sheetpile wall. A cantilever design should be used since there is no room for a tie back wall with the buildings, utilities, and other improvements situated near the wall. The wall should be designed by a qualified geotechnical engineer.

The existing wall and other obstructions should be removed from the location where the new wall will be installed. The borings revealed one sample where the sampler refused further penetration. This was probably due to a cobble or boulder or some other obstruction within the upper fill layer. When installing the sheets, a similar obstruction may stop the sheet so it will need to be pulled and the obstruction removed before continuing.

Some form of cap should be placed on the tops of the sheet pile wall upon completion. This is usually a concrete cap that is cast after the sheets are installed and cut off level. The cap can support safety railings as necessary.

The sheet piling can be designed for lateral resistance of the unbalanced soil on each side of the wall. Recommended lateral earth pressure coefficients based on Rankine Theory are presented. Values are ultimate and a factor of safety should be applied, particularly to passive. Full passive resistance is mobilized only after significant movement.

Soil	At Rest	Active	Passive
Slag fill	0.47	0.31	3.26
Sand	0.5	0.33	3.0
Silt w/ Clay	0.56	0.39	2.57

There may be some vertical loads to support at the existing dock at the restaurant and/or the

Soil

Friction

boardwalk. The use of wood piles, helical piles, or conventional shallow reinforced concrete piers can be designed to support the vertical loading.

Wood piles can be designed as friction piles with side support as follows. The piles should be designed by a qualified geotechnical engineer.

Fric	ction wood shaft to soil (psi)
Slag Fill	Sand	Silt/Clay

5

There are specialty contractors that deal in helical piles. They can provide design assistance, cost estimating services, and installation. In my experience, helical piles will be more economic than wood piles.

10

Conventional shallow footings can be designed with a recommended net allowable bearing capacity of 1500 psf when bearing in the slag fill. The footings should bear at a depth of 4 feet or more for frost protection. A minimum footing dimension of 2.5 feet is recommended.

CONSTRUCTION RECOMMENDATIONS:

15

All excavations of more than 4 feet should be braced or laid back as necessary to prevent sloughing of the sidewalls. Site safety as dictated by regulating organizations such as OSHA and the NYS Department of Labor should be addressed and maintained during construction by the contractors.

Special inspections and reports that are required by Chapter 17 of the NYS Building Code should be performed by a qualified engineer to ensure compliance with the recommendations of this report.

Excavations adjacent to existing foundations or improvements should not extend below them without adequate sheeting, bracing, and/ or underpinning having been installed. This should be designed and stamped by a registered professional engineer.

Temporary dewatering may be necessary in excavation or low areas if groundwater is encountered or during wet periods. Water from precipitation should be removed from excavations immediately rather than allowed to percolate into the subgrade.

Temporary access roadways may be necessary during wet or thaw weather. This may include geofabric and/or coarse fill.

All subgrades and fill material should be kept from freezing during construction. Water, snow, and ice should not be allowed to collect in low areas and excavations.

Some obstacles including boulders or rubble may be encountered in excavations. If necessary, rippers, breaking tools, and drilling and blasting may be required to remove such materials.

All proof rolling operations should be witnessed by a qualified geotechnical engineer. All subgrades should be inspected by a qualified geotechnical engineer.

APPENDIX:

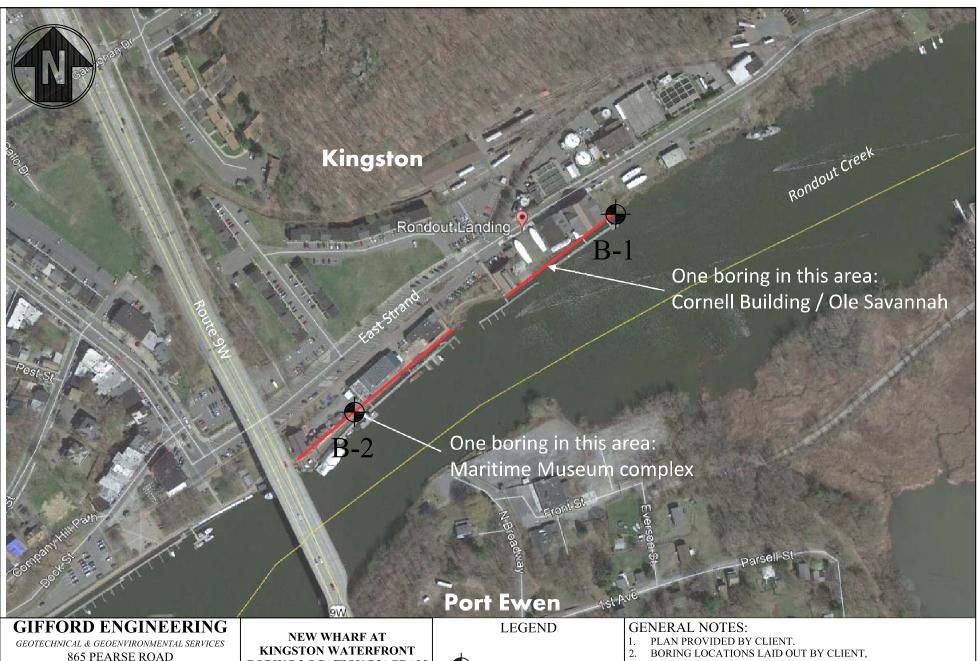
General Qualifications
Location Diagram
Boring Logs
Laboratory and Field Test Results
USGS Design Maps Summary Report
General Notes
Unified Soil Classification System
Important Information About Your Geotechnical Engineering Report

GENERAL QUALIFICATIONS:

This report has been prepared to aid in the evaluation of this property and to assist the architect and/or engineer in the design of this project. The scope of the project and location described herein, and description of the project represents my understanding of the significant aspects relevant to soil and foundation characteristics. In the event that any changes in the design or location of the proposed facilities, as outlined in this report, are planned, the geotechnical engineer should be informed so the changes can be reviewed and the conclusions of this report modified in writing, if necessary.

It is recommended that all construction operations dealing with earthwork and foundations be inspected by an experienced geotechnical engineer to ensure that the design requirements are fulfilled in the actual construction. If desired, the geotechnical engineer would review the plans and specifications when they have been prepared to ensure that the geotechnical recommendations have been incorporated into the design, plans, and specifications.

The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and/or test pits performed at the locations indicated on the location diagram and from any other information discussed in the report. This report does not reflect any variations which may occur between these locations. In the performance of subsurface investigations, specific information is obtained at specific locations at specific times. However, it is a well-known fact that variations in soil and rock conditions exist on most sites between subsurface investigation locations and also such situations as groundwater conditions vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, it will be necessary for a reevaluation of the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.



865 PEARSE ROAD NISKAYUNA, NY 12309 PHONE: (518) 382-2545 EMAIL: giffeng@nycap.rr.com

KINGSTON WATERFRONT **BORING LOCATION DIAGRAM**

KINGSTON, NY File No. 1835 July 24, 2018



APPROXIMATE LOCATIONS SHOWN.

P	ROJI	ECT NAME:		New	Wharf W	all				FILE NO.: 1835		
	BC	ORING NO.:			-1 (page					CASING SAMPLER CORE BARREL		
		CLIENT:			MV Engir				TYPE:	HSA SS		
S		LOCATION:			Kingston				SIZE I.D.:	4.25" 1.375"		
		ORING LOC				tion Diag			HAMMER WT:			
	SUK	FACE ELEV		MDLE	See Loca	tion Diag	gram		HAMMER FALL:	30"		
T		DEPTH		AMPLE S PER 6'	ONICAL	MDLED		COL.	STRATA	FIELD CLASSIFICATION AND REMARKS		
DEPTH	NO.	RANGE	0-6	6-12	12-18	18-24	REC.	A	CHANGE	FIELD CLASSIFICATION AND REMARKS		
	S-1	0.0' - 2.0'		5	12 10	10 24	1.5'			4-inches topsoil over black, wet, medium dense,		
	5 1	0.0 2.0			5	3	1.5		1	slag with brick fragments, fill.		
									1			
5												
	S-2	5.0' - 5.9'	3	50/0.4'			0.6'			Poor recovery, mostly brick fragments.		
									01			
									8'			
									1			
10	S-3	10.0' - 12.0'	5	4			2.0'		1	Grey, wet, loose, Sand, little Silt, trace Gravel,		
	5 5	10.0 12.0			5	9	2.0		1	SM, probable native with organic odor.		
									1	71		
									14'			
15												
10	S-4	15.0' - 17.0'	1	1			1.4'		_	Grey, wet, soft, varved Silt, trace Clay with		
					1	1			1	occasional fine Sand layers, organic odor.		
									-			
									-			
20	S-5	20.0' - 22.0'	WOH	WOH			2.0'		1	Similar.		
	55	20.0 22.0	***************************************	***************************************	3	2	2.0		1	Similar.		
									1			
25	~ -											
	S-6	25.0' - 27.0'	WOH	WOH	WOII	WOII	2.0'		4	Similar.		
					WOH	WOH			-			
									-			
20									1			
30	S-7	30.0' - 32.0'	N/A	N/A			2.0'		1	Shelby Tube Sample.		
					N/A	N/A]			
									1			
									1			
35	C 0	25.01 27.01	WOH	WOH			2.0'		4	Similar		
	5-8	35.0' - 37.0'	WOH	WOH	WOH	WOH	2.0		1	Similar.		
					WOII	WOII			†			
									1			
40]			
40	S-9	40.0' - 42.0'	WOH	WOH			2.0']	Similar.		
					WOH	WOH			1			
									1			
									-			
STR A	TIFIC	ATION LINES	SREPRE	SENT AP	PROXIM	IATE RO	UNDA	RIFS	I RETWEEN SOIL TV	PES. IN-SITU TRANSITION MAY BE GRADUAL.		
										GIFFORD ENGINEERING		
	WA	TER LEVEL	:	Water at	5-7 feet.					GEOTECHNICAL & GEOENVIRONMENTAL SERVICES 865 Pearse Road		
DR	ILLE	R:	SJB S	ervices, Ir	nc SW		Γ	ATE:	17-Jul-18	Niskayuna, NY 12309-2909		
APPI	OVED BY: JCB DATE: 24-Jul-18						24-Jul-18	Phone: (518) 382-2545				

	PROJ	ECT NAME:		New	Wharf W	/all					FILE NO.:	
	BO	ORING NO.:			3-1 (page					CASING	SAMPLER	CORE BARREL
		CLIENT:			MV Engii				TYPE:	HSA	SS	
		LOCATION:			Kingston				SIZE I.D.:	4.25"	1.375"	
		ORING LOC				ation Diag ation Diag			HAMMER WT: HAMMER FALL:		140# 30"	
-	SUK	FACE ELEV		AMPLE	See Loca	mon Diag	gram	1	HAMINIER FALL:		30"	
F.T.		DEPTH		S PER 6'	" ON SA	MPLER		COL.		FIELD C	LASSIFICATI	ON AND REMARKS
DEPTH	NO.	RANGE	0-6	6-12	12-18	18-24	REC.	Α	CHANGE	TILLD	2.1001110111	
	S-10	45.0' - 47.0'	WOH	WOH			2.0'			Similar.		
					WOH	WOH						
									-			
50	S-11	50.0' - 52.0'	WOH	WOH			2.0'			Similar.		
	5 11	30.0 32.0	***************************************	11011	WOH	WOH	2.0			Siliniar.		
55	~											
	S-12	55.0' - 57.0'	WOH	WOH	WOH	WOH	2.0'		-	Similar.		
					WOH	WOH			-			
60												
00	S-13	60.0' - 62.0'	WOH	WOH			2.0'			Similar.		
					WOH	WOH						
									-			
									-			
65	S-14	65.0' - 67.0'	WOH	WOH			2.0'			Similar.		
					WOH	WOH			67'			
										End of bori	ng at 67 feet.	
70									-			
75												
									-			
									-			
80												
00												
									-			
85												
	<u> </u>								-			
STR /	TIFIC	ATION I INF	S REPRE	SENT AT	PPR⊖XIV	I IATE RO	I IND /	ARIFS	L RETWEEN SOIL TVI	PES INLSIT	TI TRANSITIO	N MAY BE GRADUAL.
SIK							OIND!	MILO.	DET WEEN BOIL III		SIFFORD ENG	
L	WA	TER LEVEL	ı :	Water at	5-7 feet.							IRONMENTAL SERVICES
	RILLE		SJB S	ervices, Iı	nc SW				17-Jul-18		Niskayuna, NY	12309-2909
APPROVED BY: JCB					I	DATE:	24-Jul-18		Phone: (518)			

F	PROJI	ECT NAME:		New	Wharf W	all				FILE NO.: 1835		
	BORING NO.: B-2 (page 1 of 2)									CASING SAMPLER CORE BARREL		
		CLIENT:			MV Engir				TYPE:	HSA SS		
S		OCATION:			Kingston				SIZE I.D.:	4.25" 1.375"		
		ORING LOC				tion Diag			HAMMER WT:			
_	SUK	FACE ELEV			See Loca	ition Diag	gram	1	HAMMER FALL:	30"		
DEPTH		DEPTH		AMPLE S PER 6'	LONGA	MDLED		COL.	STRATA	FIELD CLASSIFICATION AND REMARKS		
E	NO.	RANGE	0-6	6-12	12-18	18-24	REC.	A	CHANGE	FIELD CLASSIFICATION AND REMARKS		
H	S-1	0.0' - 2.0'		6	12-10	10-24	1.8'			Black, wet, medium dense, slag with brick		
	5 1	0.0 2.0		Ů	8	3	1.0		-	fragments, fill.		
					_					ang		
5												
3	S-2	5.0' - 7.0'	5	5			1.8'			Similar with rock fragments.		
					6	10						
									8'			
10	G 2	10.01 12.01	WOII	1			2.01			C 1 C 1:441- C:14 4 C1		
	S-3	10.0' - 12.0'	WOH	1	WOH	2	2.0'		-	Grey, wet, loose, Sand, little Silt, trace Gravel, SM, probable native with organic odor.		
					WOH				-	Sivi, probable native with organic odor.		
									14'			
15	S-4	15.0' - 17.0'	WOH	1			2.0'		1	Grey, wet, soft, varved Silt, trace Clay with		
					2	2				occasional fine Sand layers, organic odor.		
20												
	S-5	20.0' - 22.0'	WOH	WOH	MOH	MOH	2.0'			Similar.		
					WOH	WOH			-			
									-			
25	S-6	25.0' - 27.0'	N/A	N/A			2.0'			Shelby Tube Sample.		
					N/A	N/A				•		
30	0.7	20.01 22.01	WOII	WOII			2.01			g: 11		
	S-7	30.0' - 32.0'	WOH	WOH	WOH	WOH	2.0'		-	Similar.		
					VV OI1	** OII			1			
									1			
25									1			
35	S-8	35.0' - 37.0'	WOH	WOH			2.0']	Similar.		
					WOH	WOH]			
									4			
			-	-					4			
40	9.0	40.0' - 42.0'	WOH	WOH			2.0'		1	Similar.		
	3-9	70.0 - 42.0	W O11	VV O11	WOH	WOH	2.0		1	ommat.		
					,, 011	,, 011			1			
				1					1			
STRA	TIFIC	ATION LINE	S REPRE	SENT AF	PROXIM	IATE BO	UNDA	ARIES I	BETWEEN SOIL TY	PES. IN-SITU TRANSITION MAY BE GRADUAL.		
	WA	TER LEVEI	,:	Water at	5-7 feet.					GIFFORD ENGINEERING GEOTECHNICAL & GEOENVIRONMENTAL SERVICES		
-							_		17 1 10	865 Pearse Road		
_	ILLE		SJB S	ervices, Ir	ıc SW				17-Jul-18	Niskayuna, NY 12309-2909		
APP	PPROVED BY: JCB DATE: 24-Ju								∠4-Jui-18	Phone: (518) 382-2545		

	PROJ	ECT NAME:		New	Wharf W	/a11				FILE NO.: 1835
	BORING NO.: B-2 (page 2 of 2)									CASING SAMPLER CORE BARREL
		CLIENT: SMV Engineering							TYPE:	
5		LOCATION:			Kingston	, NY			SIZE I.D.:	
		ORING LOC				ation Diag			HAMMER WT:	
	SUR	FACE ELEV			See Loca	ation Diag	gram		HAMMER FALL:	30"
DEPTH				AMPLE		,		COL.	STRATA	
EP	NO.	DEPTH		S PER 6'			REC.		CHANGE	FIELD CLASSIFICATION AND REMARKS
	C 10	RANGE	0-6	6-12	12-18	18-24				Similar.
	5-10	45.0' - 47.0'							-	Similar.
									-	
50										
30	S-11	50.0' - 52.0']	Similar.
									-	
55	S-12	55.0' - 57.0'							1	Similar.
	3-12	33.0 - 37.0							-	Sililiar.
									1	
60									60'	
	S-13	60.0' - 62.0'								Boring operations terminated by engineers at 60
									-	feet due to water and gas bubbling from boring. Boring backfilled with grout to block the water and
									-	gas from exiting the ground.
									1	gas from externg the ground.
65										
70									-	
									-	
75										
00									•	
80									1	
									1	
	<u> </u>		-			1		-	J	
			-			1			1	
85									1	
									1	
]	
CULD :	TIETO	ATION I DIE	C DEPPE	CIDATE AT	מת מתו	(ATE DO	TIME (DIEG	DETWEEN COU	DEC. IN CITE TRANSPICAL MAY BE OB ABOUT
SIRA	ATIFIC	ATION LINE	3 KEPKE	SENT Al	'rkUXIN	AATE BO	UNDA	AKIES .	BETWEEN SOIL TY.	PES. IN-SITU TRANSITION MAY BE GRADUAL. GIFFORD ENGINEERING
WATER LEVEL: Water at 5-7 feet.										GEOTECHNICAL & GEOENVIRONMENTAL SERVICES
DF	RILLE	CR:	SJB S	ervices, Iı	nc SW	17-Jul-18	865 Pearse Road Niskayuna, NY 12309-2909			
		ED BY:		JCB					24-Jul-18	Phone: (518) 382-2545
-										•

GIFFORD ENGINEERING

 $Geotechnical\ \&\ Geoen vironmental\ Services$

LABORATORY TEST RESULTS New Wharf at Kingston Waterfront File No. 1835

Grain Size Distribution ASTM D 421, D 422 & D 1140

Size/Sieve	Percent Passing by Weight	Percent Passing by Weight
	B-2 S-3 10'-12'	B-2 S-9 40'-42'
No. 4	92.0%	100.0%
No. 10	89.0%	100.0%
No. 20	85.8%	100.0%
No. 40	77.6%	99.9%
No. 100	27.6%	97.6%
No. 200	17.0%	92.6%

ZUSGS Design Maps Summary Report

User-Specified Input

Report Title New Wharf at Kingston Waterfront, File No.: 1835

Tue July 24, 2018 15:49:30 UTC

Building Code Reference Document 2012/2015 International Building Code

(which utilizes USGS hazard data available in 2008)

Site Coordinates 41.92018°N, 73.97927°W

Site Soil Classification Site Class E - "Soft Clay Soil"

Risk Category I/II/III



USGS-Provided Output

$$S_s = 0.174 g$$

$$S_{MS} = 0.434 g$$

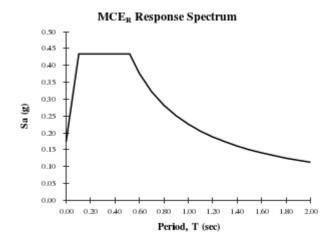
$$S_{DS} = 0.289 g$$

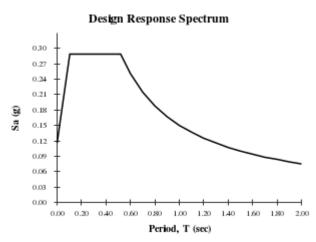
$$S_1 = 0.064 g$$

$$S_{M1} = 0.226 g$$

$$S_{D1} = 0.150 g$$

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS*

WATER LEVEL SYMBOLS**

SS	Split Spoon – 1 3/8" I.D., 2" O.D.	\mathbf{WL}	Water Level
\mathbf{ST}	Shelby Tube -3 " O.D.	WCI	Wet Cave In
OS	Osterberg Sampler – 3" Shelby Tube	DCI	Dry Cave In
PA	Power Auger Sample	WS	While Sampling
DB	Diamond Core – NQ, BX, HQ	$\mathbf{W}\mathbf{D}$	While Drilling
WR	Weight of Rod	BCR	Before Casing Removal
\mathbf{WH}	Weight of Hammer	ACR	After Casing Removal
RD	Rotary Drill Bit	AB	After Boring
\mathbf{DC}	Driven Casing, Washed		

*Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon, except where noted.

** Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence on ground water elevations must be sought.

CLASSIFICATION

COHESIONLESS SOILS

WB Washed BoringHSA Hollow Stem Auger

OH Open Hole

COHESIVE SOILS*

1% - 10%		N (Blows/ft)	$\mathbf{Q_c}$ (TSF)
10% - 20%	Soft	0 - 4	0.00 - 0.49
20% - 35%	Medium	5 - 8	0.50 - 0.99
35% - 50%	Stiff	9 - 15	1.00 - 1.99
	Very Stiff	16 - 30	2.00 - 3.99
0 - 9 Blows	Hard	> 30	≥ 4.00
10 - 29 Blows			
30 - 50 Blows			
> 50 Blows			
	10% - 20% 20% - 35% 35% - 50% 0 - 9 Blows 10 - 29 Blows 30 - 50 Blows	10% - 20% Soft 20% - 35% Medium 35% - 50% Stiff Very Stiff 0 - 9 Blows 10 - 29 Blows 30 - 50 Blows	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

* If Clay content is sufficient so that clay dominates soil properties, then Clay becomes the principal known with the other major soil constituent as modifier: i.e., Silty Clay. Other minor soil constituents may be added according to classification breakdown for cohesionless soils: i.e., Silty Clay, little Sand, trace Gravel. Additional explanation available upon request. See attached Unified Soil Classification sheet.

Table 3.5 Unified Soil Classification

Field Identification Procedures (Excluding particles larger than 3 in, and basing fractions on estimated weights)			Group Symbols	Typical Names	Information Required for Describing Soils		Laboratory Classification Criteria					
More than half of mater frainced soils farger than No. 200 sieve ut the smallest particle visible to naked eye Sands	Gravels More than half of coarse fraction is larger than No. 4 sieve size t in. size may be used as No. 4 sieve size).	avels wing preciate population of fines)		n grain size a	nd substantial diate particle	GW	Well graded gravels, gravel- sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses	no.	in size an No. illows:	$ \begin{vmatrix} C_{0} = \frac{D_{60}}{D_{10}} & Greater than 4 \\ C_{C} = \frac{(D_{20})^{2}}{D_{10} \times D_{60}} & Between 1 and 3 \end{vmatrix} $	
			Predominant!	y one size or a intermediate	range of sizes sizes missing	GP	Poorly graded gravels, gravel- sand mixtures, little or no fines			and sand from grain size (fraction smaller than No. 1s are classified as follows: , SW, SP, , SW, SP, , SW, SP, , SW, SP, , SW, SC, , SW, SP, SW, SP, SW, SW, SW, SW, SW, SW, SW, SW, SW, SW	Not meeting all gradation requirements for GW	
			Nonplastic fi	nes (for ident	dification pro-	GM	Silty gravels, poorly graded gravel-sand-silt mixtures				Atterberg limits below "A" line, or PI less than 4 Above "A" line with PI between 4 and 7 are	
			Plastic fines (f	or identifications)	on procedures,	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures	tion on stratification, degree of compactness, cementation. moisture conditions and drainage characteristics		of gravel a of fines (f GW, GP, GM, GC, Borderlin dual sy	"A" line, with PI greater than 7	
	Sands ian half of coarse in is smaller than if steve size visual classification, the			n grain sizes ar f all interme		sw	Well graded sands, gravelly sands, little or no fines				$C_{\text{U}} = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_{\text{C}} = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3	
	Sands I half of co s smaller th sieve size that classific equivaler		Predominantly with some	y one size or a intermediate		SP	Poorly graded sands, gravelly sands, little or no fines	hard, angular gravel particles 1-in. maximum size; rounded and subangular sand grains	given under	percentages on percentag size) coarse g an 5% han 12%	Not meeting all gradation requirements for SW	
	More than fraction is No. 4 s	Sands will fines (appreciate amount of fines)	Nonplastic fir cedures, s	nes (for ident see ML below)		SM	Silty sands, poorly graded sand- silt mixtures	coarse to fine, about 15 % non- plastic fines with low dry strength; well compacted and moist in place; alluvial sand;	Determine percentages cauve Curve Depending on percentage 200 sieve size) coarse ge Less than 12% More than 12% 5% to 12%	Atterberg limits below Above "A" line with PI between 5 4 and 7 are		
			Plastic fines (fo		on procedures,	sc	Clayey sands, poorly graded sand-clay mixtures	(SM)	fractions :	Dogo	Atterberg limits below "A" line with PI greater than 7	
	Identification Procedures on Fraction Smaller than No. 40 Sieve Size								the			
	Sitts and clays liquid limit less than 50		Dry Strength (crushing character- istics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: Clayey silt, brown; slightly plastic; small percentage of	identifying	60 Compari	ing soils at equal liquid limit	
			None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity		curve in	No 40 Toughne with incr		
	Silts	Silts Hq. less		None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		Use grain size	Spirit 20 OH		
			Slight to medium	Slow	Slight	OL	Organic silts and organic silt- clays of low plasticity			10 cl ol		
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	МН	Inorganic silts, micaccous or diatomaccous fine sandy or silty soils, clastic silts					
			High to very high	None	High	СН	Inorganic clays of high plas- ticity, fat clays				Liquid limit	
			Medium to high	None to very slow	Slight to medium	ОН	Organic clays of medium to high plasticity			for labor	Plasticity chart atory classification of fine grained soils	
н	ighly Organic S		Readily iden		lour, odour,	Pt	Peat and other highly organic soils	fine sand; numerous vertical root holes: firm and dry in place; loess; (ML)			see, j stadding of this granted solls	

a Boundary classifications. Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well graded gravel-sand mixture with clay binder.

b All sieve sizes on this chart are U.S. standard.

Field Identification Procedure for Fine Grained Soils or Fractions

These procedures are to be performed on the minus No. 40 sieve size particles, approximately 1/64 in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (Reaction to shaking):

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky.

Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during

squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics): After removing particles larger than No. 40 sieve size, mould a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished

by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit):

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is moulded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eight inch in diameter. The thread is then folded and re-rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached.

After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The tougher the thread near the plastic limit and the stiffer the lump when it finally crumbles, the more potent is the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line.

Highly organic clays have a very weak and spongy feel at the plastic limit.

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you - assumedly a client representative - interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. **Active involvement in the Geoprofessional Business** Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civilworks constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared solely for the client. Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnicalengineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full*.

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be,* and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations only after observing actual subsurface conditions revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnicalengineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you've included the material for informational purposes only. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may

perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.



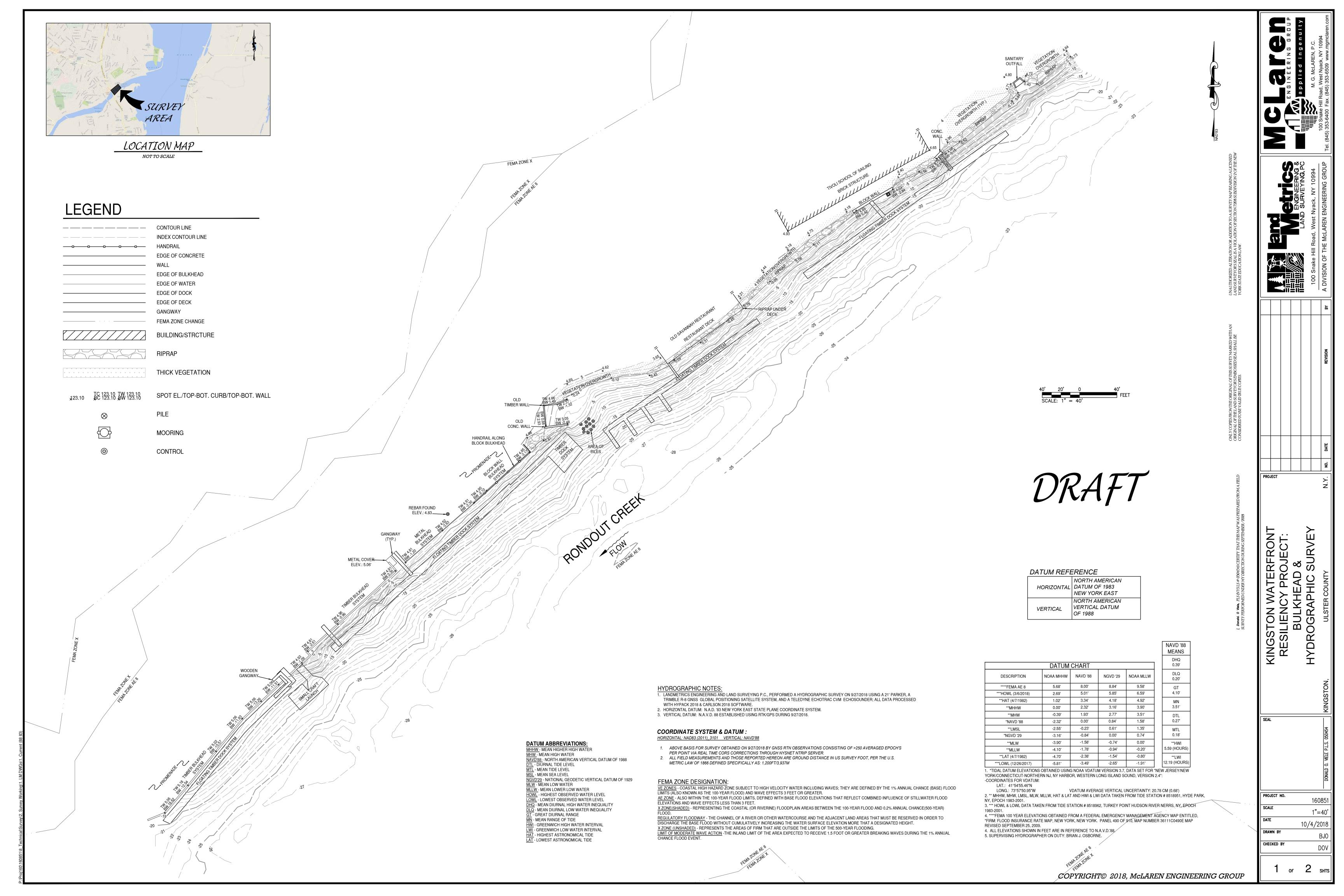
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Appendix B:









Appendix C:







Arts, Entertainment & Exhibits Ports, Coastal & Waterfront Real Estate Development Public Infrastructure Transportation Government Healthcare Education Industrial Energy

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FIELD REPORT

McLaren Engineering Group M.G. McLaren, P.C. 530 Chestnut Ridge Road Woodcliff Lake, NJ 17677

PROJECT: Kingston Waterfront Rehabilitation FIELD REPORT NO: 01

McLAREN FILE NO: 160851

Date: October 12, 2018 Weather: Sunny Time: 8:00 AM Arrival Temp. Range: 54-66°

Present on Site: Work in Progress:

Inspection of Shoreline along Rondout Creek Tyler Hackett (McLaren) Stephen Molison (McLaren)

Daniel Murphey (McLaren) John Wooley (McLaren)

REPORT BY: Tyler Hackett

OBSERVATIONS:

The McLaren team arrived at the Hudson River Maritime Museum at 8:00 AM by company vehicle. The 1,200 linear feet of shoreline that comprises the project site was stationed out. A topside inspection and underwater inspection with cross sections was complete for the entire shoreline in question.

McLaren's inspection began at the westernmost property boundary of the Hudson River Maritime Museum, station (0+00). The shoreline in question runs west to east and changes construction often with a total of 7 types of shoreline. The inspection began with two McLaren team members stationing the entire shoreline, while a third member drew dimensioned sketches of the above water bulkhead

Offices: New York, New Jersey, Maryland, Florida, Connecticut, California, Georgia, Pennsylvania

M.G. McLaren, P.C. 530 Chestnut Ridge Road

Woodcliff Lake, NJ 07677 Phone (201) 775-6000 elements, and the fourth member took photographs as well as notes on construction type and noticeable defects.

After a full above water inspection was completed, the underwater inspection began. Mr. Hackett entered the water by means of ladder with surface supplied diving equipment. Due to the length of the shoreline, three dive sites were required to reach the entire shoreline. The first dive station was set up just to the west of the Hudson River Maritime Museum, the second was set up between the Maritime Museum and the Riverport Wooden Boat School, and the third was set up between the Ole Savannah Restaurant and the Cornell Building. No underwater photos were taken due to the lack of adequate visibility during the time of inspection. The McLaren team mobilized offsite at approximately 4:00pm.

FINDINGS:

The above and underwater inspection determined that the majority of the shoreline in question is in severe condition and should be addressed. Each shoreline type within the project scope was found to have areas with partial or complete failure.

Station 0+00 to Station 3+82

The timber bulkhead adjacent to the Maritime Museum was found to be mostly intact with the exception of areas where the cribbing wall had partially failed allowing fill to leech into the waterway, creating areas of subsidence behind the timber bulkhead. Timber cribbing debris was unexpectedly found throughout the entire site. Dimensioned timber debris was found along the entire shoreline length against the existing mean low water level and extending out to a maximum of 20ft in some locations.

Station 3+96 to Station 4+93

The steel framed bulkhead with timber planks behind the Boat School had areas where fill was leeching as well. Timber elements were deteriorating and displaced due to the upland surcharge pressures.

Station 4+93 to Station 6+00

The stacked concrete block wall appeared to be in adequate shape from the above water inspection; however, underwater inspection determined that the wall was set on top of the deteriorating timber cribbing. Constructing the wall on top of the cribbing has resulted in voids underneath the wall and loss of adequate bearing.

Station 6+00 to Station 8+10

The abandoned ferry slip area between the Boat School and Ole Savannah was found to have a large amount of concrete debris and abandoned timber piles that no longer serve any structural function.

Station 8 + 10 to Station 9 + 12

The area consisting of the Ole Savannah Building and the west edge of the Cornell building is primarily a rip-rap shoreline with areas of large concrete and timber debris.

Station 9 + 12 to Station 10 + 50

The Cornell Building shoreline varies and shows a rip-rap shoreline similar to the Ole Savannah with intermittent areas of stacked concrete blocks for gangway connections to the floating docks.



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Station 10 + 50 to Station 11 + 75

The stacked concrete blocks at the Cornell Building showed similar deterioration to the wall behind the Boat School with the bulkhead being constructed on top of existing timber cribbing. This area showed more severe signs of settlement and displacement of the stacked concrete blocks.

INFORMATION OR ACTION REQUIRED:

McLaren will prepare existing cross sections of each shoreline type and design adequate alternatives.

ATTACHMENTS:

Photos

cc: File





Photo 1: View of Timber Bulkhead at Hudson River Maritime Museum, looking East.



Photo 2: View of area of subsidence behind the timber bulkhead due to fill leeching.





Photo 3: View of Timber Bulkhead behind the Maritime Museum with original failed cribbing in front.



Photo 4: View of Steel and timber planking bulkhead with failed areas and leeching of fill.





Photo 5: View of Steel bulkhead and Concrete block interface, loss of fill due to failed bulkhead.



Photo 6: View of interface between Concrete block wall and abandoned ferry landing rip-rap.





Photo 7: View of Ferry Landing debris and remaining structure.



Photo 8: View of Ferry Landing shoreline with failed barrier and timber debris.





Photo 9: View of Ole Savannah Shoreline with concrete debris and riprap underneath of cantilevered patio.



Photo 10: View of displaced stacked concrete blocks for gangway connection at the Cornell Building.





Photo 11: View of displaced stacked concrete blocks for the gangway connection at the Cornell Building.

