APPENDIX F CASE 10-T-0139 STORMWATER POLLUTION PREVENTION PLAN (SWPPP) ASTORIA HVDC CONVERTER STATION SEGMENT 22

Stormwater Pollution Prevention Plan (SWPPP)

Prepared for Construction Activities At:

Champlain Hudson Power Express
Astoria DC Converter Station

SWPPP Prepared For:

Transmission Developers, Inc.

1301 Avenue of the Americas, 26th Floor

New York, NY 10019-6022



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SWPPP Preparation Date:

December 2022

Estimated Project Start and End Dates:

June 2023 - June 2025

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SECTION 1: CONTACT INFORMATION/ RESPONSIBILITIES

1.1 Construction Stormwater Team

| Construction Stormwater Team | | | |
|---|------------------|---|--|
| Name, company/organization, position, and contact information | Responsibilities | I Have Read and Understand the Applicable Requirements of Title 15, Chapter 19.1 NYC Rules and Regulations | |
| Transmission Developers, Inc. | | □ Yes Date: | |
| Primary Contractor Name | | | |
| | | □ Yes Date: | |
| Sub-Contractor Name | | | |
| | | ☐ Yes Date: | |
| Emergency 24-hour Name | | | |
| | | ☐ Yes Date: | |

1.2 Design Stormwater Team

| Design Stormwater Team | | | |
|---|--------------------|---|--|
| Name, company/organization, position, and contact information | Responsibilities | I Have Read and Understand the Applicable Requirements of Title 15, Chapter 19.1 NYC Rules and Regulations | |
| Transmission Developers, Inc. | Owner/Developer | □ Yes Date: | |
| Nathaniel Havener KC Engineer and Land Surveying, P.C. Associate 646-795-5064 nhavener@kcepc.com | SWPPP Preparer | □ Yes Date: | |
| Kiewit Engineering Group Inc. | Primary Consultant | □ Yes Date: | |

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project Site Information

Maximum soil disturbance at any time

| Project Nam | e and Address | | | | |
|--|---|----------------------------------|---------------------|---|--------------|
| Project/ Site | Name: Champ | olain Hudson Power Ex | xpress - As | storia DC Converter S | tation |
| Project Stree | roject Street/ Location: Located on the East River adjacent to ConEdison's Astoria facilities | | | toria facilities | |
| City: Astoria | | | | | |
| State: New \ | ork (| | | | |
| Zip Code: 11 | 105 | | | | |
| Borough: Qu | jeens | | | | |
| Block(s) and | Lot(s): Block 8 | 50 Lot 1 | | | |
| DEC Region | : 2 | | | | |
| Business Day | rs and hours for | the project: Monday | / – Friday , | 7:00am to 5:00pm | |
| Project Latitu | ude/ Longitude | (from GIS) | | | |
| Center of sit | e: | | | | |
| Latitude: 40. (Decimal de | | | _ | tude: -73.900269 ° W mal degrees) | |
| Latitude/lon | gitude data sou | ırce: | | | |
| □ MAP | ☐ GPS | | specify): C | Google Map | |
| Horizontal Re | eference Datun | ո։ | | | |
| □ NAD 27 | ⋈ NAD 83 | □ WG\$ 85 | | | |
| Type of Con | struction Site (C | heck all that apply): | | | |
| ☐ Single-Far☐ Institution | • | ☐ Multi-Family Res ay or Road | idential Jtility | □ Commercial☒ Other: | □ Industrial |
| Size of Cons | truction Site | | | | |
| Size of Prop | perty | | 7.77 Acr | es | |
| | Expected to be | Disturbed by | 7.77 Acr | | |

5.0 Acres

2.2 Nature of the Construction Activity

General Description of Project

The proposed Champlain Hudson Power Express (CHPE) project involves the construction of ±339 miles of high voltage direct current underground and underwater transmission line from Montreal, Canada to Queens, New York. It will bring 1,250 megawatts of hydropower to replace the use of fossil fuel, reduce carbon emission, and to help achieve clean renewable energy by the year 2025. The proposed project will provide enough power for more than 1 million homes, along with numerous environmental and economic benefits to millions of residents in New York State communities. The Astoria Converter Station will convert the high voltage DC electricity to AC for local distribution. Astoria convert station will be owned by TDI and will be connected to the existing 345 kV Astoria Annex substation owned by NYPA (ConEd).

Site restoration of disturbed areas such as pavements and lawn areas are addressed on the plan sheets, detail sheets and erosion and sediment control plans. Limits of proposed disturbances and restoration areas are identified on the plans and reference site specific details regarding the required restoration. Once the construction activity is completed, all disturbed grounds will be stabilized with gravel.

The proposed project will disturb approximate 7.90 acres and will result in an increase of impervious area, so an increase of peak flow and pollutant load is anticipated. As such, peak flow mitigation and water quality treatment are required by the State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities (GP-0-20-001). Additionally, a full SWPPP including post construction measures and erosions and sediment control measures is required. The scope of work for this project will be managed such that no more than 5 acres of soil will be disturbed and subject to erosion at any given time during the construction duration. Dense graded aggregate will be placed at the surface throughout the entire site to ensure stabilization is met and to avoid erosion throughout construction. This SWPPP encompasses all work involving erosion and sediment control, and post construction stormwater management. The construction will be managed to ensure the maximum soil disturbance is less than 5 acres. As such a 5-acre waiver for disturbance will not be required.

This SWPPP has been prepared in accordance with the criteria presented in the SPDES General Permit GP-0-20-001, the New York State Stormwater Management Design Manual (January 2015), the New York State Standards and Specifications for Erosion and Sediment Control (July 2016), and the New York City Stormwater Manual (February, 2022). Work for the project is scheduled to take place from June 2023 through June 2025.

The total land disturbance acreage is calculated based on proposed site work and grading within the property. Detailed disturbance and limit of work limits are depicted on the Erosion and Sediment Control plan sheets.

Site Limitations/Assessment

A significant portion of the site is within FEMA floodplain zones AE and X.

The soil disturbance for the proposed work is limited to the total land disturbance acreage listed. Based on a review of the USDA Soil Survey for the project area, the original soils on the project site are listed and described in Appendix I for USDA Soils Maps. A summary of the soil composition is shown in Table 1.

Table 1 - Soils

| Soil Unit Symbol | Soil Unit Name, % Slope Range | HSG | Acres in AOI | Percent of AOI |
|----------------------|---|-----|--------------|----------------|
| Queens County | | | | |
| LUA | LaGuardia-Urban land complex, 0 to 3 percent slopes | С | 6.07 | 78.1% |
| UrA | Urban land, unclaimed substratum, 0 to 3 percent slopes | C* | 1.70 | 21.9% |
| Totals for Area of I | nterest | • | 7.77 | 100.0% |

^{*}This soil unit has no HSG. Because the majority of the site belongs to group C, it will also be applied to this soil unit.

See Appendix I for the NRCS soils map for the Project.

2.3 Surface Waters

Based on the existing topography on the project site, runoff is generally conveyed overland towards existing ditches, culverts, catch basins, and rivers onsite and offsite. The East River is listed as an impaired waterbody.

The water quality of surface waters in New York State is classified by the New York State Department of Environmental Conservation as A, B, C, or D, with special classifications for water supply sources (AA). A "T" used with the classification indicates the stream supports, or may support, a trout population. Water quality standards are also provided. The standards apply the same classification system but, in some cases, are more stringent in an effort to eventually improve the water quality. The higher standard is most often used to reflect the existence or the potential for breeding trout (designation of (T) as discussed above). All surface waters with a Classification and/or a Standard of C (T) or better are regulated by the State. A summary of the stream classifications is shown in Table 2. Locations of the receiving waters are shown on figures and maps in Appendix H.

Table 2 – Summary of Receiving Waters and Stream Classifications

| State that receiv | For each point of discharge, provide a point of discharge ID (a unique 3-digit ID, e.g., 001, 002), the name of the first water of the State that receives stormwater from the MS4 outfall. If the receiving water is on Table 1-2 of the NYC SWDM, identify the pollutant of concern and the practices used to meet no net increase (NNI) requirement by the practice number indicated in Section 5.1 of this template. | | | | |
|--------------------------|--|--|--|--|---|
| Point of Discharge ID | Name of receiving water: | Is the receiving water impaired (on the CWA 303(d) list)? | If yes, list the pollutants that are causing the impairment: | Identify possible pollutant source on site based on location and intended use: | SMP/BMP used to meet NNI |
| 001 | East River | ⊠ Yes □ No | | | Stormwater runoff from impervious areas on site will be directed to and treated by an Infiltration basin and underground infiltration system. During Construction portable toilets will be located away from storm drains and open water. |

2.4 Other SPDES discharges:

| Site Plan Map Location | Discharge Type | Pollutants or Pollutant Constituents | NYSDEC SPDES Permit Number |
|--|------------------------------|--|-------------------------------|
| Staging area to be provided within the construction area. Concrete trucks shall be allowed to wash out within project areas provided that it is within this staging area so that concrete/slurry material washed from the trucks can be collected, contained, and disposed at a later time. No concrete/slurry shall be discharged from the property at any time of construction. If such washing is anticipated, the contractor shall submit a plan detailing the control of concrete/slurry to the engineer for approval. | Concrete Truck Washout | Sediment | |
| Foreign waste materials shall be collected and stored in a secured area until removal and disposal by a licensed solid waste management company. All trash and construction debris from the project area shall be disposed of in a portable container unit. No foreign waste materials shall be buried within the project area. All personnel shall be instructed regarding the correct procedure for waste disposal. Notices stating these practices shall be posted in the project trailer and the individual who manages day-to-day project operations will be responsible for seeing that these procedures are followed. | Waste disposal | Fuels, paints | |

Construction Support Activities

| Contact information for | construction suppor | t activity (to be | e filled in by | contractor the | at pulls the |
|-------------------------|---------------------|-------------------|----------------|----------------|--------------|
| permit): | | | | | |

| Name: |
|----------|
| Гel: |
| Email: |
| Address: |

2.5 Allowable Non-Stormwater Discharges

List of Authorized Non-Stormwater Discharges Present at the Site

| Type of Authorized Non-Stormwater Discharge | Likely to be Present at Your Site? |
|--|------------------------------------|
| Landscape irrigation | ⊠ Yes □ No |
| Waters used to wash vehicles and equipment (cleansers are not used) ¹ | ⊠ Yes □ No |
| Water used to control dust | |
| Potable water including uncontaminated water line flushing's | ☐ Yes ☒ No |
| External building wash down (soaps/solvents are not used, and external surfaces do not contain hazardous substances) | □ Yes ⊠ No |
| Pavement wash waters (spills or leaks have not occurred) | □ Yes ⊠ No |
| Uncontaminated air conditioning or compressor condensate* | ☐ Yes ⊠ No |
| Uncontaminated, non-turbid discharges of ground water or spring water* | □ Yes ⊠ No |
| Foundation or footing drains* | |
| Discharges from construction de-watering operations*3 | ⊠ Yes □ No |

^{*}Require permits from DEP's Bureau of Water and Sewer Operations, DEP's Bureau of Waste Water Treatment, Department of Buildings and/or NYSDEC.

¹Details in Section 3.1 and Section 3.3

²Discharge will be limited to the site

³Sediment laden water shall be collected in a filter bag

SECTION 3: EROSION AND SEDIMENT CONTROLS

3.1 Practices

3.1.1 General ESC Practices

Soil erosion and sediment control plans have been developed in accordance with the Department's technical standards in compliance with the "New York Standards and Specifications for Erosion and Sediment Control". The soil erosion and sediment control plans will mitigate soil erosion and discharge of sediment offsite relating to activities from construction by using various sediment control methods such as seeding, silt fence and or composite filter sock, inlet protection, and stockpile covers. All temporary erosion and sediment controls are to be inspected and maintained in accordance with New York State Standards and Specifications for Erosion and Sediment Control (Blue Book), in compliance with this SWPPP, and as ordered by the NYCDPR.

Specific Erosion and Sediment Controls

| Silt Fence | |
|------------------------|--|
| Reference Detail | C-308 |
| Reference Standard | NYS BLUE BOOK Page 5.54 |
| Design Specifications | |
| How does this practice | This practice will be used as a temporary barrier of geotextile fabric |
| meet the standards and | installed on the contours across a slop used to intercept sediment |
| requirements? | laden runoff from small drainage areas of disturbed soil by |
| | temporarily ponding the sediment laden runoff allowing settling to |
| | occur. |

| Sediment Dewatering Bag (Geotextile Filter Bag) | | |
|---|--|--|
| Reference Detail | C-308 | |
| Reference Standard | NYS BLUE BOOK Page 5.16 | |
| Design Specifications | | |
| How does this practice | This practice will be used to temporary trap and retain sediment | |
| meet the standards and | laden water prior to its discharge to drainageways or offsite. | |
| requirements? | | |
| | | |

| Temporary Sediment Trap | | |
|-------------------------|---|--|
| Reference Detail | C-309 | |
| Reference Standard | NYS BLUE BOOK Page 5.46 | |
| Design Specifications | | |
| How does this practice | A sediment trap will be placed with a minimum storage of 14,4000 | |
| meet the standards and | cubic feet formed by excavation and/or embankment to intercept | |
| requirements? | sediment-laden runoff and trap the sediment in order to protect the | |
| | waterways offsite from sedimentation. | |

| Dust Control | | |
|------------------------|---|--|
| Reference Detail N/A | | |
| Reference Standard | NYS BLUE BOOK Page 2.25 | |
| Design Specifications | | |
| How does this practice | Land-disturbing activities that generate excessive dust shall be | |
| meet the standards and | controlled by sprinkling water to prevent off-site damage, health | |
| requirements? | hazards, and traffic safety problems. | |

| Landgrading | | | |
|------------------------|--|--|--|
| Reference Detail | Refer to C-101 to C-105 for Grading Plan | | |
| Reference Standard | NYS BLUE BOOK Page 4.24 | | |
| Design Specifications | | | |
| How does this practice | Permanent reshaping of the existing land surface by grading in | | |
| meet the standards and | accordance with an engineering topographic plan and | | |
| requirements? | specification to provide for erosion control and vegetative | | |
| | establishment on disturbed, reshaped areas. | | |

| Inlet Protection | | |
|------------------------|---|--|
| Reference Detail | C-308 | |
| Reference Standard | NYS BLUE BOOK Page 5.57 | |
| Design Specifications | | |
| How does this practice | A temporary sediment sack with low permeability, installed around | |
| meet the standards and | inlets in the form of a fence, berm or excavation around an | |
| requirements? | opening, detaining water and thereby reducing the sediment | |
| | content of sediment laden water by settling thus preventing heavily | |
| | sediment laden water from entering a storm drain system. | |

| Stockpile Management | | | |
|------------------------|--|--|--|
| Reference Detail | C-309 | | |
| Reference Standard | Project Contract Documents (Project drawings and specifications) | | |
| Design Specifications | | | |
| How does this practice | Soil stockpiles and exposed soil shall be stabilized by seed, mulch, | | |
| meet the standards and | or other appropriate measures, when activities temporarily cease | | |
| requirements? | during construction for 7 days or more in accordance with NYSDEC | | |
| | requirements | | |

| Soil Restoration | | | | |
|------------------------|--|--|--|--|
| Reference Detail | N/A | | | |
| Reference Standard | NYS BLUE BOOK Page 4.52 | | | |
| Design Specifications | | | | |
| How does this practice | The decompaction of areas of development site or construction | | | |
| meet the standards and | project where soils have been disturbed to recover the original | | | |
| requirements? | properties and porosity of the soil; thus, providing a sustainable | | | |
| | growth medium for vegetation, reduction of runoff and filtering of | | | |
| | pollutants from stormwater runoff. | | | |

| Concrete Truck Washout | | | | |
|------------------------|--|--|--|--|
| Reference Detail | C-308 | | | |
| Reference Standard | NYS BLUE BOOK Page 2.24 | | | |
| Design Specifications | | | | |
| How does this practice | A temporary excavated or above ground lined constructed pit | | | |
| meet the standards and | where concrete truck mixers and equipment can be washed after | | | |
| requirements? | their loads have been discharged, to prevent highly alkaline runoff | | | |
| | from entering storm drainage systems or leaching into soil. Location | | | |
| | of the practice will be determined by the contractor but has to be a | | | |
| | minimum of 100 feet from the drainage swales, and storm drain | | | |
| | inlets. | | | |

| Stabilized Construction Access | | | |
|--------------------------------|---|--|--|
| | | | |
| Reference Detail | C-308 | | |
| Reference Standard | NYS BLUE BOOK Page 2.30 | | |
| Design Specifications | | | |
| How does this practice | A stabilized pad of aggregate underlain with geotextile located | | |
| meet the standards and | at any point where traffic will be entering or leaving a construction | | |
| requirements? | site to or from a public right-of-way, street, alley, sidewalk, or parking area. The purpose of stabilized construction access is to reduce or eliminate the tracking of sediment onto public rights-of-way or streets. | | |

| Spill Protection | | | | |
|------------------------|--|--|--|--|
| Reference Detail | N/A | | | |
| Reference Standard | NYS BLUE BOOK Page 2.29 | | | |
| Design Specifications | | | | |
| How does this practice | Safety Data Sheets (SDS) for all materials to be stored on site. All | | | |
| meet the standards and | workers on-site will be required to be trained on safe handling and | | | |
| requirements? | spill prevention procedures for all materials used during | | | |
| | construction. All spills shall be cleaned up immediately upon | | | |
| | discovery. Spent absorbent materials and rags shall be hauled off- | | | |
| | site immediately after the spill is cleaned for disposal at a local | | | |
| | landfill. Spill kits shall be provided on site. | | | |

| Culvert Outfall Rip Rap | | |
|-------------------------|--|--|
| Reference Detail | C-302 | |
| Reference Standard | NYS BLUE BOOK Page 3.39 | |
| Design Specifications | | |
| How does this practice | A section of rock protection placed at the outlet end of the | |
| meet the standards and | culverts, conduits, or channels to reduce the depth, velocity, and | |
| requirements? | energy of water, such that the flow will not erode the receiving | |
| | downstream reach. | |

| Temporary Stone Check Dam | | | | |
|---------------------------|---|--|--|--|
| Reference Detail | C-309 | | | |
| Reference Standard | NYS BLUE BOOK Page 3.2, Project Contract Documents (Project | | | |
| Design Specifications | drawings and specifications), and Calculation in Appendix J | | | |
| How does this practice | This practice will be used as a small barrier or dam constructed of | | | |
| meet the standards and | stone, bagged sand or gravel, or other durable materials across a | | | |
| requirements? | drainageway to reduce erosion in a drainage swale by reducing | | | |
| | the velocity of flow in the swale. Spacing between check dams will | | | |
| | follow NYSDOT Standard sheets, detail table in LS-113. | | | |

3.1.2 Nonstandard ESC Practices

N/A

3.2 Construction (Phasing and) Sequence of Operations

Pre-Construction ESC Activities

This SWPPP presents erosion and sediment controls, both temporary and permanent, to assist the operator in compliance with the project's SPDES General Permit for construction activity. To the degree practicable, all temporary erosion and sediment control mitigation measures shall be installed immediately before associated project areas are disturbed in anticipation of all soil disturbing activities to follow. Based upon NYSDEC and NYCDEP regulations, the owner or operator of a construction activity shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department.

Construction activities shall be scheduled by the Contractor with the intent to minimize the amount of disturbed soil exposed at any one time by area and length of time. In general, once work has been started on a particular structure, this work shall be completed to the extent possible, before work on another structure is started. The Contractor must submit a schedule of construction activities for approval by the Engineer prior to any disturbance to the site.

The project will be carried out as outlined as follow, while maintaining the amount of disturbed soil in compliance with the NYSDEC and NYCDEP limit.

Pre-Construction ESC Activities

- 1. Establish work area and contractor staging areas
- 2. Install stabilized construction entrance and temporary erosion and sediment control measures
- 3. Identify all-natural resources and mark and protect them as necessary including trees, existing points of water discharge off-site, etc.
- 4. Install controls to protect all onsite water resources from receiving sedimentation.
- 5. Install perimeter sediment control such as silt fences, as shown on the soil Erosion and Sediment Control Plans.
- 6. Install temporary construction fencing as shown on the Soil Erosion and Sediment Control Plans.
- 7. Onsite earth disturbance should be limited to work necessary to install erosion and sedimentation controls.

Construction Sequence

- 1. Install all temporary ESC activities including, silt fence, inlet protection, stabilized construction entrance/exist, and geotextile filter bags.
- 2. Once all temporary ESC activities are established, perform excavation and trenching and install all utilities.
- 3. Install the underground infiltration system as specified in the details.
- 4. Place Geo-fabric and rock at outfalls as indicated on plans.
- 5. Strip topsoil from remainder of site (where proposed improvements or grading is shown only). Topsoil stockpiles(s) remaining for more than seven days shall be stabilized with vegetative cover, mulch, tarps or other approved practice. Erosion from topsoil piles left for less than seven days shall be controlled with silt fence or other approved methods. Any Topsoil stockpile within 25' of a roadway or drainage ditch shall be covered with tarps or other approved methods. All disturbed ground left inactive for seven or more days is to be stabilized by seed, sod, mulch, or other approved methods.

- 6. Begin building construction.
- 7. Surplus topsoil shall be removed from the site by the contractor. Final grade the site.
- 8. Install Aggregate base course in areas to be asphalt and/or concrete paved
- 9. Remove accumulated sediment in the infiltration basin and install stone layer as specified in the details. Minimize compaction and construction traffic in these areas.
- 10. Upon site stabilization, remove temporary erosion control practices. Clean structures of any sediment and/or construction debris and remove construction debris and accumulated sediment from the infiltration basin and underground infiltration system structures.

| Construction Sequen | Construction Sequence | | | |
|--|--|---------------------------------|--|--|
| Activity (In order of construction) | Erosion and sediment control practice | When will practice be installed | Maintenance, replacement and removal of ESCs | |
| Establish work area | Stabilized Construction Entrance | Before | Inspected daily. All sediment spilled, dropped, or washed onto public rights-ofway must be removed immediately. | |
| Excavation and trenching and install all utilities within project limits | Silt Fence | Before | Inspected weekly replaced when damaged or no longer effective. The Maximum period of use is limited by the ultraviolet stability of the fabric (approximately one year). | |
| | Storm Drain Inlet Protection | Before | Inspected weekly replaced when damaged or no longer effective | |
| | Sediment Trap | Before | Sediment traps must be cleaned out as sediment accumulates within the trap. It is recommended to clean out the trap when it has lost one-half of the wet storage volume. | |
| Landgrading | Anchored Stabilization Matting | During activity | Blanketed areas shall be inspected weekly and after each runoff event until perennial vegetation is established to a minimum uniform 80% coverage throughout the blanketed area. Damaged or displaced blankets shall be restored or replaced within 2 calendar days. | |
| Install aggregate base course in areas to be asphalt | Storm Drain Inlet Protection | Before and after | Inspected weekly replaced when damaged or no longer effective | |
| Final Stabilization | Soil Restoration | After Activity | Final stabilization occurs when all soil disturbing activities at the site have been completed and the site is completely stabilized by the final gravel surface. Upon soil stabilizing, operators on construction activities can formally submit an NOT. | |

3.3 Pollution Prevention and Good Housekeeping Practices

3.3.1 General Requirements

- A copy of the SPDES General Permit (GP-0-20-001), the signed Notice of Intent (NOI), NOI acknowledgement letter, SWPPP, and inspection reports shall be maintained onsite until the site has achieved final stabilization.
- During construction it may be necessary to remove surface or subsurface water from work areas. Where dewatering is necessary, the discharges of water from the excavated areas will be pumped into sediment filter bags placed on the ground surface within a stabilized area (e.g., vegetated, or permeable surface such as aggregate). Once passed through that filter bag, the dewatering effluent will be discharged onto a vegetated area. Additional erosion and sedimentation controls may be installed as determined by the Environmental Inspector. Sediment filter bags will be inspected regularly. The filter bag and accumulated sediment shall be disposed of in an upland location at least 100 feet from a wetland or waterbody, or disposed of offsite in a state approved solid waste disposal facility. Soil excavated from the site shall be stockpiled separately within a straw bale/ silt fence barrier to prevent siltation into surrounding areas.
- Trapped sediment collected during dewatering activities shall be graded on the right-of-way
 in areas where it cannot be washed into the adjacent stream, wetland, or other sensitive
 resource. Dewatering structures will be removed as soon as possible following the completion
 of dewatering activities.
- Any contaminated waters removed from a work site may not be discharged without a SPDES permit or must be discharged at a wastewater treatment plant following chemical analysis.
- Built up sediment shall be removed from any silt fence when it has reached one-third the height of the fence.
- Sediment fencing shall be inspected for depth of sediment, and tears, to see if fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- The construction entrance shall be cleaned of sediment and redressed when voids in the crushed stone become filled and vehicular tracking of sediment is occurring.
- Dust shall be controlled on access points and other disturbed areas subject to surface dust movement and blowing.
- Inspection must verify that all practices are adequately operational, maintained properly and that sediment is removed from all control structures.
- Inspection must look for evidence of soil erosion on the site, potential of pollutants entering drainage systems, problems at the discharge points, and signs of soil and mud transport from the site to the public road.

3.3.2 Dewatering Methods

All the procedures related to dewatering methods are described in the section 4.3.2 of the Environmental Management and Construction Plan (EM&CP) and Spill Prevention Control & Countermeasures Plan (SPCC) in Appendix K of the EM&CP.

The construction Contractor or applicable subcontractor will be responsible for providing a dewatering system for construction that is of adequate size and capacity to lower and maintain the groundwater at the specified level. The dewatering system will meet the following requirements:

- a. Utilize commercial sediment filter bags. A dewatering hose will be connected to a filter bag placed on the ground surface within a stabilized area. As needed additional erosion and sediment controls may be installed as determined by the Environmental Inspector. Sediment filter bags will be inspected regularly and disposed of in upland locations at least one hundred (100) feet from a wetland or waterbody or disposed of at an off-site disposal location. A Sediment Dewatering Bag detail is provided on the Erosion and Sediment Control Drawings (Sheet C-304 of Appendix F) to show the general design of one of the methods that may be utilized by the construction Contractor.
- b. Trapped sediment collected during dewatering activities shall be managed as excavated soil materials as described in the Soil Management Plan in Appendix L of the EM&CP.
- c. Include standby pumps and power sources for continuous operation.

The dewatering system will be kept in continuous operation from the time excavation is started in the dewatering area (or before if required by site conditions to lower groundwater to the elevations) until the time backfilling is completed at least two (2) feet above the normal groundwater level. All water removed from the excavation will be conveyed in a closed conduit. No trench excavations will be used as temporary drainage ditches. All water removed from the excavation will be disposed of by the construction Contractor in a manner that does not endanger public health, property, or any portion of the Project under construction or completed. If contaminated water is encountered during dewatering, the procedures described in the Soil Management Plan (Appendix L of the EM&CP) will be followed. Water disposal will not cause erosion or sedimentation to occur in existing wetland and stream resources areas, or other swales or water bodies.

3.3.3 Construction Site Pollutants

Construction and waste materials expected to be stored on-site consists of materials and equipment typically used for earthwork, concrete placement, and installation of drainage pipes and drainage structures. Equipment generally consists of heavy earth moving, and paving equipment. The following sections, but not limited to these sections of the Department's Standard Specifications, address provisions for construction and waste materials expected to be stored on site: Sections 107-12. The project's General Soil Erosion and Sediment Control Notes address provisions for construction and waste materials expected to be stored on site and additional temporary disturbances associated with the contractor's staging and spoil areas will not result in any change to the design or function of any permanent practices described in this report.

3.3.4 Spill Prevention and Response

A Spill Prevention and Response Plan will be developed for the site by the Contractor. The plan will detail the steps needed to be followed in the event of an accidental spill and shall identify contact names and phone numbers of people and agencies that must be notified.

The Plan shall include Safety Data Sheets (SDS) for all materials to be stored on-site. All workers on-site

will be required to be trained on safe handling and spill prevention procedures for all materials used during construction. Regular safety meetings shall be held and all workers that are expected on the site during the week shall be required to attend.

All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags shall be hauled off-site immediately after the spill is cleaned for disposal at a local landfill. All personnel working on the site shall be instructed of the proper procedures for spill prevention and control. Any spill large enough to discharge to surface water will be immediately reported to the local fire / police departments, NYCDEP, NYSDEC Spill Hotline (1-800-457-7362), the National Response Center (1-800-424-8802), and the NYC DPR.

Specific Pollution Prevention Practices

| Spill Kits Readily Available | | | |
|------------------------------|--|--|--|
| Description | Description When Fueling and Maintaining Vehicles, a spill kit will be readily available | | |
| Installation | On site during mobilization. Spill kit to be stored near fueling and equipment maintenance areas | | |
| Maintenance | Spill kits will be checked regularly to ensure no damage has occurred to kit | | |
| Requirements | contents | | |

3.3.5 Fueling and Maintenance of Equipment or Vehicles

Fueling of all equipment shall occur within the limits of the construction staging area. Fuel will be delivered to the site as needed under the supervision of the general contractor. Only minor vehicle equipment cleaning and maintenance which does not produce discharge of liquids of any type onto the ground will be permissible to occur within the Project site. Drip pans will be used overnight and during fueling operations. All major maintenance and repairs shall be performed off-site. Vehicles and equipment shall be inspected on each day of use. Any sources of leakage discovered shall be addressed immediately and be brought to the attention of the NYC DPR. All leaking equipment unable to be repaired shall be immediately removed from the Project site.

3.3.6 Washing of Equipment and Vehicles

General

The Contractor shall designate areas for equipment cleaning, maintenance, and repair. The areas shall be protected and monitored to ensure all fluids are contained and are not discharged outside the designated area.

3.3.6.1 Concrete Truck Washout

Concrete trucks shall be allowed to wash out within project areas provided that the contractor provides an area which collects and contains any concrete / slurry material washed from trucks for recovery and disposal at a later time. No concrete / slurry shall be discharged from the property at any time of construction. If such washing is anticipated, the contractor shall submit a plan detailing the control of concrete / slurry to the engineer for approval.

3.3.7 Storage, Handling, and Disposal of Construction Products, Materials, and Wastes

3.3.7.1 Building Products

General

Excavated soil stockpiles from trenching will remain on site. Stockpiles will be surrounded by silt fence when located on grass surfaces, and strawbales when located on hardscape surfaces, to limit any possible spread or overflow into any other material. Stockpiles will be covered with tarps or temporary seeding to limit the effects of erosion.

Specific Pollution Prevention Practices

| Stockpile Containment | | | | |
|-----------------------|--|--|--|--|
| Description | Temporary Seeding and Tarps | | | |
| Installation | Throughout the duration of the project | | | |
| Maintenance | Refer to Appendix H for Specifications | | | |
| Requirements | | | | |
| Design | Project Contract Documents (Project drawings and specifications) | | | |
| Specifications | Froject Confider Docoments (Froject drawings and specifications) | | | |

3.3.7.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials General

All pesticides, herbicides, insecticides, fertilizers, and landscape materials must be handled in compliance with manufacturer specifications and all applicable New York State and Federal laws. Store, cover, and isolate construction materials to prevent runoff of pollutants and contamination of groundwater and surface waters. Distribute or post information material regarding proper handling, spill response, spill kit location, and emergency actions to be taken to all construction personnel.

3.3.7.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals General

All fuel, hydraulic fluids, petroleum products, and other chemicals shall be disposed of into designated containers and stored in accordance with the Project Health and Safety Plan (HASP). These materials will be removed from the site and disposed of in a legal manner in compliance with all applicable New York City, New York State, and Federal laws.

3.3.7.4 Hazardous or Toxic Waste

General

All hazardous or toxic waste materials shall be handled, stored, and disposed of in accordance with all applicable New York State and Federal laws, and in compliance with the Project Health and

Safety Plan (HASP). No hazardous waste shall be disposed of on-site. Material safety data sheets, material inventory, and emergency contact numbers will be maintained in the office trailer. All personnel working on the site shall be instructed of the proper procedures for hazardous waste handling and disposal.

3.3.7.5 Construction and Domestic Waste

General

All construction waste materials shall be collected and removed from the site regularly by the contractor. The contractor shall supply waste barrels for proper disposal of waste materials. All personnel working on the site shall be instructed of the proper procedures for construction waste disposal. All waste disposal shall be removed from the site and disposed of in a legal manner in compliance with all applicable New York State and Federal laws.

3.3.7.6 Sanitary Waste

General

Temporary sanitary facilities (portable toilets) shall be provided on site during the entire duration of construction. The portable toilets shall be provided with containment trays to provide extra barrier of protection against wash down water and spill. The portable toilets shall be regularly maintained and inspected weekly for evidence of leaking holding tanks. When servicing the portable toilets, containment trays shall be pumped dry of any contaminates that may have been collected in the basin.

3.3.8 Washing of Applicators and Containers used for Paint, Concrete, or Other Materials

General

No applicators and containers will be washed or stored on site.

3.3.9 Other Pollution Prevention Practices

General

ALL ESC practices for the Project shall be in compliance with the contract documents, the SPDES General Permit, and all other applicable New York State and Federal laws. Should it be deemed that there are any discrepancies between this SWPPP and any other applicable rules or regulation, the more stringent measures shall apply for the Project.

SECTION 4: CONSTRUCTION INSPECTION

4.1 Inspection Personnel and Procedures

All erosion and sediment control practices and pollution prevention measures being implemented within the active work area shall be inspected daily by a trained contractor to ensure that they are being maintained in effective operating condition at all times. The trained contractor must document all inspection forms, corrections, and certification of change by the contractor on site in a site log book that becomes an addendum to this plan.

The qualified inspector shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

- A. Date and time of inspection
- B. Name and title of person(s) performing inspection
- C. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection
- D. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any discharges of sediment from the construction site. Include discharges from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow
- E. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any discharges of sediment to the surface waterbody
- F. Identification of all erosion and sediment control practices and pollution prevention measures that need repair or maintenance
- G. Identification of all erosion and sediment control practices and pollution prevention measures that were not installed properly or are not functioning as designed and need to be reinstalled or replaced
- H. Description and sketch of areas with active soil disturbance activity, areas that have been disturbed but are inactive at the time of the inspection, and areas that have been stabilized (temporary and/or final) since the last inspection
- I. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards
- J. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices and pollution prevention measures; and to correct deficiencies identified with the construction of the postconstruction stormwater management practice(s)
- K. Identification and status of all corrective actions that were required by previous inspection
- L. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The qualified inspector shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The qualified inspector shall attach paper color copies of the digital photographs to the inspection report that documents

the completion of the corrective action work within seven (7) calendar days of that inspection.

Within one business day of the completion of an inspection, the qualified inspector shall notify the owner or operator and appropriate contractor or subcontractor of this permit of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame. All inspection reports shall be signed by the qualified inspector. Pursuant to Part II.D.2. of the NYSDEC SPDES General Permit for Stormwater Discharge from Construction Activity (GP-0-20-001), the inspection reports shall be maintained on site with the SWPPP.

Table 4-1: Inspection frequency and Qualified Inspector(s)

| Standard Frequency: | | | |
|---|--|--|--|
| Every 7 days and within 24 hours of a 0.5-inch rainfall event | | | |
| Increased Frequency (if applicable): | | | |
| For areas where 5 or more acres are disturbed or for projects that discharge to a 303d listed water | | | |
| ☐ Twice every 7 days and within 24 hours of a 0.5-inch rainfall event, at least 2-days between | | | |
| inspections | | | |
| Temporary Shutdown Frequency: | | | |
| With DEP approval of temporary shutdown | | | |
| □ Once every 30 days and within 24 hours of a 0.5-inch rainfall event | | | |
| Qualified Inspector | | | |
| Company Name: Name: Address: Tel: Email: | | | |

Inspection Report Forms

Refer to Appendix C

4.2 Trained Contractor List

Table 4-2: Documentation for Completion of Training

| Contractor | Name of Trained Contractor | NYS DEC Erosion and Sediment Control Training Certificate Number | Expiration Date |
|------------|-------------------------------|--|-----------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

SECTION 5: POST CONSTRUCTION STORMWATER CONTROLS

| Design Point #1 | | | | | |
|-----------------------------|--|---------------|------------|---------------------------------|--------------------------------------|
| Location Description | | North of site | | | |
| Located in Site Map/Drawing | | C-101.00 | | | |
| # | Practice | | Practice # | Total Contributing Area (acres) | Impervious Contributing Area (acres) |
| | Infiltration Basin (I-2) | | 1 | 3.89 | 3.89 |
| 1 | Description: Provides RRv, WQv, CPv, Overbank, Extreme Flood | | | Reference Drawing: | |
| | | | | | |

| | Design Point #4 | | | | |
|----------------------------------|--|-----------|------------|---------------------------------|--------------------------------------|
| Location Description South o | | n of site | | | |
| Located in Site Map/Drawing C-10 | | C-101.0 | 00 | | |
| # | Practice | | Practice # | Total Contributing Area (acres) | Impervious Contributing Area (acres) |
| | Underground Infiltration System (I- 4) | | 2 | 2.86 | 2.86 |
| 2 | Description: Provides RRv, WQv, CPv, Overbank, Extreme Flood | | | | Reference Drawing: |
| | | | | | |

A long-term operation and maintenance plan addressing all permanent SMPs and BMPs is included as **Appendix K**. The entity that will be responsible for long term operation and maintenance of the practices must be designated in **Appendix K**. (Note this manual must include best management practices to reduce pathogens if required.)

5.2 Hydrology

Contributing drainage basins were delineated using topographic survey information, aerial photos, record plans, and proposed grading plan. The analyzed contributing area is within the project limit. The hydrological analysis method used for peak flow analysis is SCSThe times of concentration were based on the NYCDEP guidelines, and a minimum time of concentration of 6 minutes was used. A 10-year design storm frequency was used for sizing the closed drainage system design.

5.3 No-Net-Increase

This project is not located in an MS4 area so therefore No-Net-Increase will not be required.

5.4 Safe Drinking Water Act Underground Injection Controls Requirements Do you plan to install any of the following controls? Check all that apply below. Infiltration trenches (if stormwater is directed to any bored, drilled, driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface fluid distribution system) Commercially manufactured pre-cast or pre-built proprietary subsurface detention vaults, chambers, or other devices designed to capture and infiltrate stormwater flow Drywells, seepage pits, or improved sinkholes (if stormwater is directed to any bored, drilled,

driven shaft or dug hole that is deeper than its widest surface dimension, or has a subsurface

fluid distribution system)

SECTION 6: CERTIFICATION AND NOTIFICATION

- 1. A site-specific Draft Maintenance Easement shall be included as **Appendix A**. (**Note:** The Maintenance Easement must be recorded in the Office of the City Register or, for project on Staten Island, the Richmond County Clerk's office before a permit may be issued.)
- 2. The Pre-Construction Documents & Certifications provided in **Appendix B** shall be filled out by the owner/developer, preparer, and qualified professional, as appropriately shown in the section.
- 3. The site-specific Construction Duration Inspection form shall be provided in **Appendix C** and is to be filled out and signed by the qualified professional that performs site inspections and oversee installation of ESCs for this project.
- 4. The Monthly Summary of Site Inspection Activities form provided in **Appendix D** is to be filled out and signed by the owner, or the duly authorized representative of the owner.
- 5. The Contractor's Certification Statement provided in **Appendix E** is to be filled out and signed by the contractor with primary responsibility for the project site.
- 6. The Contractor's Certification Statement provided in **Appendix E** is to be filled out and signed by all subcontractors.
- 7. The Certificate of Issuance provided in **Appendix E** is to be filled out and signed by the contractor with primary responsibility for the project site prior to performing any site work.
- 8. The Erosion and Water Quality Control Identification form provided in **Appendix E** is to be filled out by the developer/contractor.
- 9. Records of site work and site stabilization are to be kept on the Construction Stabilization form provided in **Appendix E** and is to be filled out by the developer/contractor as necessary.
- 10. The Certificate of Change by the Contractor provided in **Appendix E** is to be filled out and signed by the operator upon implementation of any requested changes to the SWPPP by the owner, preparer, or any local authority having jurisdiction over the project site. Changes to the SWPPP are only to be made when the plan or contractor's implementation proves to be ineffective in eliminating or significantly minimizing pollutants from the construction activity.
- 11. The Final Stabilization and Retention of Records form provided in **Appendix F** is to be filled out and signed by the qualified professional that will perform site inspections and oversee installation of erosion control measures for this project.
- 12. The Certificate of Return provided in **Appendix F** is to be filled out and signed by the operator and owner after final stabilization of the site has been completed.
- 13. The NYC DEP Notice of Termination (NOT) will be filed by the owner or its representative upon completion of the site's final stabilization using the online form.

SECTION 7: RETENTION OF RECORDS

The following are to be retained by the owner at the site and for a period of five years from the date the site is finally stabilized:

- 1. SWPPP
- 2. Contract Documents including contract drawings and technical specifications
- 3. Stormwater inspections and maintenance reports
- 4. Contractor Certification
- 5. SWPPP Certification Statement of Satisfactory Completion

SECTION 8: REQUIRED DRAWINGS

- 1. Sediment and Erosion Control Plan
- 2. Drainage plans
- 3. Grading plans

Appendix A – Draft Maintenance Easement

Instructions:

- Required for all projects that require a post construction stormwater management practices.
- Fill in the Maintenance Easement Template with any site-specific information.
- When the SWPPP is approved and before pulling the construction permit file the
 maintenance easement in the office of the City Register or, for projects in Staten Island,
 the Richmond County Clerk's office. You will not be able to pull the permit if DEP
 cannot verify that the Maintenance Easement is filed.

Appendix B - Certifications

Pre-Development

Project Name: Champlain Hudson Power Express Astoria DC Converter Station

Name of

Owner/Developer: Transmission Developers Inc.

Name of Preparer: KC Engineering and Land Surveying, P.C.

Preamble to Site Assessment and Inspections

The following information to be read by all person's involved in the construction of stormwater related activities:

A qualified professional shall conduct an assessment of the site prior to the development activity (1) and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Preparer shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days or within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections), except as otherwise required during "temporary shutdown". The developer shall maintain a record of all inspection reports in this **site logbook**. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The developer shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

A qualified professional shall perform a final site inspection. The qualified professional shall certify that the site had undergone final stabilization (2) using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, a qualified professional must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

The Owner, qualified inspector and qualified professional must submit a Notice of Termination Request to NYCDEP via the SWPTS. DEP may inspect the site to confirm that it meets the requirements of the NOT. If post construction practices are present an application for a Stormwater Maintenance Permit must also be submitted via SWPTS.

- (1) "Development activity" means soil disturbance on a site including but not limited to land contour work, clearing, grading, excavation, demolition, construction, reconstruction, new development, redevelopment, creation or replacement of impervious surface, stockpiling activities or placement of fill. Clearing activities include but are not limited to the cutting and skidding of trees, stump removal and brush root removal. Such term does not include routine maintenance (such as road resurfacing) that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.
- (2) "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

Certifications

Owner's Certification

I certify that I am the Owner of this property and have read or been advised of the applicable sections of the Rules of the City of New York (RCNY) Title 15, Chapter 19.1 and I believe that I understand them. I also understand that, under RCNY, I am responsible for submitting a fee to initiate review of the stormwater pollution prevention plan (SWPPP). I hereby certify that this SWPPP and all associated documentation provided were prepared under my direction or supervision. I understand that certifying false, incorrect or inaccurate information is a violation of the laws of the City of New York and could subject me to criminal or civil penalties and/or administrative proceedings. I also understand that, by submitting this application, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction.

| Name: | Title: |
|------------|--------|
| Signature: | Date: |

| Developer's Certific |
|----------------------|
|----------------------|

I have read or been advised of the applicable sections of RCNY Title 15 Chapter 19.1 and believe that I understand them. I also understand that, under the RCNY I am responsible for submitting a fee to initiate review of this application. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I understand that certifying false, incorrect or inaccurate information is a violation of the laws of the City of New York and could subject me to criminal or civil penalties and/or administrative proceedings. I also understand that, by submitting this application, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction.

| · · | |
|------------|--------|
| Name: | Title: |
| Signature: | Date: |
| | |
| | |
| | |
| | |

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project was prepared by me or under my direct supervision in accordance with the RCNY Title 15 Chapter 19.1 and terms and conditions of the most recent NYSDEC SPDES General Permit for Stormwater Discharges from Construction Sites. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the City New York and could subject me to criminal, civil and/or administrative proceedings.

| Name: Nathaniel Havener | Title: Associate |
|-------------------------|------------------|
| Signature: | Date: |
| | |

Appendix C - Construction Duration Inspections

Construction Duration Inspection Form

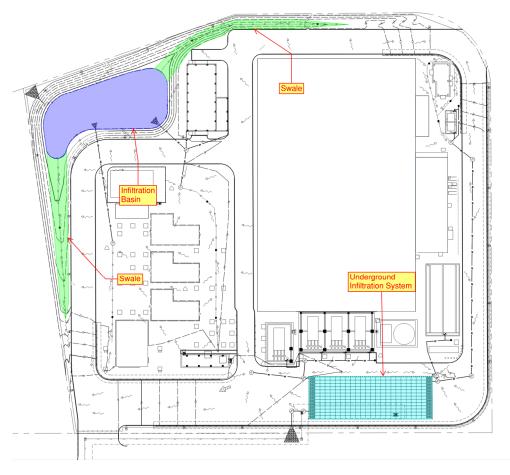
a. Directions:

Inspection Form will be filled out during the entire construction phase of the project.

Required Elements:

- 1. On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work with the next 14-day period.
- 2. Indicate on site map all areas of the site that have undergone temporary or permanent stabilization.
- 3. Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period.
- 4. Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent).
- 5. Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earther berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and
- 6. Immediately report to the Operator any deficiencies that are identified with the implementation of SWPPP.

SITE PLAN/SKETCH



| Inspector (print name) | Date of Inspection |
|---|--|
| Qualified Inspector (print name) | Qualified Inspector Signature |
| The above signed acknowledges that, to the be provided on the forms is accurate and comple | <u> </u> |
| · · · · · · · · · · · · · · · · · · · | |
| Weather | Soil Description |
| Reason for Inspection: [] 7 day/weekly Inspection [] 30-day inspection (Temporary Shutdown) [] other | [] Twice every 7 days inspection [] Inspection after Rainfall |

| Maintaining | Water Quality |
|------------------------|--|
| Yes No N/A | |
| | Is there an increase in turbidity causing or reasonably likely to cause a substantial visible contrast to natural conditions? |
| | Is there residue from oil and floating substances, visible oil film, or globules or grease? |
| | All disturbance is within the limits of the approved plans. |
| | Have receiving lake/bay, stream, and/or wetland been impacted by silt from the project? |
| <u>Housekeepir</u> | ng |
| 1. Gene | eral Site Conditions |
| Yes No N/A | |
| | Is construction site litter and debris appropriately managed? |
| | Are facilities and equipment necessary for implementation or erosion and sediment control in working order and/or properly maintained? |
| | Is construction impacting the adjacent property? |
| | Is dust adequately controlled? |
| 2. Stabi Yes No N/A | lized Construction Entrance |
| | Stone is clean enough to effectively remove mud from vehicles. |
| | Installed per standards and specifications? |
| | · |
| | Does all traffic use the stabilized entrance to enter and leave site? Is adequate drainage provided to prevent ponding at entrance? |
| Runoff Contr | ol Practices |
| 1. Exca | vation Dewatering |
| Yes No N/A | |
| | Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan. |
| | Clean water from upstream pool is being pumped to the downstream pool. |
| | Sediment laden water from work area is being discharged to a silt trapping device. |
| | Constructed upstream berm with one-foot minimum freeboard. |
| | porary Sediment Trap |
| Yes No N/A | |
| | Trap and outlet structure constructed per the approved plan. |
| | Trap side slopes are stabilized with seed/mulch. |
| | Drainage structure flushed and trap surface restored upon removal of sediment trap facility. |
| | Sediment trap dewatering pool is dewatering at appropriate rate. Sediment accumulation is% of design capacity. |

| n full (considered full when remaining bag flow area |
|--|
| et from all wetlands and other surface waters . |
| that is vegetated, relatively level, and provides for |
| man is vegetated, relatively level, and provides for |
| peen replaced. |
| |
| |
| |
| egetation and/or mulch. |
| the toe of the slope. |
| |
| |
| n have been applied to idle areas. |
| as been applied under permanent seeding. |
| |
| |
| |
| rom toe of slope (not across conveyance channels). |
| g the two ends together for continuous support. |
| m. |
| ght and without rips or frayed areas. Sediment |
| n capacity. |
| |
| urb, or Excavated practices) |
| , |
| thwise so open ends face outward, not upward. |
| No. 3 crushed stone and concrete blocks. |
| |
| eet. |
| be 2:1. |
| |
| |
| • |
| - |
| and without rips or frayed areas. |
| of design capacity. |
| nd structurally sound. g between posts. eet below ground and secured to frame/posts with |
| |

| | 3. | Tempo | rary Check Dam |
|-----|------|---------------|--|
| Ye | s No | N/A | |
| | | | Is channel stable? (flow is not eroding soil underneath or around the structure). |
| | | | Check is in good condition (rocks in place and no permanent pools behind the structure). |
| | | | Has accumulated sediment been removed? |
| | | | |
| | 4. | Concre | ete Washout Area |
| Ye | | Concre N/A | ete Washout Area |
| Ye: | | | ete Washout Area Washout Facility is free of damage and leaks. |
| Ye: | | | |
| | | | Washout Facility is free of damage and leaks. |
| | | | Washout Facility is free of damage and leaks. Excess rainwater is not present within concrete washout facility. |

(**Note:** Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design. Construction inspection checklists for post-development stormwater Management practices can be found in Appendix F of the New York State Stormwater Management Design Manual.)

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Developer shall amend the SWPPP whenever:

- 1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP; or
- 2. The SWPPP proves to be ineffective in;
 - a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
 - b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
- 3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

| Modification & Reason: |
|------------------------|
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| Detailed Description of Consistent Issues in the Construction and Technical Standards of SMPs: | |
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| Comments from the Previous Inspection on | and Remarks: |
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| Other Comments: | |
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Post- Construction Stormwater Management Practices (SMPs)

| Post-Construction SMP | Current Phase of Construction | Notes |
|-----------------------|----------------------------------|-------|
| Infiltration Basin | | |
| | | |
| | | |
| | | |
| Underground Arch | | |
| Infiltration System | | |
| | | |
| | | |
| | | |
| | | |

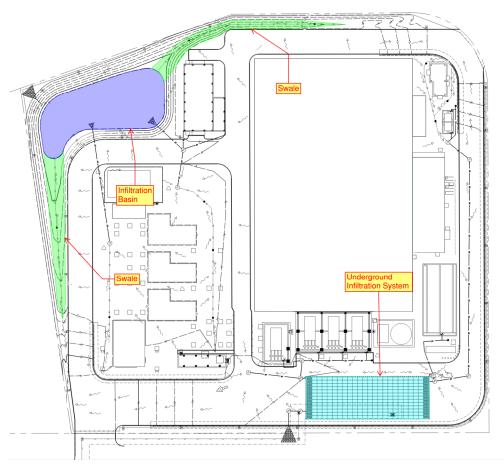
a. Directions:

Inspection Form will be filled out during the entire construction phase of the project.

Required Elements:

- 1. On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work with the next 14-day period.
- 2. Indicate on site map all areas of the site that have undergone temporary or permanent stabilization.
- 3. Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period.
- 4. Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent).
- 5. Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earther berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and
- 6. Immediately report to the Operator any deficiencies that are identified with the implementation of SWPPP.

SITE PLAN/SKETCH



| Inspector (print name) | Date of Inspection |
|---|---|
| Trained Contractor (print name) | Trained Contractor Signature |
| The above signed acknowledges that, to provided on the forms is accurate and co | the best of his/her knowledge, all information implete. |
| Weather | Soil Description |
| Reason for Inspection: [] Daily Inspection [] other | |
| Stage of Construction: | |

| Maintaining | Water Quality |
|--------------------|--|
| Yes No N/A | |
| | Is there an increase in turbidity causing or reasonably likely to cause a substantial visible contrast to natural conditions? |
| | Is there residue from oil and floating substances, visible oil film, or globules or grease? |
| | All disturbance is within the limits of the approved plans. |
| | Have receiving lake/bay, stream, and/or wetland been impacted by silt from the project? |
| <u>Housekeepir</u> | ng |
| 1. Gene | eral Site Conditions |
| Yes No N/A | |
| | Is construction site litter and debris appropriately managed? |
| | Are facilities and equipment necessary for implementation or erosion and sediment control in working order and/or properly maintained? |
| | Is construction impacting the adjacent property? |
| | Is dust adequately controlled? |
| 2. Stabi | lized Construction Entrance |
| | Stone is clean enough to effectively remove mud from vehicles. |
| | Installed per standards and specifications? |
| | Does all traffic use the stabilized entrance to enter and leave site? |
| | Is adequate drainage provided to prevent ponding at entrance? |
| Runoff Contr | ol Practices |
| 1. Exca | vation Dewatering |
| Yes No N/A | |
| | Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan. |
| | Clean water from upstream pool is being pumped to the downstream pool. |
| | Sediment laden water from work area is being discharged to a silt trapping device. |
| | Constructed upstream berm with one-foot minimum freeboard. |
| | porary Sediment Trap |
| Yes No N/A | |
| | Trap and outlet structure constructed per the approved plan. |
| | Trap side slopes are stabilized with seed/mulch. |
| | Drainage structure flushed and trap surface restored upon removal of sediment trap facility. |
| | Sediment trap dewatering pool is dewatering at appropriate rate. Sediment accumulation is% of design capacity. |

| 3. Geotextile Filter Bag Yes No N/A Bags are being replaced when full (considered full when remaining bag flow area has been reduced by 75%) Bags are placed at least 50 feet from all wetlands and other surface waters. Bags are placed in a location that is vegetated, relatively level, and provides for ease of access. Torn or damaged bags have been replaced. Soil Stabilization 1. Topsoil and Spoil Stockpiles Yes No N/A Stockpiles are stabilized with vegetation and/or mulch. Sediment control is installed at the toe of the slope. 2. Revegetation Yes No N/A Temporary seeding and mulch have been applied to idle areas. 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices 1. Silf Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Installed on Contour, 10 feet from toe onds together for continuous support. Installed inches minimum. |
|---|
| Bags are being replaced when full (considered full when remaining bag flow area has been reduced by 75%) Bags are placed at least 50 feet from all wetlands and other surface waters. Bags are placed in a location that is vegetated, relatively level, and provides for ease of access. Torn or damaged bags have been replaced. Soil Stabilization |
| Bags are placed at least 50 feet from all wetlands and other surface waters. Bags are placed in a location that is vegetated, relatively level, and provides for ease of access. Torn or damaged bags have been replaced. Soil Stabilization 1. Topsoil and Spoil Stockpiles |
| Bags are placed in a location that is vegetated, relatively level, and provides for ease of access. Torn or damaged bags have been replaced. Soil Stabilization |
| ease of access. Torn or damaged bags have been replaced. Soil Stabilization 1. Topsoil and Spoil Stockpiles Yes No N/A Stockpiles are stabilized with vegetation and/or mulch. Sediment control is installed at the toe of the slope. 2. Revegetation Yes No N/A Temporary seeding and mulch have been applied to idle areas. Sediment Control Practices 1. Silt Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
| Soil Stabilization 1. Topsoil and Spoil Stockpiles Yes No N/A □ □ Stockpiles are stabilized with vegetation and/or mulch. □ □ Sediment control is installed at the toe of the slope. 2. Revegetation Yes No N/A □ □ □ Temporary seeding and mulch have been applied to idle areas. □ □ □ 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices 1. Silt Fence Yes No N/A □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ Units constructed by wrapping the two ends together for continuous support. |
| 1. Topsoil and Spoil Stockpiles Yes No N/A Stockpiles are stabilized with vegetation and/or mulch. Sediment control is installed at the toe of the slope. 2. Revegetation Yes No N/A Temporary seeding and mulch have been applied to idle areas. in the inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices 1. Silt Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
| Yes No N/A |
| Stockpiles are stabilized with vegetation and/or mulch. Sediment control is installed at the toe of the slope. Revegetation Yes No N/A Temporary seeding and mulch have been applied to idle areas. 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices Silf Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
| Sediment control is installed at the toe of the slope. Revegetation Yes No N/A |
| 2. Revegetation Yes No N/A Temporary seeding and mulch have been applied to idle areas. 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices 1. Silt Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
| Yes No N/A Temporary seeding and mulch have been applied to idle areas. 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices 1. Silt Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
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| ☐ ☐ ☐ 6 inches minimum of topsoil has been applied under permanent seeding. Sediment Control Practices Silt Fence Yes No N/A ☐ ☐ ☐ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) ☐ ☐ ☐ Joints constructed by wrapping the two ends together for continuous support. |
| Sediment Control Practices 1. Silt Fence Yes No N/A □ □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ □ □ Joints constructed by wrapping the two ends together for continuous support. |
| 1. Silt Fence Yes No N/A Installed on Contour, 10 feet from toe of slope (not across conveyance channels) Joints constructed by wrapping the two ends together for continuous support. |
| Yes No N/A □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ □ □ Joints constructed by wrapping the two ends together for continuous support. |
| □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) □ □ □ Installed on Contour, 10 feet from toe of slope (not across conveyance channels) |
| \square \square Joints constructed by wrapping the two ends together for continuous support. |
| |
| □ □ □ Fabric buried 6 inches minimum |
| L L L Table bolled o literies millimoti. |
| \square \square Post are stable, fabric is tight and without rips or frayed areas. Sedimen |
| accumulation is% of design capacity. |
| 2. Storm Drain Inlet Protection |
| (Use for Stone & Block, Filter Fabric, Curb, or Excavated practices) |
| Yes No N/A |
| □ □ Installed concrete blocks lengthwise so open ends face outward, not upward. |
| □ □ Placed wire screen between No. 3 crushed stone and concrete blocks. |
| □ □ □ Drainage area is 1 acre or less. |
| □ □ Excavated area is 900 cubic feet. |
| |
| □ □ □ Excavated side slopes should be 2·1 |
| □ □ □ Excavated side slopes should be 2:1. □ □ □ □ 2" x 5" frame is constructed and structurally sound. |
| \square \square 2" x 5" frame is constructed and structurally sound. |
| 2" x 5" frame is constructed and structurally sound. D D D Posts 3-foot maximum spacing between posts. |
| □ □ □ 2" x 5" frame is constructed and structurally sound. □ □ □ □ Posts 3-foot maximum spacing between posts. □ □ □ □ Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with |
| 2" x 5" frame is constructed and structurally sound. D D D Posts 3-foot maximum spacing between posts. |

| | 3. | Tempo | rary Check Dam |
|----|------|-----------|--|
| Ye | s No | N/A | |
| | | | Is channel stable? (flow is not eroding soil underneath or around the structure). |
| | | | Check is in good condition (rocks in place and no permanent pools behind the structure). |
| | | | Has accumulated sediment been removed? |
| | 4. | Concre | ete Washout Area |
| Ye | s No | N/A | |
| | | , , , , , | |
| | | | Washout Facility is free of damage and leaks. |
| | | | Washout Facility is free of damage and leaks. Excess rainwater is not present within concrete washout facility. |
| _ | | | , |
| | | | Excess rainwater is not present within concrete washout facility. |

(**Note:** Not all erosion and sediment control practices are included in this listing.
Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater
Management practices can be found in Appendix F of the New York State
Stormwater Management Design Manual.)

CONSTRUCTION DURATION INSPECTIONS

b. Modifications to the SWPPP (To be completed as described below)

The Developer shall amend the SWPPP whenever:

- 1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP; or
- 2. The SWPPP proves to be ineffective in;
 - a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
 - b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
- 3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

| Modification & Reason: |
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| Detailed Description of Consistent Issues in the Construction and Technical Standards of SMPs: | | | | |
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| Other Comments: | | | | |
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Post- Construction Stormwater Management Practices (SMPs)

| Post-Construction SMP | Current Phase of Construction | Notes |
|-----------------------|----------------------------------|-------|
| Infiltration Basin | | |
| | | |
| | | |
| | | |
| Underground Arch | | |
| Infiltration System | | |
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Appendix D - Monthly Summary Reports

Monthly Summary of Qualified Professional Site Inspection Activities

| | | 1 | | T | |
|--|--|--|--|--|--|
| Name of Facility: | | Today's Date: | | Reporti | ng Month: |
| Champlain Hudson Pov | | | | | |
| Express Astoria DC Con | verter | | | | |
| Station | | | | | |
| Location: Astoria | | | | | |
| Name of Site Inspectors | : | | Telephone # of | Site Insp | pector: |
| | Т _ | | | _ | |
| Date of Inspection | _ | ular/Rainfall ed Inspection | Name of Insp | ector | Items of Concern |
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| Qualified Inspector's Country under my direction or signification or signification or signification or signification of the person of the pers | of law upervising perly go perly go n or per ng the in true, ac informa | that this docum on in accordan athered and ev sons who mand formation, the i ccurate, and co ation is a violatio | ce with a syster aluated the info age the system, information sub- omplete. I under on of the laws o | n desigr ormatior or those mitted is stand th f the Cit | ned to assure that a submitted. Based on e persons directly s, to the best of my nat certifying false, by of New York and |
| Qualified Professional (| print na | me) | Qualified Pr | ofession | al Signature |

| Name of Facility: | | Today's Date: | | Reporti | ng Month: |
|--|--|--|--|--|--|
| Champlain Hudson Po | wer | | | | |
| Express Astoria DC Cor | | | | | |
| Station | | | | | |
| Location: Astoria | | | | | |
| Name of Site Inspector | : | | Telephone # | of Site Insp | pector: |
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| Date of Inspection | _ | ular/Rainfall ed Inspection | Name of In | spector | Items of Concern |
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| ained Contractor's Contractor's Contractor's Contractor's Contractor Contract | of law supervision or perly go n or per or true, ace information | that this document on in accordant athered and eversions who mandaformation, the accurate, and coation is a violation. | nce with a systemated the ingesthe system information submplete. I undo not the laws | em desigr nformation n, or those bmitted is erstand th of the Cit | ned to assure that a submitted. Based of persons directly s, to the best of my nat certifying false, by of New York and |

Appendix E - Contractor's Certifications & Forms

CONTRACTOR'S CERTIFICATION STATEMENT

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|---|------|----|----|----|----|----|----|------------|---|
| | | | | | | | | | |

Construction Site Name: Champlain Hudson Power Express Astoria DC Converter

Station

Site Location: Located on the East River adjacent to Con Edison's Astoria

facilities

II. CONTRACTORS INFORMATION

Contracting Firm Name: Contracting Firm Address: Telephone Number(s):

Contact(s): 1)

2)

III. CERTIFICATION

"I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the developer must comply with the terms and conditions of the NYC Stormwater Construction Permit, the most current version of the New York State Pollutant Discharge Elimination System (SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware that there are significant penalties for submitting false information that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations."

| Contractor (print name) | Contractor Signature |
|-------------------------|----------------------|
| | |
| Title | Date |

SUBCONTRACTOR'S CERTIFICATION STATEMENT

I. SITE INFORMATION

Construction Site Name: Champlain Hudson Power Express Astoria DC Converter

Station

Site Location: Located on the East River adjacent to ConEdison's Astoria

facilities

II. CONTRACTORS INFORMATION

Contracting Firm Name: Contracting Firm Address: Telephone Number(s):

Contact(s): 1)

2)

III. CERTIFICATION

"I hereby certify under penalty of law that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the developer must comply with the terms and conditions of the NYC Stormwater Construction Permit, the most current version of the New York State Pollutant Discharge Elimination System (SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I am aware that there are significant penalties for submitting false information that I do not believe to be true, including the possibility of fine and imprisonment for knowing violations."

| Subcontractor (print name) | Subcontractor Signature |
|----------------------------|-------------------------|
| | |
| Title | Date |

CERTIFICATE OF ISSUANCE

As directed by the developer, a copy of the SWPPP will be retained at the site, along with all signed statements, reports and schedules contained herein for completion by the contractor. Upon completion, the SWPPP and all records shall be returned to the developer.

| Date of issuance: | |
|---------------------|--|
| Name: Title: | |
| | |
| Firm: | |
| Signature: | |
| Received from: | |
| Name: | |
| Title: | |
| Address: | |
| Tel. Number(s): | |
| 101. 110111201 (3). | |

(**Note:** Inquiries in regard to copies of SWPPP by either the State Director or any local agency having jurisdiction to be directed to owner's project representative.)

EROSION AND WATER QUALITY CONTROL IDENTIFICATION

The contractor and/or subcontractors that will implement each erosion control measure must be identified:

IDENTIFICATION

| Name of Contractor and/or Subcontractor | Measure to be Implemented |
|---|---------------------------|
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(**Note:** Each contractor and subcontractor identified must sign a copy of the certification statement. Those copies must be filed with the SWPPP, kept on-site, and kept up to date.

This identification does not reassign or remove responsibility for all measures as agreed to the contract documents. The contractor is responsible for all subcontractors.)

CONSTRUCTION STABILIZATION

The contractor shall initiate stabilization measures as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased. When construction activity is precluded by snow cover, stabilization measures shall be initiated as soon as practicable. When construction activity will resume within 21 days from when activity ceased, then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

| Major Work Activity | Portion of the Site | Date Commenced | Date Ceased (Permanently/Temporarily) | Date Stabilization Measures Initiated |
|------------------------|---------------------|-------------------|--|--|
| | | | | |
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^{*}THESE MUST BE KEPT UP TO DATE AND ON-SITE FOR INSPECTION AT ANYTIME.

| CERTIFICATE OF CHANGE BY THE CONTRACTOR | |
|---|---|
| То: | |
| Project: | |
| Site Address: | |
| Enclosed, please find your written notification of being met: | the following provision(s) of the SWPPP not |
| Provisions of the plan requiring modification: | |
| Action taken to modify plan to bring project into | compliance: |
| Date Completed: | |
| Received By: Name: Title: Contracting Firm: | Received By: Name: Title: Contracting Firm: |
| Address: Tel. Number: | Address: Tel. Number: |
| Signature: | Signature: |

(**Note:** Plan amendments – major and minor need to be filed on-line. Major amendments include changes to structural components that would require design review. All others shall be filed as a minor amendment, but will not require review.)

Appendix F - End of Construction Documents

FINAL STABILIZATION AND RETENTION OF RECORDS

A. Qualified Professional Certification: A qualified professional shall perform a final site inspection.

| Yes | No. | N/A | | |
|-----|--------|--|---|--|
| | | | Final site drainage will prev properties, uncontrolled or | vent erosion, concentrated flows to adjacent verflow, and ponding. |
| | | | Conveyance systems are | stabilized. |
| | | | Channels and stream ban | ks are seeded at the outlet points. |
| | | that of veget equive been structu specif certify permit | all soil disturbing activities rative cover with a density alent stabilization measures employed on all unpaveoures. Further, all temporary eied for permanent erosion ring false, incorrect or inactivities. | undergone final stabilization. Final stabilization means have been completed and a uniform, perennially of eighty (80) percent has been established or so (such as the use of mulches or geotextiles) have ed areas and areas not covered by permanent erosion and sediment controls (such as silt fence) not an control have been removed. I understand that recurate information is a violation of the referenced and State of New York and could subject me to be proceedings." |
| Qu | alifie | ed Pro | fessional (print name) | Qualified Professional Signature |
| | | | , | |
| Da | te | | · · · · · · · · · · · · · · · · · · · | |

- B. Retention of Records: The developer shall retain copies of SWPPPs, all reports, and records of all data for a period of at least five years from the date that the site is finally stabilized.
- C. Maintenance of SWPPP and Reports at the Construction Site: The operator shall retain a copy of the SWPPP at the construction site from the data of initiation of construction activities to the date of final stabilization.

CERTIFICATE OF RETURN

As directed by the owner's representative, the copy of the storm water pollution prevention plan retained at the site, along with all signed statements, reports and schedules contained herein for completion by the contractor are to be returned to the owner. The owner shall retain the plan, reports and records of all data for a period of five years from the date that the site is stabilized. This period may be extended by the City director at any time upon written notification.

| Date of issuance: Name: Title: Firm: | |
|--|--|
| Signature: | |
| Received from: Name: Title: Address: Tel. Number(s): | |
| Sianature: | |

(**Note:** Inquiries in regard to copies of pollution prevention plan by either the State Director or any local agency having jurisdiction to be directed to owner's project representative.)

Appendix G – NYSDEC Notice of Intent Form & NOTICE OF TERMINATION

NOI for coverage under Stormwater General **Permit for Construction Activity**

version 1.35

(Submission #: HPK-B9FZ-SQRGR, version 1)

Details

Originally Started By SEAN LENAHAN

Alternate Identifier Champlain Hudson Power Express Astoria HVDC Converter Station

Submission ID HPK-B9FZ-SQRGR

Submission Reason New

Status Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)

Transmission Developers, Inc.

Owner/Operator Contact Person Last Name (NOT CONSULTANT)

NONE PROVIDED

Owner/Operator Contact Person First Name

NONE PROVIDED

Owner/Operator Mailing Address

1301 Avenue of the Americas, 26th Floor

City

New York

State NY

Email

Zip 10019-6022

Phone

NONE PROVIDED

NONE PROVIDED

Federal Tax ID NONE PROVIDED

Project Location

Project/Site Name

Champlain Hudson Power Express Astoria HVDC Converter Station

Street Address (Not P.O. Box)

12 Avenue, Con Edison

Side of Street

North

City/Town/Village (THAT ISSUES BUILDING PERMIT)

Queens

State

NY

Zip

11105

DEC Region 2

County **QUEENS**

Name of Nearest Cross Street

30th Street

Distance to Nearest Cross Street (Feet) NONE PROVIDED Project In Relation to Cross Street NONE PROVIDED

Tax Map Numbers Section-Block-Parcel

QUEENS-850-310

Tax Map Numbers NONE PROVIDED

NONETHOUBLE

1. Coordinates

Provide the Geographic Coordinates for the project site. The two methods are:

- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates

40.78694437116967,-73.90044087851241

Project Details

2. What is the nature of this project?

Redevelopment with increase in impervious area

3. Select the predominant land use for both pre and post development conditions.

Pre-Development Existing Landuse

Industrial

Post-Development Future Land Use

Other: Converter Station

3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.

NONE PROVIDED

4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage) within the disturbed area.

*** ROUND TO THE NEAREST TENTH OF AN ACRE. ***

Total Site Area (acres)

7.77

Total Area to be Disturbed (acres)

7.77

Existing Impervious Area to be Disturbed (acres)

4.36

Future Impervious Area Within Disturbed Area (acres)

7.5

5. Do you plan to disturb more than 5 acres of soil at any one time?

No

6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.

A (%

•

B (%) 0

C (%) 100

D (%)

7. Is this a phased project?

No

8. Enter the planned start and end dates of the disturbance activities.

Start Date

06/01/2023

End Date

06/01/2025

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

East River

9a. Type of waterbody identified in question 9? River Off Site

Wetland/State Jurisdiction On Site (Answer 9b)

Other Waterbody Type Off Site Description

NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?

Delineated by Consultant

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001?

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as D (provided the map unit name is inclusive of slopes greater than 25%), E or F on the USDA Soil Survey? NONE PROVIDED

If Yes, what is the acreage to be disturbed?

NONE PROVIDED

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?

Nο

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? Yes

16. What is the name of the municipality/entity that owns the separate storm sewer system?

Consolidated Edison

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? No

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?

Nο

19. Is this property owned by a state authority, state agency, federal government or local government?

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)

No

Required SWPPP Components

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?

Yes

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?

Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?

Yes

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

Professional Engineer (P.E.)

SWPPP Preparer

KC Engineering and Land Survey, PC

Contact Name (Last, Space, First)

Nathaniel Havener

Mailing Address

7 Pennsylvania Plaza Suite 1604

City

New York

State NY

Zip

10001

Phone

646-795-5064

Email

nhavener@kcepc.com

Download SWPPP Preparer Certification Form

Please take the following steps to prepare and upload your preparer certification form:

- 1) Click on the link below to download a blank certification form
- 2) The certified SWPPP preparer should sign this form
- 3) Scan the signed form
- 4) Upload the scanned document

<u>Download SWPPP Preparer Certification Form</u>

Please upload the SWPPP Preparer Certification

NONE PROVIDED

Comment

NONE PROVIDED

Erosion & Sediment Control Criteria

25. Has a construction sequence schedule for the planned management practices been prepared?

26. Select all of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

Check Dams
Sediment Traps
Silt Fence
Storm Drain Inlet Protection
Construction Road Stabilization
Dust Control

Biotechnical

None

Vegetative Measures

Topsoiling Protecting Vegetation

Permanent Structural

Rock Outlet Protection Land Grading Retaining Wall

Other

Soil Restoration, Geotextile Filter Bag

Post-Construction Criteria

* IMPORTANT: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

Locating Development in Less Sensitive Areas

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)

29. Post-construction SMP Identification

Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)

802

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?

No

If Yes, go to question 36. If No, go to question 32.

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

If Yes, go to question 33.

Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. SMPs

Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)

0

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). .675

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? No

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv required and provided or select waiver (#36a), if applicable.

CPv Required (acre-feet)

NONE PROVIDED

CPv Provided (acre-feet)

NONE PROVIDED

36a. The need to provide channel protection has been waived because:

Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (#37a), if applicable.

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)

24.29

Post-Development (CFS)

4.05

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)

37.5

6.26

Post-Development (CFS)

37a. The need to meet the Qp and Qf criteria has been waived because:

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?

If Yes, Identify the entity responsible for the long term Operation and Maintenance

Owner

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.

Full water quality treatment is not possible due to downward sloping entry driveways. Runoff is not able to be captured for treatment in these areas. The WQv deficet is 0.089 acre-feet.

Post-Construction SMP Identification

Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs

Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

RR Techniques (Area Reduction)

Round to the nearest tenth

Total Contributing Acres for Conservation of Natural Area (RR-1) NONE PROVIDED Total Contributing Impervious Acres for Conservation of Natural Area (RR-1) NONE PROVIDED Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2) NONE PROVIDED Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2) NONE PROVIDED Total Contributing Acres for Tree Planting/Tree Pit (RR-3) NONE PROVIDED Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3) NONE PROVIDED Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4) NONE PROVIDED RR Techniques (Volume Reduction) Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4) NONE PROVIDED Total Contributing Impervious Acres for Vegetated Swale (RR-5) NONE PROVIDED Total Contributing Impervious Acres for Rain Garden (RR-6) NONE PROVIDED Total Contributing Impervious Acres for Stormwater Planter (RR-7) NONE PROVIDED Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8) NONE PROVIDED Total Contributing Impervious Acres for Porous Pavement (RR-9) NONE PROVIDED Total Contributing Impervious Acres for Green Roof (RR-10) NONE PROVIDED Standard SMPs with RRv Capacity Total Contributing Impervious Acres for Infiltration Trench (I-1) NONE PROVIDED Total Contributing Impervious Acres for Infiltration Basin (I-2) 3.89 Total Contributing Impervious Acres for Dry Well (I-3) NONE PROVIDED Total Contributing Impervious Acres for Underground Infiltration System (I-4) 2.86 Total Contributing Impervious Acres for Bioretention (F-5) NONE PROVIDED Total Contributing Impervious Acres for Dry Swale (O-1) NONE PROVIDED Standard SMPs Total Contributing Impervious Acres for Micropool Extended Detention (P-1) NONE PROVIDED **Total Contributing Impervious Acres for Wet Pond (P-2)**

NONE PROVIDED

Total Contributing Impervious Acres for Wet Extended Detention (P-3)

NONE PROVIDED

Total Contributing Impervious Acres for Multiple Pond System (P-4)

NONE PROVIDED

Total Contributing Impervious Acres for Pocket Pond (P-5)

NONE PROVIDED

Total Contributing Impervious Acres for Surface Sand Filter (F-1)

NONE PROVIDED

Total Contributing Impervious Acres for Underground Sand Filter (F-2) NONE PROVIDED

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)

NONE PROVIDED

Total Contributing Impervious Acres for Organic Filter (F-4)

NONE PROVIDED

Total Contributing Impervious Acres for Shallow Wetland (W-1)

NONE PROVIDED

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)

NONE PROVIDED

Total Contributing Impervious Acres for Pond/Wetland System (W-3)

NONE PROVIDED

Total Contributing Impervious Acres for Pocket Wetland (W-4)

NONE PROVIDED

Total Contributing Impervious Acres for Wet Swale (O-2)

NONE PROVIDED

Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Total Contributing Impervious Area for Hydrodynamic

NONE PROVIDED

Total Contributing Impervious Area for Wet Vault

NONE PROVIDED

Total Contributing Impervious Area for Media Filter

NONE PROVIDED

"Other" Alternative SMP?

NONE PROVIDED

Total Contributing Impervious Area for "Other"

NONE PROVIDED

Provide the name and manufaturer of the alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

Manufacturer of Alternative SMP

NONE PROVIDED

Name of Alternative SMP

NONE PROVIDED

Other Permits

40. Identify other DEC permits, existing and new, that are required for this project/facility.

Water Quality Certificate

Tidal Wetlands

If SPDES Multi-Sector GP, then give permit ID

NONE PROVIDED

If Other, then identify

NONE PROVIDED

41. Does this project require a US Army Corps of Engineers Wetland Permit?

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth NONE PROVIDED

42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff

from construction activities, please indicate the former SPDES number assigned.

NONE PROVIDED

MS4 SWPPP Acceptance

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?

NONE PROVIDED

MS4 SWPPP Acceptance Form Download

Download form from the link below. Complete, sign, and upload.

MS4 SWPPP Acceptance Form

MS4 Acceptance Form Upload

NONE PROVIDED

Comment

NONE PROVIDED

Owner/Operator Certification

Owner/Operator Certification Form Download

Download the certification form by clicking the link below. Complete, sign, scan, and upload the form. Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form

NONE PROVIDED

Comment

NONE PROVIDED

New York State Department of Environmental Conservation Division of Water

625 Broadway, 4th Floor

Albany, New York 12233-3505

(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

| Please indicate your permit identification number: NYR | | |
|--|----------------------------|--|
| I. Owner or Operator Information | | |
| 1. Owner/Operator Name: | | |
| 2. Street Address: | | |
| 3. City/State/Zip: | | |
| 4. Contact Person: | 4a.Telephone: | |
| 4b. Contact Person E-Mail: | | |
| II. Project Site Information | | |
| 5. Project/Site Name: | | |
| 6. Street Address: | | |
| 7. City/Zip: | | |
| 8. County: | | |
| III. Reason for Termination | | |
| 9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. *Date final stabilization completed (month/year): | | |
| 9b. Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR (Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit) | | |
| 9c. □ Other (Explain on Page 2) | | |
| IV. Final Site Information: | | |
| 10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no (If no, go to question 10f.) | | |
| 10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2) | | |
| 10c. Identify the entity responsible for long-term operation and m Owner | aintenance of practice(s)? | |

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the **SPDES General Permit for Construction Activity - continued** 10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes 10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s): □ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality. □ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s). □ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record. □ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan. 10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? 6.25 (acres) 11. Is this project subject to the requirements of a regulated, traditional land use control MS4? (If Yes, complete section VI - "MS4 Acceptance" statement V. Additional Information/Explanation: (Use this section to answer questions 9c. and 10b., if applicable) VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage) I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time. Printed Name:

Date:

Title/Position:

Signature:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:

| I hereby certify that all disturbed areas have achieved final stabilization as of the general permit, and that all temporary, structural erosion and sedim been removed. Furthermore, I understand that certifying false, incorrect of violation of the referenced permit and the laws of the State of New York a criminal, civil and/or administrative proceedings. | nent control measures have or inaccurate information is a |
|---|--|
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |
| VIII. Qualified Inspector Certification - Post-construction Stormwat | er Management Practice(s): |
| I hereby certify that all post-construction stormwater management practic conformance with the SWPPP. Furthermore, I understand that certifying information is a violation of the referenced permit and the laws of the Starsubject me to criminal, civil and/or administrative proceedings. | false, incorrect or inaccurate |
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |
| IX. Owner or Operator Certification | |
| I hereby certify that this document was prepared by me or under my direct determination, based upon my inquiry of the person(s) who managed the persons directly responsible for gathering the information, is that the infordocument is true, accurate and complete. Furthermore, I understand that inaccurate information is a violation of the referenced permit and the laws could subject me to criminal, civil and/or administrative proceedings. | construction activity, or those mation provided in this certifying false, incorrect or |
| Printed Name: | |
| Title/Position: | |
| Signature: | Date: |

(NYS DEC Notice of Termination - January 2015)

Appendix H - Water Quality Product Data



The Recharger® 280HD is a 26.5" (673 mm) tall, mid-size chamber and is typically used for installations with depth restrictions or when a larger infiltrative area is required. The Recharger® 280HD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

| Size (L x W x H) | 8' x 47" x 26.5" |
|--------------------------------|---------------------------|
| | 2.44 m x 1194 mm x 673 mm |
| Installed Length | 7' |
| | 2.13 m |
| Length Adjustment per Run | 1' |
| | 0.30 m |
| Chamber Storage | 6.08 ft ³ /ft |
| | 0.56 m³/m |
| | 42.55 ft³/unit |
| | 1.21 m³/unit |
| Min. Installed Storage | 9.21 ft³/ft |
| | 0.86 m³/m |
| | 64.46 ft³/unit |
| | 1.83 m³/unit |
| Min. Area Required | 30.33 ft ² |
| | 2.82 m² |
| Chamber Weight | 64.0 lbs |
| | 29.03 kg |
| Shipping | 35 chambers/skid |
| | 2,345 lbs/skid |
| | 12 skids/48' flatbed |
| Min. Center-to-Center Spacing | 4.33' |
| | 1.32 m |
| Max. Allowable Cover | 12' |
| | 3.66 m |
| Max. Inlet Opening in End Wall | 21" HDPE, PVC |
| | 525 mm HDPE, PVC |
| Max. Allowable O.D. | 10" HDPE, 12" PVC |
| in Side Portal | 250 mm HDPE, 300 mm PVC |
| Compatible Feed Connector | HVLV FC-24 Feed Connector |

Calculations are based on installed chamber length.

All above values are nominal.

Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 52"(1321 mm) center-to-center spacing.

| or chamber and typical stone surround at 32 (1321 mm) center to center spacing. | | | | |
|---|------------------------|-----------------------|-----------|--|
| | Stone Foundation Depth | | | |
| | 6" 12" 18" | | | |
| | 152 mm | 305 mm | 457 mm | |
| Chamber and Stone Storage Per Chamber | 64.46 ft ³ | 70.53 ft ³ | 76.59 ft³ | |
| Chamber | 1.83 m³ | 2.00 m ³ | 2.17 m³ | |
| Min. Effective Depth | 3.21' | 3.71' | 4.21' | |
| | 0.98 m | 1.13 m | 1.28 m | |
| Stone Required Per Chamber | 2.03 yd^3 | 2.59 yd³ | 3.15 yd³ | |
| | 1.55 m³ | 1.98 m³ | 2.41 m³ | |

Calculations are based on installed chamber length. Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 52"(1321 mm) center-to-center spacing and stone foundation as listed in table. Stone void calculated at 40%.



Recharger® 280HD Bare Chamber Storage Volumes

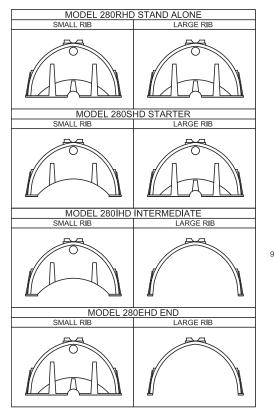
| Eleva | ation | Incremental Storage Volume | | | | lative age | |
|-------|-------|-------------------------------|-------|--------|-------|---------------|-------|
| in. | mm | ft³/ft | m³/m | ft³ | m³ | ft³ | m³ |
| 26.5 | 686 | 0.000 | 0.000 | 0.000 | 0.000 | 42.553 | 1.205 |
| 26 | 660 | 0.018 | 0.002 | 0.126 | 0.004 | 42.553 | 1.205 |
| 25 | 635 | 0.047 | 0.004 | 0.329 | 0.009 | 42.427 | 1.202 |
| 24 | 609 | 0.100 | 0.009 | 0.700 | 0.020 | 42.098 | 1.192 |
| 23 | 584 | 0.134 | 0.012 | 0.938 | 0.027 | 41.398 | 1.172 |
| 22 | 559 | 0.159 | 0.015 | 1.113 | 0.032 | 40.460 | 1.146 |
| 21 | 533 | 0.179 | 0.017 | 1.253 | 0.035 | 39.347 | 1.114 |
| 20 | 508 | 0.195 | 0.018 | 1.365 | 0.039 | 38.094 | 1.079 |
| 19 | 483 | 0.209 | 0.019 | 1.463 | 0.041 | 36.729 | 1.040 |
| 18 | 457 | 0.221 | 0.021 | 1.547 | 0.044 | 35.266 | 0.999 |
| 17 | 432 | 0.232 | 0.022 | 1.624 | 0.046 | 33.719 | 0.955 |
| 16 | 406 | 0.241 | 0.022 | 1.687 | 0.048 | 32.095 | 0.909 |
| 15 | 381 | 0.249 | 0.023 | 1.743 | 0.049 | 30.408 | 0.861 |
| 14 | 356 | 0.263 | 0.024 | 1.841 | 0.052 | 28.665 | 0.812 |
| 13 | 330 | 0.267 | 0.025 | 1.869 | 0.053 | 26.824 | 0.760 |
| 12 | 305 | 0.271 | 0.025 | 1.897 | 0.054 | 24.955 | 0.707 |
| 11 | 279 | 0.275 | 0.026 | 1.925 | 0.055 | 23.058 | 0.653 |
| 10 | 254 | 0.279 | 0.026 | 1.953 | 0.055 | 21.133 | 0.598 |
| 9 | 229 | 0.287 | 0.027 | 2.009 | 0.057 | 19.180 | 0.543 |
| 8 | 203 | 0.292 | 0.027 | 2.044 | 0.058 | 17.171 | 0.486 |
| 7 | 178 | 0.294 | 0.027 | 2.058 | 0.058 | 15.127 | 0.428 |
| 6 | 152 | 0.305 | 0.028 | 2.135 | 0.060 | 13.069 | 0.370 |
| 5 | 127 | 0.306 | 0.028 | 2.142 | 0.061 | 10.934 | 0.310 |
| 4 | 102 | 0.308 | 0.029 | 2.156 | 0.061 | 8.792 | 0.249 |
| 3 | 76 | 0.310 | 0.029 | 2.170 | 0.061 | 6.636 | 0.188 |
| 2 | 51 | 0.312 | 0.029 | 2.184 | 0.062 | 4.466 | 0.126 |
| 1 | 25 | 0.326 | 0.030 | 2.282 | 0.065 | 2.282 | 0.065 |
| To | tal | 6.079 | 0.565 | 42.553 | 1.205 | 42.553 | 1.205 |

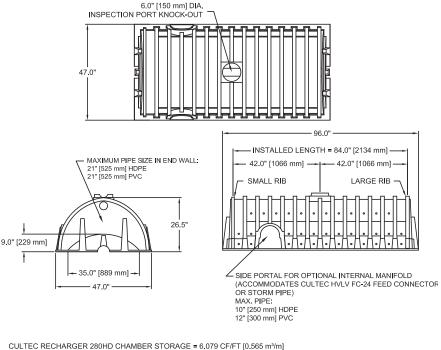
Calculations are based on installed chamber length.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

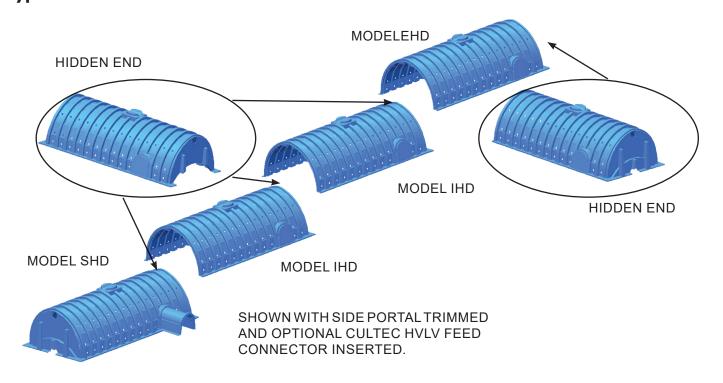


Three View Drawing





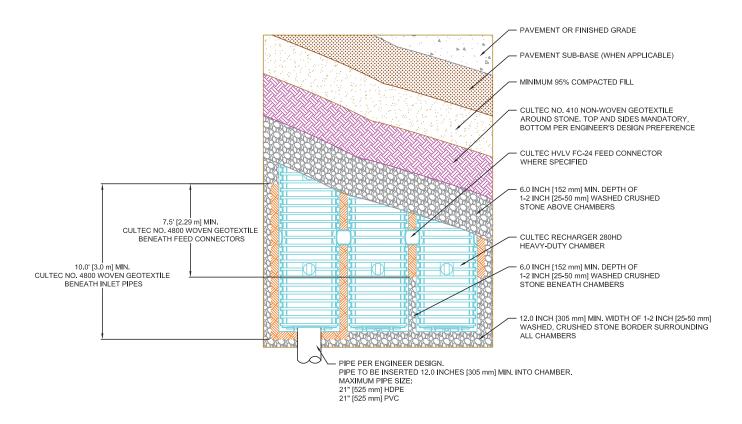
Typical Interlock Installation



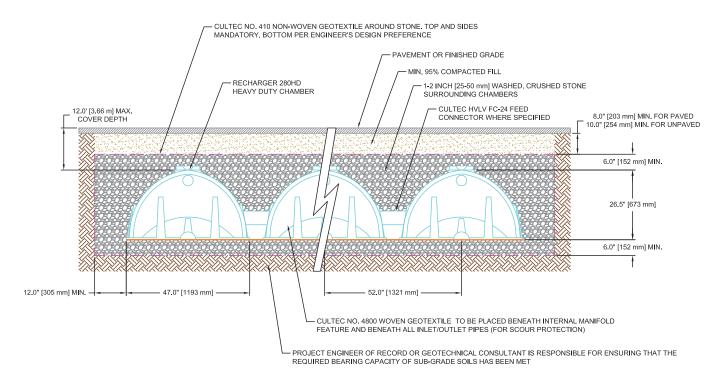
INSTALLED LENGTH ADJUSTMENT = 1.0' [0.3048 m]



Plan View Drawing



Typical Cross Section for Traffic Application



CULTEC Recharger® 280HD Stormwater Chamber



CULTEC Recharger® 280HD Specifications

GENERAL

CULTEC Recharger® 280HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

- 1. The chambers shall be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
- 2. The chamber shall be vacuum thermoformed of polyethylene with a black interior and blue exterior.
- 3. The chamber shall be arched in shape.
- 4. The chamber shall be open-bottomed.
- 5. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings or separate end walls.
- 6. The nominal chamber dimensions of the CULTEC Recharger® 280HD shall be 26.5 inches (673 mm) tall, 47 inches (1194 mm) wide and 8 feet (2.44 m) long. The installed length of a joined Recharger® 280HD shall be 7 feet (2.13 m).
- 7. Maximum inlet opening on the chamber end wall is 21 inches (525 mm) HDPE, PVC.
- 8. The chamber shall have two side portals to accept CULTEC HVLV® FC-24 Feed Connectors to create an internal manifold. Maximum allowable O.D. in the side portal is 10 inches (250 mm) HDPE, 12 inches (300 mm) PVC.
- 9. The nominal chamber dimensions of the CULTEC HVLV® FC-24 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 24.2 inches (614 mm) long.
- 10. The nominal storage volume of the Recharger® 280HD chamber shall be 6.079 ft³ / ft (0.565 m³ / m) without stone. The nominal storage volume of a single Recharger 280RHD Stand Alone unit shall be 48.63 ft³ (1.38 m³) without stone. The nominal storage volume of a joined Recharger® 280IHD Intermediate unit shall be 42.553 ft³ (1.205 m³) without stone. The nominal storage volume of the length adjustment amount per run shall be 6.08 ft³ (0.56 m³) without stone.
- 11. The nominal storage volume of the HVLV® FC-24 Feed Connector shall be 0.913 ft³ / ft (0.085 m³ / m) without stone.
- 12. The Recharger® 280HD chamber shall have seventy-two discharge holes bored into the sidewalls of the unit's core to promote lateral conveyance of water.
- 13. The Recharger® 280HD chamber shall have 15 corrugations.
- 14. The end wall of the chamber, when present, shall be an integral part of the continuously formed unit. Separate end plates cannot be used with this unit.
- 15. The Recharger® 280RHD Stand Alone unit must be formed as a whole chamber having two fully formed integral end walls and having no separate end plates or separate end walls.
- 16. The Recharger® 280SHD Starter unit must be formed as a whole chamber having one fully formed integral end wall and one partially formed integral end wall with a lower transfer opening of 9 inches (229 mm) high x 35 inches (889 mm) wide.
- 17. The Recharger® 280IHD Intermediate unit must be formed as a whole chamber having one fully open end wall and one partially formed integral end wall with a lower transfer opening of 9 inches (229 mm) high x 35 inches (889 mm) wide.
- 18. The Recharger® 280EHD End unit must be formed as a whole chamber having one fully formed integral end wall and one fully open end wall and having no separate end plates or end walls.
- 19. The HVLV® FC-24 Feed Connector must be formed as a whole chamber having two open end walls and having no separate end plates or separate end walls. The unit shall fit into the side portals of the Recharger® 280HD and act as cross feed connections.
- 20. Chambers must have horizontal stiffening flex reduction steps between the ribs.
- 21. The chamber shall have a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.
- 22. The units may be trimmed to custom lengths by cutting back to any corrugation on the large rib end.
- 23. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
- 24. The chamber shall be designed and manufactured to meet the material and structural requirements of IAPMO PS 63-2019, including resistance to AASHTO H-10 and H-20 highway live loads, when installed in accordance with CULTEC's installation instructions.
- 25. Maximum allowable cover over the top of the chamber shall be 12' (3.66 m).
- 26. The chamber shall be designed to withstand traffic loads when installed according to CULTEC's recommended installation instructions.

Contactor® & Recharger® Stormwater Chambers



Installation Instructions

for CULTEC Stormwater Management Systems

Contactor® Models Field Drain™ C-4HD™, 100HD™ Recharger® Models 150XLHD™, 180HD™, 280HD™, & 330XLHD™



Installation Instructions for CULTEC Stormwater Chambers



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Doc ID: CULG012 12-17

December 2017

You are using version CULG012 12-17of our CULTEC Stormwater Installation Instructions for Contactor® Models Field Drain™ C-4HD™, 100HD™, Recharger® Models 150XLHD™, 280HD™, & 330XLHD™

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.

All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.

Actual designs may vary.



Required Materials and Equipment

- Proper geotechnical soil evaluation by a qualified engineer or soil scientist to determine suitability of structural installation
- OSHA compliance
- CULTEC warning tape, or equivalent
- Assurances from local utilities that no underground gas, electrical or other potentially dangerous pipelines or conduits are already buried at the site
- Acceptable 1 2 inch (25 51 mm) washed, crushed stone as shown in Table 4, page 19.
 Cleanliness of stone to be verified by engineer.
- Acceptable fill material as shown in Table 5, page 20.
- CULTEC No. 410[™] non-woven geotextile or equivalent (See Table 3, page 19).

- All CULTEC chambers and accessories as specified in the engineer's plans including CULTEC
 No. 410™ non-woven geotextile, CULTEC StormFilter® and CULTEC No. 66™ woven geotextile,
 where applicable. Check CULTEC chambers for
 damage prior to installation. Do not use damaged CULTEC chambers. Contact your supplier
 immediately to report damage or packing-list
 discrepancies.
- Reciprocating saw or router
- Stone bucket
- Stone conveyor and/or tracked excavator
- Transit or laser level measuring device
- Compaction equipment with maximum gross vehicle weight of 12,000 lbs (5,440 kgs).
- Vibratory rollers may only be used on the stone base prior to the installation of chambers.

Requirements for CULTEC Chamber System Installations

- CULTEC systems must be designed and installed in accordance with CULTEC's minimum requirements. Failure to do so will void the limited warranty. To request a copy of the CULTEC limited warranty, call CULTEC at 203-775-4416 or visit www.cultec.com.
- Installing contractors are expected to comprehend and use the most current installation instructions prior to beginning a system installation. If there is any question as to whether these are the most current instructions, contact CULTEC at (203) 775-4416 or visit www.cultec.com.
- Contact CULTEC at least thirty days prior to system installation to arrange for a pre-construction meeting.
- All CULTEC system designs must be certified by a registered professional engineer.
- Use these installation instructions as a guideline only. Actual design may vary. Refer to approved construction drawings for job-specific details. Be sure to follow the engineer's drawings as your primary guide.
- System cover/backfill requirements will vary based on CULTEC chamber model. Please refer

- to Table 6 on page 20 and engineer's drawings.
- Any discrepancies with the system sub-grade soil's bearing capacity must be reported to the design engineer.
- CULTEC No. 410 non-woven geotextile must be used as specified in the engineer's drawings.
- CULTEC requires the contractor to refer to CULTEC's Installation Instructions Tables 1 6 shown on pages 18-20, concerning vehicular traffic. Responsibility for preventing vehicles that exceed CULTEC's requirements from traveling across or parking over the chamber system lies solely with the contractor throughout the entire site construction process. The placement of warning tape, temporary fencing, and/or appropriately located signs is highly recommended. Imprinted warning tape is available from CULTEC. For Acceptable Vehicle Load information, refer to Tables 1 and 2 on page 18.
- Erosion and sediment-control measures must meet local codes and the design engineer's specifications throughout the entire site construction process.



CULTEC Chamber Specification Information

| | Size (LxWxH) | Installed Length | Length Adjust- ment | Max. Inlet in End Wall | Max. O.D. in Side Portal | Compatible Feed Connector |
|----------------------|---------------------------|---------------------|---------------------------|------------------------------|-----------------------------|------------------------------|
| Contactor® | 8.5' x 48" x 8.5" | 8′ | 0.5′ | 4.5" | n/a | n/a |
| Field Drain C-4HD | 2.59 m x 1219 mm x 216 mm | 2.44 m | 0.15 m | 114 mm | II/ d | 11/4 |
| Contactor® 100UD | 8′ x 36″ x 12.5″ | 7.5′ | 0.5′ | 10" | 6.9" | HVLV® SFCx2 |
| Contactor® 100HD | 2.44 m x 914 mm x 318 mm | 2.29 m | 0.15 m | 250 mm | 175 mm | Feed Connector |
| Dealessan @ 450VIIID | 11′ x 33″ x 18.5″ | 10.25′ | 0.75′ | 12" | 10.25″ | HVLV® FC-24 |
| Recharger® 150XLHD | 3.13 m x 838 mm x 470 mm | 2.87 m | 0.28 m | 300 mm | 260 mm | Feed Connector |
| D 1 0011D | 7.33′ x 36″ x 20.5″ | 6.33′ | 1′ | 15″ | 12.25″ | HVLV® FC-24 |
| Recharger® 180HD | 2.33 m x 914 mm x 521 mm | 1.93 m | 0.30 m | 375 mm | 311 mm | Feed Connector |
| Dealessan @ 200UD | 8′ x 47″ x 26.5″ | 7′ | 1′ | 18" | 12.25″ | HVLV® FC-24 |
| Recharger® 280HD | 2.44 m x 1194 mm x 673 mm | 2.13 m | 0.30 m | 450 mm | 311 mm | Feed Connector |
| Recharger® 330XLHD | 8.5' x 52" x 30.5" | 7′ | 1.50′ | 24" | 11.75″ | HVLV® FC-24 |
| | 2.59 m x 1321 mm x 775 mm | 2.13 m | 0.46 m | 600 mm | 298 mm | Feed Connector |

CULTEC Heavy Duty (HD) chambers must be used for any traffic applications. CULTEC Heavy Duty chambers have a colored stripe permanently affixed along the full length of the chamber. These models listed that do not have a stripe must not be used for traffic applications.



Shown left-to-right: Contactor Field Drain C-4HD. Contactor 100HD, Recharger 150XLHD, Recharger 280HD, and Recharger 330XLHD.

CULTEC HVLV Feed Connector Specification Information

| Model | Size (LxWxH) | Compatible Models | Installed Length (exposed) |
|----------------------------|--|--|--|
| HVLV® SFCx2 Feed Connector | 19.7" x 12" x 7.6" 500 mm x 305 mm x 194 mm | Contactor® 100HD | For Contactor 100HD: 4" (102 mm) typ. |
| HVLV® FC-24 Feed Connector | 12" x 16" x 24.2" 305 mm x 406 mm x 614 mm | Recharger® 150XLHD Recharger® 180HD Recharger® 280HD Recharger® 330XLHD | For Recharger 150XLHD: 6" (152 mm) typ. For Recharger 180HD: 3" (76 mm) typ. For Recharger 280HD: 5" (127 mm) typ. For Recharger 330XLHD: 6" (152 mm) typ. |



Shown left-to-right: HVLV SFCx2 Feed Connector and HVLV FC-24 Feed Connector



Site Preparation and Excavation

- Excavate and level the area per engineer's drawings. Refer to plan view and cross-section details and excavate bed to accommodate chambers and manifold system. Be sure to allow for a minimum 12 inch (305 mm) stone border around the perimeter of the system and unforeseen overages in your excavation calculations.
- Remove any standing water and maintain positive drainage of the site throughout the installation. Dewatering procedures must be used if necessary.
- Prepare the sub-grade soil for the chamber bed as specified by the engineer's drawings.
- Place CULTEC No. 410[™] non-woven geotextile (or equivalent see Table 3, page 19) on the excavated bed bottom and perimeter sidewalls as specified by the engineer's drawings. CULTEC No. 410 non-woven geotextile is required on the sides and over the top of the system. It is also recommended on the system bottom. Overlap the geotextile by at least 24 inches (610 mm) where the fabric edges meet.
- Disperse a level base of 1 to 2 inch (25 51 mm) diameter washed, crushed stone over the entire area of the bed bottom (see Table 4, page 19 for stone requirements). Refer to the engineer's drawings for sub-grade soil preparation and required stone foundation thickness.
- Compact the stone base to achieve a flat, level surface. Vibratory rollers may only be used on the stone base prior to the installation of chambers. Use of vibratory rollers is strictly prohibited on all other backfill layers.











Directional arrows located on the top of the chamber point towards the Small Rib End. The open end of the next chamber overlaps the small rib end of the preceding chamber.



End Detail Information for CULTEC Contactor® Models Field Drain C-4HD and 100HD

Directional arrows located on the top of the chamber point towards the Small Rib End.

Model RHD is a **starter / stand alone** unit with two full end walls. They are used to start lines or can be used singularly. They may also be trimmed into model type EHD.

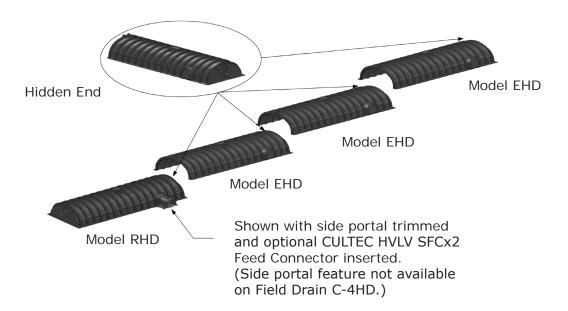
Model EHD is a **middle / end unit** with one closed end wall and one open end. They are used to continue lines and also used to end a line.



Typical Installation Method for CULTEC Contactor® Models Field Drain C-4HD and 100HD

Interlock Model RHD to EHD using the patented overlapping rib connection.

- Start each row with a Model RHD.
- Use Model EHD to continue the length of your row.
- End your row by using a Model EHD.





End Detail Information for CULTEC Recharger® Models 150XLHD, 180HD, 280HD, and 330XLHD

Directional arrows located on the top of the chamber point towards the Small Rib End.

Model RHD is a **stand alone** unit with two fully closed end walls. They are used when a single unit is required. They may also be trimmed into model types SHD, IHD, or EHD.

Model SHD is a **starter** unit with one closed end wall and one partially open end wall. They are used to start a chamber row.

Model IHD is an **intermediate** unit with one fully open end and one partially open end wall. They are used to continue the length of a line of chambers.

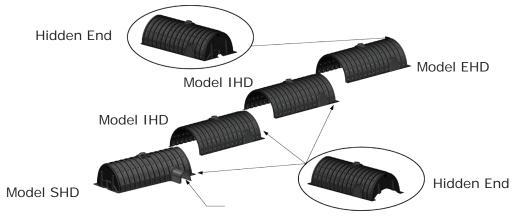
Model EHD is an **end unit** with one fully open end and one fully closed end wall. They are used to end a chamber run.



Typical Installation Method for CULTEC Recharger® Models 150XLHD, 180HD, 280HD, and 330XLHD

Interlock Model SHD to IHD using the patented overlapping rib connection. Finish the row with Model EHD.

- Start each row with a Model SHD.
- Use Model IHD to continue the length of your row.
- End your row by using a Model EHD.



Shown with side portal trimmed and optional CULTEC HVLV Feed Connector inserted.



Chamber Preparation and Installation

CULTEC Contactor® and Recharger® chambers have the distinctive features of a fully formed end wall and over-lapping rib connection. CULTEC chamber ribs are dimensionally sized with an open large rib and a closed smaller rib to allow for an easy interlocking rib connection.

- Identify and group the different chamber types to ensure proper placement and usage as outlined on pages 6 - 7.
- Place one Starter Unit (Model S for Recharger® series, Model R for Contactor® series) as designed for each row of units to be installed. Directional arrows point towards the small rib end of the chamber.
- If using the side portal internal manifold feature, trim the side portal(s) according to guidelines located on the sidewall of the chamber, as required see page 11. Insert one end of the HVLV Feed Connector into the trimmed portal to create the internal manifold. Refer to Manifold Installation section on page 11.
- Place middle chamber (Model I for Recharger® series, Model E for Contactor® series) so the directional arrow located in the center of the unit points downstream towards the end of the line. Overlap the large open end rib over the small rib of the preceding chamber's end wall, interlocking the chambers together see page 6 7. When placing chambers, take care to maintain center-to-center separation requirements, measuring from the base of the chamber.
- To ease backfilling requirements, only install as many middle chambers as the stone-laying bucket or conveyor can reach.
- Place stone as outlined on page 15 taking care not to drop stone over the last rib to be overlapped.
- Continue chamber and stone placement using middle chambers (Model I for Recharger[®] series, Model E for Contactor[®] series) to extend the length of the row.
- Model E chamber is used to end the line.
- Prior to the placement of the next line of chambers, the level and alignment of the chamber units shall be checked and corrected, where needed.









Installation of Manifold

Utilize the side portals located on the chamber as an internal manifold in locations where indicated on the engineer's drawings. HVLV® Feed Connectors are inserted into the portals to promote flow. An additional external manifold is not required unless specified by the engineer's design.

- CULTEC No. 66 woven geotextile is to be placed under all chambers utilizing the internal manifold feature and under all chambers accepting inlet/outlet pipe connections per engineer's drawings. If inserting a pipe 18" (450 mm)* diameter or larger into the CULTEC chamber, the use of CULTEC No. 66 woven geotextile is recommended to prevent washout. See detail on page 13.
- Most installations are designed with the internal manifold located at the ends of the chamber bed. However, the side portal internal manifold feature allows for the manifold to be located at any point within the chamber run. Refer to system design for manifold location(s). Install chambers according to directional arrows located in the top center of the unit.
- Using a reciprocating saw or router, trim the sidewall portals of the units that are to receive the HVLV Feed Connectors. Feed connectors may be placed on any chamber requiring a manifold, as indicated by the engineer's drawings. See page 11.
- Place the HVLV Feed Connectors into the side portal of the chambers per engineer's drawings.
- Check for correct center-to-center spacing of chamber runs according to engineer's drawings before proceeding to next row.
- Insert inflow/outflow pipe(s) into end wall or side portal as detailed on engineer's drawings. See page 4 for maximum inlet sizes for end wall and side portals. There is no need to feed every row if utilizing the internal manifold feature.

The side portal feature is not available on the Contactor Field Drain C-4HD. If manifold installation does not include CULTEC's side portal internal manifold, proceed according to the engineer's drawings for pipe manifold installation.

*Different chamber sizes accept varying maximum pipe connections. See page 4 for details.







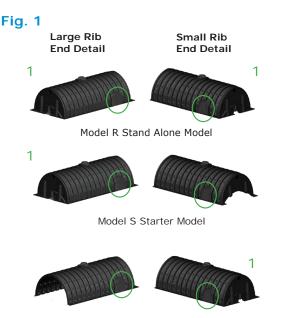


How to Trim the CULTEC Chamber to Accommodate Pipe on End Wall

When using a conventional pipe manifold or inlet / outlet pipes, the contractor is required to trim the CULTEC Chamber on site.

Here are some quick steps to ensure a successful outcome:

- Lay out chambers according to engineered plans.
- Directional arrows located at the top of the chamber point towards the small rib end.
- Line up the pipe on the chamber end wall to the designated pipe elevation as detailed on the engineer's drawing.
- Using a grease pen, outline the pipe on the end wall of the CULTEC chamber.
- Drill a hole on the chamber end wall large enough to accommodate a saw bit.
- Following the grease pen outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" (6 mm) tolerance of pipe O.D.
- Insert the pipe or fitting a minimum of 8" (203 mm) into the chamber. This is not required to be a watertight connection.
- Backfill as noted in the installation instructions and engineering details.



Model E End Model





Trimming may only be performed on fully closed end walls (indicated by Number 1 in Fig. 1) or side portal areas (See green circles in Fig. 1 for side portal locations). Pipe may not be inserted into the sidewall of the chamber unless it is within the side portal trim lines. See page 11-12 for more information on trimming side portals.



How to Trim the Side Portal to Accommodate HVLV Feed Connector for Internal Manifold

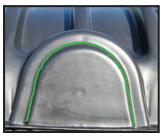
When using the side portal internal manifold feature, the contractor is required to trim the side portal of the CULTEC Chamber on site.

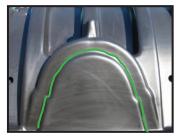


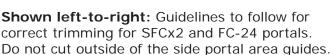




- Following the guides on the side portal, use a reciprocating saw to trim out the opening to accommodate the HVLV Feed Connector. Trimming should be within 1/4" (6 mm) tolerance of the HVLV Feed Connector.
- Insert the HVLV Feed Connector a minimum of 8" (203 mm) into the chamber. This is not required to be a watertight connection.







Trimming may only be performed on the side portal area. Side entry in any other location is unacceptable.





| Model | Compatible Feed Connector |
|-------------------|---------------------------|
| Contactor 100HD | HVLV SFCx2 Feed Connector |
| Recharger 150XLHD | HVLV FC-24 Feed Connector |
| Recharger 180HD | HVLV FC-24 Feed Connector |
| Recharger 280HD | HVLV FC-24 Feed Connector |
| Recharger 330XLHD | HVLV FC-24 Feed Connector |

How to Trim the Side Portal to Accommodate Pipe for Side Entry

When using the side portal feature as an inlet /outlet location, the contractor is required to trim the side portal of the CULTEC Chamber on site.





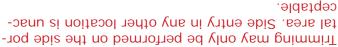


- Line up the pipe on the chamber side portal to the designated pipe elevation as detailed on the engineer's drawing. Pipe outside diameter (O.D.) may not exceed those listed in Table 1.
- Using a grease pen, outline the pipe on the side portal of the CULTEC chamber. See Fig. 1 for acceptable trim area.
- Drill a hole on the chamber side portal large enough to accommodate a saw bit.
- Following the grease pen outline, use a reciprocating saw to trim out the opening to accommodate the pipe. Trimming should be within 1/4" (6 mm) tolerance of pipe O.D. Fig. 1



mm) into the chamber. This is not required to

Insert the pipe or fitting a minimum of 8" (203







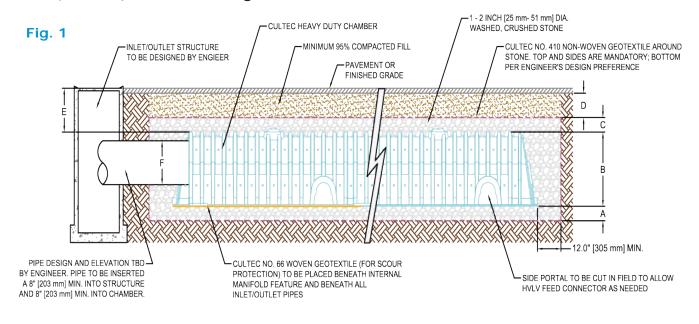
Shown left-to-right: Guidelines to follow for correct trimming for SFCx2 and FC-24 portals when using pipe. Do not cut outside of the side portal area guides.

Table 1

| Gecharger 150XLHD 10.25" 311 mm Becharger 180HD 12.25" 311 mm | Side Portal | ni .Q.O əldswollA .xsM | Model |
|---|-------------|------------------------|-------------------|
| Gecharger 180HD 12.25" 311 mm 311 mm 311 mm | աա 371 | "6 ·9 | Contactor 100HD |
| echarger 280HD 12.25" 311 mm | mm 092 | JO.25" | Recharger 150XLHD |
| | ատ ۱18 | 12.25" | Recharger 180HD |
| echaraer 330XI HD 75" 298 mm | ատ ۱18 | 12.25" | Recharger 280HD |
| | mm 892 | "3 <u>7</u> .11 | Recharger 330XLHD |



Typical Cross Section for Hi-Flow Pipes 18" (450 mm) diameter or larger



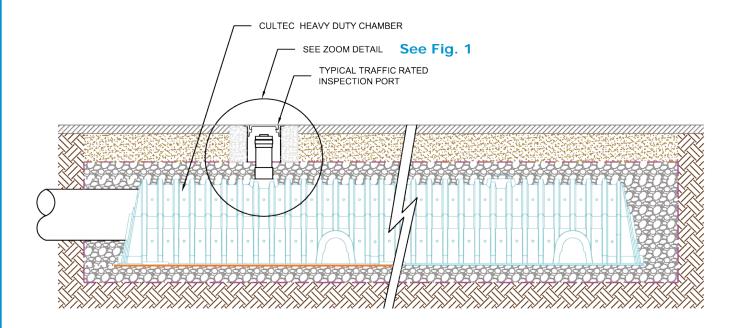
| See Fig. | Description | Contactor 100HD | Recharger 150XLHD | Recharger 180HD | Recharger 280HD | Recharger 330XLHD |
|----------|---|--------------------|----------------------|--------------------|--------------------|----------------------|
| А | Min. depth of stone base | 6" 152 mm | 6" 152 mm | 6" 152 mm | 6" 152 mm | 6" 152 mm |
| В | Chamber Height | 12.5″ 318 mm | 18.5″ 470 mm | 20.5″ 521 mm | 26.5" 673 mm | 30.5″ 775 mm |
| С | Min. depth of stone required above units for traffic applications | 6" 152 mm | 6" 152 mm | 6" 152 mm | 6" 152 mm | 6" 152 mm |
| | Min. depth of required 95% compacted fill: | | | | | |
| D | For paved applications | 8" 203 mm | 8" 203 mm | 8" 203 mm | 8" 203 mm | 10″ 254 mm |
| | For unpaved applications | 10" 254 mm | 10″ 254 mm | 10" 254 mm | 10" 254 mm | 12" 305 mm |
| Е | Max. depth of cover allowed above crown of chamber | 12′ 3.66 m | 12′ 3.66 m | 12′ 3.66 m | 12′ 3.66 m | 12′ 3.66 m |
| F | Max. inlet/outlet pipe size into the end wall of the chamber | 10″ 250 mm | 12" 300 mm | 15" 375 mm | 18″¹ 450 mm¹ | 24″¹ 600 mm¹ |

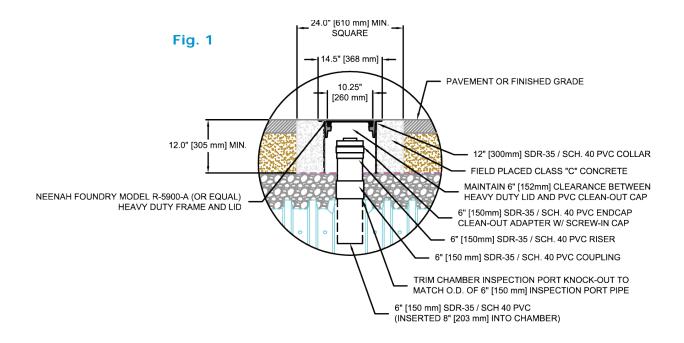
¹ For Recharger Models 280HD, and 330XLHD, CULTEC No. 66 woven geotextile to be placed beneath all chambers accepting inlet piping connections greater than 18" (450 mm) diameter (see Fig. 1).



Inspection Port Detail for Paved Traffic Applications

Does not apply for Contactor C-4HD





Trim inspection port knock-out with reciprocating saw or hole-saw. Corrugated pipe is not suitable for inspection port.

A belled end pipe may be used as replacement to configuration depicted. Belled-end may rest on outside of chamber.



Embedment Stone Backfill

Backfill using washed, crushed stone as specified in Table 4, page 19 and Table 5, page 20. To maintain row separation distance and prevent chamber displacement, slowly distribute stone on top of the center of the chamber crown so that stone trickles down and builds between chamber rows as required. Stone column differential should not exceed 12" (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

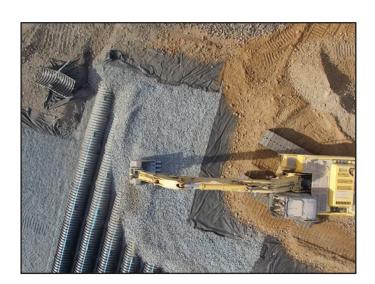
Place the stone carefully over the centerline of the chamber crown. Embedment stone must only be placed by an excavator or telescoping conveyor boom. Placement of embedment stone with a bulldozer is not an acceptable method of installation and may cause damage to the chambers. Any chambers damaged using an unacceptable method of backfill are not covered under the CULTEC limited warranty.



Excavator-Placed Stone

Typically the most common method, excavatorplaced stone is limited by the reach of the arm. To accommodate this issue with larger beds, it is common to prepare a bed by joining just a few chamber units at a time, then placing the stone and fabric before installing the next few units.

The excavator is usually operated within the excavation area. The excavator may work at grade level over recently placed chambers, provided coverage between the chambers and the excavator tracks meets the minimum requirements as shown in Table 2, page 18 and Table 6, page 20.



Telescoping Conveyor Boom Placement

With booms as much as 120-140 feet (36.6 - 42.7 meters) long, telescoping aggregate conveyors can greatly aid the process of stone placement.

Once secured, stone may be placed to surround the chambers and fill the perimeter areas. System cover/backfill requirements will vary based on CULTEC chamber model and engineer's design. Refer to Table 6 on page 20 and engineer's drawings.







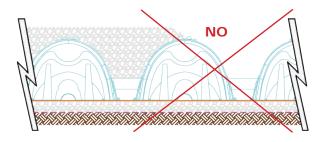
Do not allow equipment to drive over the chambers unless the minimum cover as shown in Table 6, page 20 is in place. Use a warning tape (available from CULTEC) to restrict access.

Repeat steps until the last chamber is in place. Be certain to use the Model E to end the line of chambers as specified by the drawings.

If a manifold system is designed on the back end of the chamber bed, follow manifold installation instructions as described previously.

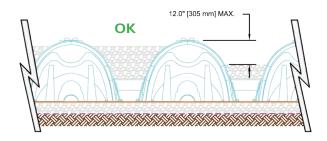
Stone column height differential should never exceed 12 inches (300 mm) with adjacent chambers or between chamber rows and perimeter. Minimum depth of cover of properly compacted material must be met before allowing vehicles to drive over the bed. Avoid using large rocks and/or organic matter as backfill material. See Table 5, page 20 for acceptable cover materials, or contact the design engineer for approved fill types.





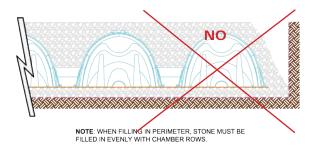
NOTE: CHAMBERS MUST BE BACKFILLED EVENLY.

UNEVEN BACKFILL - INCORRECT INSTALLATION



NOTE: STONE HEIGHT IN BETWEEN ROWS AND PERIMETER SHOULD NOT DIFFER BY MORE THAN 12" (300 mm).

EVEN BACKFILL - CORRECT INSTALLATION



PERIMETER NOT FULLY BACKFILLED INCORRECT INSTALLATION



NOTE: PERIMETER MUST BE FULLY BACKFILLED WITH STONE AND EXTEND TO THE EXCAVATION WALL.

PERIMETER FULLY BACKFILLED CORRECT INSTALLATION



Placement of Top Fabric Layer & System Backfill Process

- Place the stone over the entire bed area as described in previous section (See Item 2 in Fig. 1, page 21) per engineer's depth specifications.
- Cover the entire installation area with CULTEC No. 410 non-woven geotextile, starting from the perimeter and laying it atop the stone. The geotextile must overlap at least 24 inches (610 mm) at the edges.
- Fill the first 12 inches (305 mm) with enough material (See 3 in Fig. 1, page 21) to meet the requirements as shown in Table 5, page 20.
- Backfill over the top of the geotextile (See 3 in Fig. 1, page 21) in lifts that do not exceed 6 inches (152 mm), and disperse the fill with a vehicle that meets the maximum wheel loads or ground pressure limits as specified in Tables 1 & 2 on page 18.
- Compact each lift of backfill as specified in the engineer's drawings. CULTEC specifies compacting to a minimum of 95% of the standard proctor density using compaction equipment with a gross vehicle weight of less than of 12,000 lbs (5,400 kg). The use of vibratory equipment is strictly prohibited and will void any warranties.
- Backfill over the chamber bed (See 4 in Fig. 1, page 21) in 6-inch (152 mm) maximum lifts until the specified grade is achieved. CULTEC's cover requirements vary by model. See Table 3, page 19 for minimum and maximum coverage. For pavement sub-base or special fill requirements, see engineer's drawings.

NOTE:

Excavation alongside already installed chamber rows backfilled with stone is not acceptable. No chambers may be added or subtracted from previously installed systems.





Table 1: Maximum allowable axle loads for wheeled vehicles at various cover depths

| | Fill Depth C | Max. Axle Load | | |
|--|---|---|--------|-------|
| | inches | mm | lbs | kN |
| All Models | 6 | 152 | 8,000 | 35.6 |
| All Models | 9 | 305 | 16,000 | 71.2 |
| Contactor® Field Drain C-4HD | 14" with pavement 18" without pavement | 356 mm with pavement 457 mm without pavement | 40,000 | 177.9 |
| Contactor® 100HD Recharger® 150XLHD Recharger® 180HD Recharger® 280HD | 14" with pavement 16" without pavement | 356 mm with pavement 406 mm without pavement | 40,000 | 177.9 |
| Recharger® 330XLHD | 16" with pavement 18" without pavement | 406 mm with pavement 457 mm without pavement | 40,000 | 177.9 |

Any load which travels over the system that exceeds the maximum load allowed is strictly prohibited and will void the warranty.

All depths listed above are based on compacted fill and include min. 6" (152 mm) of stone above the crown of the unit as listed as 3 of Fig. 1, page 21.

Table 2: Maximum allowable ground pressures for various vehicle track widths and fill depths

| Fill Depth Ov | Fill Depth Over Chamber | | Track Width | | d Pressure ² |
|---------------|-------------------------|----------------------------|---------------------------------|-------------------------------------|----------------------------|
| inches | mm | inches | mm | PSF | kPa |
| 6 | 152 | 12 18 24 30 36 | 305 457 610 762 914 | 1070 900 800 760 720 | 51 43 38 36 34 |
| 12 | 305 | 12 18 24 30 36 | 305 457 610 762 914 | 1540 1190 1010 910 840 | 74 57 48 43 40 |
| 18 | 457 | 12 18 24 30 36 | 305 457 610 762 914 | 2010 1480 1220 1060 950 | 96 71 58 51 45 |

² Ground pressure is vehicle operating weight divided by total truck contact area for both tracks. Turning should be kept to a minimum.

The use of wheeled equipment without proper cover is strictly prohibited.





Table 3: CULTEC No. 410™ Non-Woven Geotextile Specification Information

| Properties | Test Method | Test Results |
|----------------|-------------|-----------------------|
| Appearance | | Black |
| Grab Tensile | D 4632 | 90 lbs |
| Grab rensile | D 4032 | 400 N |
| Elongation | D 4632 | 50% |
| Trapezoid Tear | D 4533 | 35 lbs |
| Trapezoid Teal | D 4555 | 155 N |
| Puncture | D 4833 | 55 lbs |
| Puncture | D 4633 | 245 N |
| Mullen Burst | D 3786 | 175 psi |
| Mulleri Buist | ט אינט ט | 1205 kPa |
| AOS | D 4751 | 70 U.S. sieve |
| A05 | D 4751 | .21 mm |
| Permittivity | D 4491 | 2.0 sec ⁻¹ |
| Permeability | D 4491 | .2 cm/sec |
| Water Flow | D 4491 | 145 gal/min/sf |
| water Flow | D 4491 | 5908 I/min/sq.m |
| UV Stability | D 4355 | 70% |

Substitutions must meet or exceed these minimums.

Geotextile placement is mandatory over top and sides of system. Coverage of system bottom is recommended. However, follow engineer's design preference.







Table 4: Criteria for acceptable 1 - 2 inch (25 - 51 mm) washed, crushed, angular stone

| Washed Crushed Stone | Description | Criteria | | | | |
|----------------------|-------------|---|--|--|--|--|
| Acceptable | Angular | Stones have sharp edges and relatively plane sides with unpolished surfaces | | | | |
| Acceptable | Subangular | Stones are similar to angular description but may have slightly rounded edges | | | | |
| Unacceptable | Subrounded | Stones have nearly plane sides but have well-rounded corners are edges | | | | |
| | Rounded | Stones have smoothly curved sides and no edges | | | | |

See 1 and 2 of Table 5 on page 20 for additional stone requirements.



Table 5: Acceptable Fill Materials

| | Material Location | Description | AASHTO M43 Classification | Compaction/ Density Requirement | |
|---|--|--|---|---|--|
| 1 | Foundation Stone below chambers per engineer's drawing 6" (152 mm) min. required for most models. | Washed, crushed stone with the majority of particles between 1" - 2" (25 - 51 mm) | 3, 4 | Plate compact or roll to achieve a 95% Standard Proctor density | |
| 2 | Embedment Stone surrounding chambers and to a min. 6" (152 mm) elevation above chamber crown for most models. | Washed, crushed stone with the majority of particles between 1" - 2" (25 - 51 mm) | 3, 4 | No compaction required | |
| 3 | Fill Material for Layer 3 starts from top of embedment stone (Layer 2) to minimum required depth above top of chamber. Refer to Table 6 page 20 for proper minimum fill requirements. | Granular well-graded soil/aggregate mixtures, <35% fines | 3, 4, 5, 6, 7, 8, 9, 10, 56, 57, 67, 68, 78, 89, 467 | Compact in 6" (152 mm) lifts to a minimum 95% Standard Proc- tor density. Roller gross vehicle weight not to exceed 12,000 lbs. (53 kN) Dynamic force not to exceed 20,000 lbs. (89 kN) | |
| 4 | Fill Material for Layer 4 starts from the top of Layer 3 to the bottom of pavement or unpaved finished grade above. Refer to Table 6 page 20 for proper chamber model minimum fill requirements. | Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements. | Per engineer's drawings | Prepare per engineer's drawing. Paved installations may have strict material and preparation requirements | |

The listed AASHTO classifications are for gradations. The stone must be washed, crushed and angular. See Table 6, page 20. For example, the stone must be specified as washed, crushed No. 4 stone. Fill materials shall be free of debris, trash, frozen lumps and other deleterious matter. Contact CULTEC for gradation requirements for specific projects that do not fall within the above specifications.

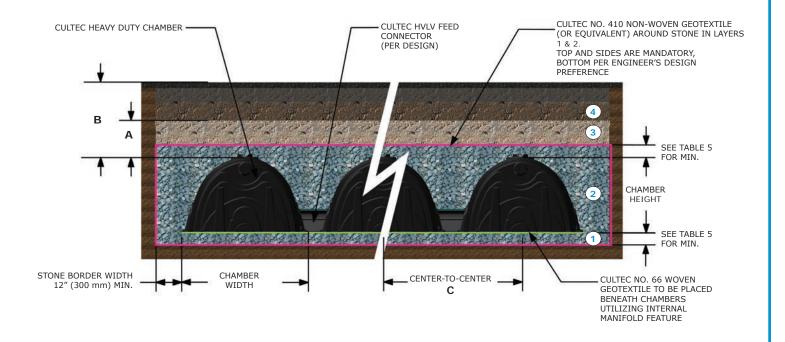
Table 6: Minimum and Maximum Fill and Separation Requirements for Traffic Installations (See Fig. 1 on page 21)

| | А | | | B Maximum Fill Requirements | | C Center-to-Center Separation Requirement | | |
|------------------------------|------------------------------|--------------------|--------------------------|-----------------------------------|------|---|--------|------|
| Model | Minimum Fill Requirements | | | | | | | |
| | For Paved inches | For Paved mm | For Unpaved inches | For Unpaved mm | feet | m | inches | mm |
| Contactor® Field Drain C-4HD | 14 | 356 | 16 | 406 | 12 | 3.66 | 48 | 1219 |
| Contactor® 100HD | 14 | 356 | 16 | 406 | 12 | 3.66 | 40 | 1016 |
| Recharger® 150XLHD | 14 | 356 | 16 | 406 | 12 | 3.66 | 39 | 991 |
| Recharger® 180HD | 14 | 356 | 16 | 406 | 12 | 3.66 | 39 | 991 |
| Recharger® 280HD | 14 | 356 | 16 | 406 | 12 | 3.66 | 52 | 1321 |
| Recharger® 330XLHD | 16 | 406 | 18 | 457 | 12 | 3.66 | 58 | 1473 |

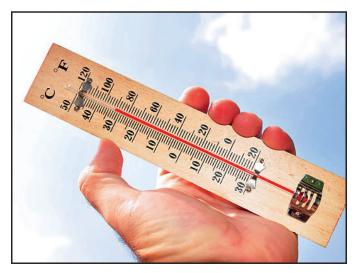
Refer to Table 4 on page 19, Table 5, page 20 and Fig. 1 on page 21 for acceptable fill requirements. Table refers to Heavy Duty version only, requirements differ for Standard Duty version. When fill requirements will exceed Maximum Fill Requirements listed above, contact CULTEC at 203-775-4416. All depths listed above are based on compacted fill and include the required stone above the crown of the unit.



Fig. 1. Fill Material Locations – refer to Tables 4, 5, and 6.



Special Handling Instructions for Polyethylene Chambers in Warmer Temperatures



CULTEC chambers are manufactured of high molecular weight polyethylene, which is inherently resistant to cold temperatures, corrosion and chemical breakdown. Additional UV inhibitors increase the chambers' resistance to sunlight and warm temperature degradation. However, CULTEC recommends that, when installed in warm temperatures above 85°F (29°C), the installer separate the units the day before installation and lay them on a flat surface (preferably not asphalt). This allows the chambers to cool and maintain their original shape as when formed. It is best practice to separate starters, intermediates and ends and lay them out individually and use those separated units rather than removing each off the stack individually. When possible, CULTEC recommends that the stone backfill be placed in temperatures less than 85°F (29°C) to minimize depressions or deflections. Also note that in sunny, warm temperatures, the chambers may be hot to the touch.

































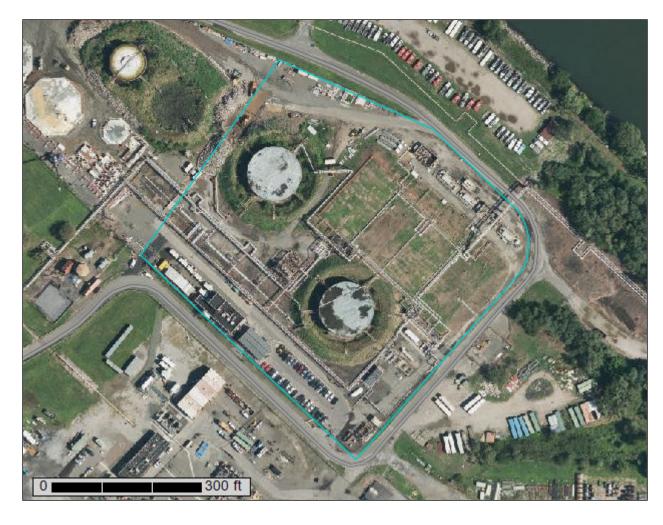
Appendix I – Soil Testing Data



NRCS

Natural Resources Conservation Service A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Queens County, New York



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2 053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

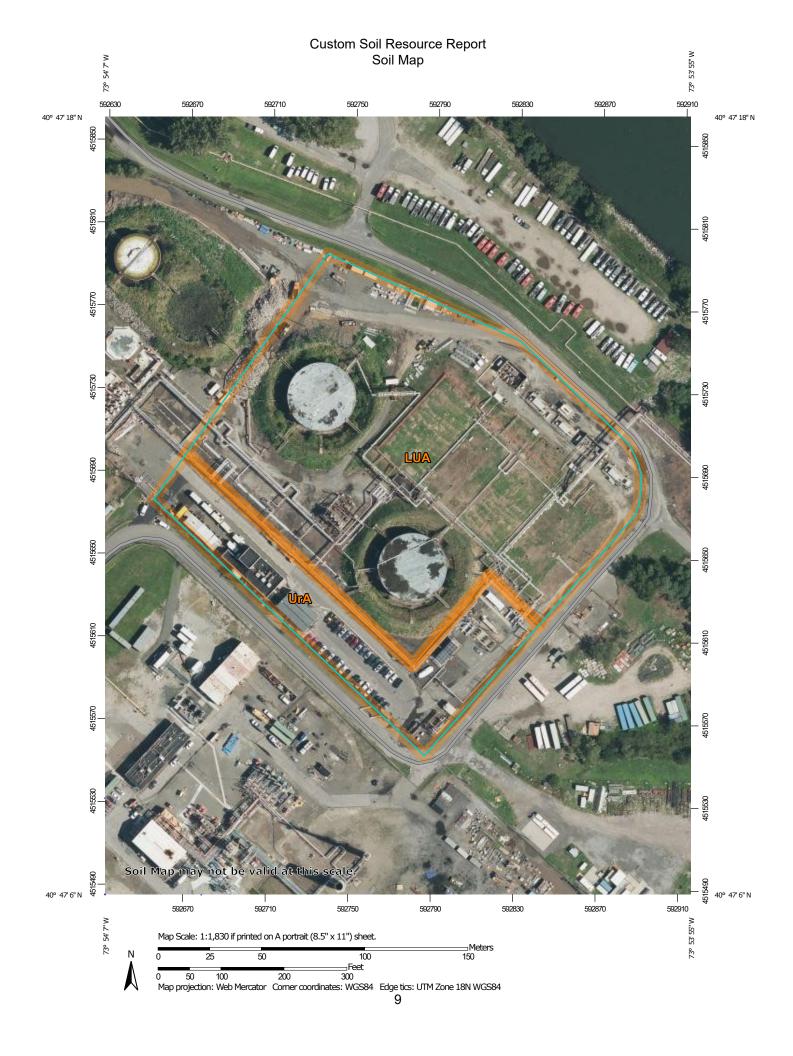
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

(o)

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Sodic Spot

Slide or Slip

Spoil Area

å

Stony Spot Very Stony Spot

Ŷ

Wet Spot

Δ

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

00

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12.000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Queens County, New York Survey Area Data: Version 12, Oct 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50.000 or larger.

Date(s) aerial images were photographed: May 12, 2020—Nov 4. 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|-----------------------------|---|--------------|----------------|
| LUA | Laguardia-Urban land complex, 0 to 3 percent slopes | 6.2 | 78.3% |
| UrA | Urban land, reclaimed substratum, 0 to 3 percent slopes | 1.7 | 21.7% |
| Totals for Area of Interest | | 7.9 | 100.0% |

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

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development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Queens County, New York

LUA—Laguardia-Urban land complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2qf9m

Elevation: 0 to 150 feet

Mean annual precipitation: 40 to 52 inches Mean annual air temperature: 47 to 62 degrees F

Frost-free period: 216 to 234 days

Farmland classification: Not prime farmland

Map Unit Composition

Laguardia and similar soils: 60 percent Urban land, till substratum: 25 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Laguardia

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Side slope, base slope, crest, dip, rise, talf

Down-slope shape: Concave, convex, linear Across-slope shape: Concave, linear, convex

Parent material: Loamy-skeletal human-transported material

Typical profile

^Au - 0 to 8 inches: cobbly-artifactual coarse sandy loam

^BCu - 8 to 26 inches: very cobbly-artifactual coarse sandy loam ^Cu - 26 to 79 inches: very cobbly-artifactual coarse sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to

moderately high (0.01 to 1.42 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Calcium carbonate, maximum content: 19 percent

Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 1

Hydrologic Soil Group: C Hydric soil rating: No

Description of Urban Land, Till Substratum

Setting

Landform position (two-dimensional): Summit

Custom Soil Resource Report

Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Asphalt over human-transported material

Typical profile

M - 0 to 15 inches: cemented material 2[^]C - 15 to 79 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00

in/hr)

Calcium carbonate, maximum content: 10 percent

Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Greenbelt

Percent of map unit: 7 percent

Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, base slope, crest, talf

Down-slope shape: Convex, linear Across-slope shape: Convex, linear

Hydric soil rating: No

Ebbets

Percent of map unit: 7 percent

Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, base slope, crest, talf

Down-slope shape: Convex, linear Across-slope shape: Convex, linear

Hydric soil rating: No

Secaucus

Percent of map unit: 1 percent

Landform position (two-dimensional): Backslope Landform position (three-dimensional): Dip, talf

Down-slope shape: Linear Across-slope shape: Concave

Hydric soil rating: No

UrA—Urban land, reclaimed substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2qf9q

Elevation: 0 to 60 feet

Mean annual precipitation: 40 to 52 inches Mean annual air temperature: 47 to 62 degrees F

Frost-free period: 216 to 234 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land, reclaimed substratum: 92 percent

Minor components: 8 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land, Reclaimed Substratum

Setting

Landform position (two-dimensional): Summit Landform position (three-dimensional): Talf

Down-slope shape: Linear Across-slope shape: Linear

Parent material: Asphalt over human-transported material

Typical profile

M - 0 to 15 inches: cemented material 2^C - 15 to 79 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00

in/hr)

Calcium carbonate, maximum content: 10 percent

Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: Unranked

Minor Components

Laguardia

Percent of map unit: 5 percent

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Side slope, base slope, crest, dip, rise, talf

Custom Soil Resource Report

Down-slope shape: Concave, convex, linear Across-slope shape: Concave, linear, convex

Hydric soil rating: No

Centralpark

Percent of map unit: 1 percent

Landform position (two-dimensional): Summit Landform position (three-dimensional): Talf

Down-slope shape: Convex Across-slope shape: Convex

Hydric soil rating: No

Greenbelt

Percent of map unit: 1 percent

Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, base slope, crest, talf

Down-slope shape: Convex, linear Across-slope shape: Convex, linear

Hydric soil rating: No

Ebbets

Percent of map unit: 1 percent

Landform position (two-dimensional): Summit, backslope, footslope Landform position (three-dimensional): Side slope, base slope, crest, talf

Down-slope shape: Convex, linear Across-slope shape: Convex, linear

Hydric soil rating: No

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Champlain Hudson Power Express Astoria Converter Station Preliminary Geotechnical Engineering Report

Astoria Generating Station 18-01 20th Avenue Astoria, New York

July 22, 2022 File No. 41.0163020.00



PREPARED FOR:

Kiewit Engineering Group Inc.

GZA GeoEnvironmental of New York

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GEOTECHNICAL

ENVIRONMENTAL

ECOLOGICAL

WATER

CONSTRUCTION MANAGEMENT

104 West 29th Street 10th Floor New York, NY 10001 T: 212.594.8140 F: 212.279.8180 www.gza.com July 22, 2022 File No. 41.0263020.00

Ms. Elisabeth Kidane Kiewit Engineering Group Inc 470 Chestnut Ridge Rd Woodcliff Lake, NJ 07677

Re: Preliminary Geotechnical Engineering Report

Champlain Hudson Power Express Astoria Converter Station Astoria Generating Station, 30-15 11th Avenue, Astoria, New York

Dear Ms. Kidane:

GZA GeoEnvironmental of New York (GZA) is pleased to submit this preliminary geotechnical engineering report to Kiewit Engineering Group, Inc. (KEG/Client) for the Champlin Hudson Power Express (CHPE) Astoria Converter Station project in Astoria, Queens, New York. This preliminary geotechnical engineering report presents the results of our subsurface exploration and laboratory testing programs and provides our foundation design and construction recommendations for the proposed project. An updated/amended report will be provided upon completion of the supplemental subsurface exploration after the demolishing of the existing structures and equipment at the site.

The work described herein was performed in accordance with the Master Services Agreement MSA No: MSA 2021- GZA GeoEnvironmental Inc. between GZA and Kiewit Engineering Group Inc., executed on May 5, 2021 and Task Order DS_1, issued on April 27, 2022.

We appreciate the opportunity to work with you on this project. Please contact us if you should have any questions regarding the contents of this report.

Very truly yours,

GZA GEOENVIRONMENTAL OF NEW YORK

Dharmil S. Patel, P.E.

Project Manager

Muktar H. Khatari, P.E.

Vice President

Consultant Reviewer



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1.0 INTRODUCTION

This preliminary geotechnical engineering report presents the results of GZA's subsurface exploration and laboratory testing program for the proposed CHPE Astoria Converter Station, located in Astoria, Queens, New York. Our services were performed in accordance with the Master Services Agreement MSA No: MSA 2021- GZA GeoEnvironmental Inc. between GZA and Kiewit Engineering Group Inc., executed on May 5, 2021 and Task Order DS_1, issued on April 27, 2022.

The findings and recommendations of this report are subject to the limitations presented in **Appendix A**.

The objectives of our services were to explore the subsurface conditions at selected locations at the Site, make engineering evaluations of the conditions observed, and provide geotechnical engineering recommendations regarding the design and construction of foundations and earthwork for the project.

To accomplish our objectives, GZA undertook the following scope of services:

- Coordinated and executed a preliminary subsurface exploration program, which included advancing 19 test borings with rock coring at selected locations, scanning boring locations for subsurface utilities with ground penetrating radar (GPR), containing the investigation-derived wastes (IDW) in steel drums, and surveying of the boring locations and elevations.
- Provided field engineering and observation of the subsurface exploration program, which included boring layout, coordination with subcontractors, and logging of the borings
- Executed a soil laboratory testing program
- Performed geotechnical engineering analyses and developed foundation design and construction recommendations based on the subsurface information obtained during the exploration and laboratory testing programs
- Prepared this preliminary geotechnical engineering report summarizing our findings and recommendations

Recommendations presented herein are in accordance with the *Technical Specification Geotechnical Investigation, No. 20026103-GT-SPC-0001 – REV A, dated March 1, 2022,* and the 2014 New York City Building Code (NYCBC), and pursuant to our discussions. Elevations in this report are referenced to the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted.

2.0 SITE AND PROJECT DESCRIPTION

2.1 SITE LOCATION

The project site is located at 30-15 11th Avenue in Astoria, Queens, New York within the northeast section of the Astoria Generating Company, L.P. property. The proposed site is approximately 7.84 acres and is bounded by 12th Ave to the south, 30th Street to the east, 11th Ave to the north, and the Astoria Generation Station Fuel Oil Tank Farm to the west. The East River shoreline is approximately 250 feet north of the site and Luyster Creek is approximately 100 feet east of the site. A Site Location Plan has been included as **Figure 1**.

2.2 SITE DESCRIPTION

The site is occupied by two above ground tanks identified as Tank 3 and 4, four earth covered tanks, mechanical equipment pads, gravel access roads, multiple abandoned support building, and paved parking area. Current site grades vary from





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approximately El 9 ft to El 13 ft, with some high points around the tank structures. At the time of preparing this report it is our understanding that the all the existing site features are under demolition by the Owner (Transmission Developers, Inc./TDI) and that upon completion of demolition the site will be excavated to remove contaminated soil and backfilled up to an elevation that will meet the existing perimeter elevation of the site, which ranges from an elevation of about 10 ft at the southwest corner to an elevation of about 12 to 13 ft along the east and west property line. At the time of preparing this report the depth of excavation to remove and replace the existing soils is not known.

2.3 PROPOSED DEVELOPMENT

Our understanding of the proposed development is based on information provided by the project team via weekly meetings and email correspondence and coordination with Civil/Structural/Architectural and Construction team.

The proposed development of the CHPE Astoria Converter Station includes an AC Switchyard Area, Transformers, Converter building which includes the Reactor Hall, Valve Hall, and DC Hall, Service Building, Relay Building, Storage Buildings, Diesel Generators, Water Tanks, MVS Buildings, and auxiliary transformers. Access roads are proposed around the facility as well as a 5-foot-high retaining wall along majority of the perimeter of the development excluding portions along the northwest and northeast limits of the site. Two retaining walls are also proposed within the site, one southwest of the AC Area and the other northeast of the converter building. The proposed retaining walls are anticipated to be approximately 5-foot-high. The anticipated maximum column loads for the main buildings are approximately 500 kips. We understand that the proposed site design will be dictated by the finish floor elevation of El 15.5. Based on existing surface elevations at the site, backfilling of up to about 6 ft. is expected at the site. Based on our conversation with KEG, TDI is to demolish the existing site features and excavate existing contaminated soils and replace with clean soils to about elevation 11 ft to match the existing perimeter elevations of the site prior to construction of the converter station facility.

2.4 HISTORIC TOPOGRAPHIC MAPS AND AERIAL IMAGERY

We reviewed historic United States Geological Survey (USGS) topographic maps of the CHPE Astoria Converter Station site for the years 1897, 1898, 1900, 1947, 1949, 1956, 1966, 1995, 2011, 2013, and 2016. The 1897 to 1949 maps show that the CHPE Astoria Converter Station site was man made in the East River excluding the northeast corner of the site. The 1956 map shows that the site has been filled and incorporated into the power station. Site ground surface elevations vary from about sea level to El 12 ft in the 1949 and 1956 maps (Mean Sea Level datum). The 1966 topographic map and more recent maps depict topographic conditions that appear to be similar to current site conditions.

We reviewed historic aerial imagery of the CHPE Astoria Converter Station site. Images from 1954 to present day show the site as a flat, gravel covered area.

2.5 REGIONAL GEOLOGY

Based on a review of published regional geology information, including *Subsurface Geology and Paleogeography of Queens County, Long Island New York,* by Soren (1978), the site is underlain by unconsolidated sediments of Late Cretaceous and Pleistocene pre-Sangamon and Sangamon ages that are underlain by Precambrian age bedrock of the Raritan Formation. The bedrock consists of complexly folded and faulted gneisses and schists. The strike of the bedrock surface in Queens County is typically about N 50° E, and the surface generally dips to the southeast at an angle of about 52 minutes.

The Upper Pleistocene deposits are generally composed of glacial-drift material such as glacial till, lacustrine deposits, and outwash sand and gravel. The coarse-grained deposits and till often contain fragments of igneous, metamorphic, and sedimentary rocks. The Upper Pleistocene deposits also contain fossil plant material, varying in stages from fairly fresh in appearance to Peat.





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2.6 **SEISMIC SETTING**

For sites east of the Rocky Mountains, the USGS Active Faults Map (USGS, 2010) indicates seismic zones rather than identifying particular faults as active. In accordance with the USGS Active Faults Map, the Site is not located within an identified active seismic zone.

2.7 FLOOD ZONE SETTING

Based on a preliminary review of the Federal Emergency Management Administration (FEMA), the CHPE Astoria Converter Station Facility appears to be in preliminary flood zone AE, with a Base Flood Elevation (BFE) of 13 ft. A FEMA flood zone map has been included as **Figure 2**.

2.8 PREVIOUS SUBSURFACE EXPLORATION

GZA drilled 11 borings and installed two piezometers in 2008 at the Astoria Power Plant, approximately one-half mile east of the site, across Luyster Creek, as well as advancing 7 borings in 2009 about 1,000 feet southeast of the site for a transmission line project. GZA also drilled 11 borings in 2019 about 250 feet northwest of the site for the Fuel Oil Tank Farm Conversion project. We reviewed the subsurface information and laboratory test data collected from the prior studies and considered the applicable data during the analyses performed for the CHPE project.

3.0 SUBSURFACE EXPLORATION AND LABORATORY TESTING PROGRAM

GZA conducted a subsurface exploration and laboratory testing program for the project. The subsurface exploration consisted of 18 test borings with rock coring at selected locations, Five Seismic Cone Penetrometer Test's (SCPT's), and geotechnical laboratory testing of selected soil samples.

Exploration locations were marked in the field using a Trimble GeoExplorer handheld sub-meter GPS unit. The as-drilled boring locations and ground surface elevations were surveyed by DPK Consulting, LLC, of Piscataway, New Jersey, and are provided in **Appendix E**. The exploration methods are discussed below.

3.1 TEST BORINGS

Craig Geotechnical Drilling Co. Inc (Craig), of Mays Landing, New Jersey was retained to advance 18 test borings at the site. Prior to beginning the subsurface exploration program, on April 5, 2022, Craig scanned a 10-foot radius around each boring location with Ground Penetrating Radar (GPR) to check for the presence of potential subsurface utilities and underground obstructions. The locations of any utilities and/or obstructions were noted in the field.

Craig advanced the test borings under the observation of our field representatives between April 9 and April 24, 2022. Test boring locations were cleared for utilities using a vacuum truck for the upper 4 feet in a 10-ft triangular pattern around the test location and the boring were performed in the center of the triangular pattern. The borings were advanced using ATV-mounted drill rig with wash rotary drilling techniques and metal casing to stabilize the boreholes. The completed boring depths varied from about 33.5 to 81.1 feet below the ground surface. Soil samples were visually classified in the field and described in accordance with the Modified Burmister Classification System. Standard Penetration Tests (SPT) were performed at two-foot intervals during drilling within the top 16 feet of each boring and at five-foot intervals thereafter in general accordance with ASTM D-1586. A 140-pound automatic hammer was used to drive the split-spoon sampler for each SPT. The number of hammer blows required to drive the split-spoon sampler from 6- to 18-inches is the SPT N-value, a commonly used indicator of soil density and consistency. The hammer blows, N-values, and Modified



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Burmister description are recorded on the boring logs for each sample as well as the NYCBC Class of Materials for each stratum.

A pocket penetrometer was used on split-spoon samples of cohesive soils. Pocket penetrometer measured strengths are reported as unconfined compressive strength in tons per square foot (tsf). The pocket penetrometer tests represent index values that provide data for classification and consistency of cohesive soil and are included on the boring logs.

The split-spoon soil samples were screened in the field for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6 eV lamp calibrated to a 100-ppm isobutylene in air standard. PID readings are reported on the boring logs in parts per million (ppm).

Rock coring was performed at test boring locations GZ-01, GZ-03, GZ-05, GZ-20, GZ-33, GZ-35, GZ-37, GZ-40, GZ-41 and GZ-43, using a double-tube NQ-sized rock core barrel. Recovered rock cores were described using the Modified International Society for Rock Mechanics (ISRM) System. The rock description, the amount of rock core sample recovery (REC), and the Rock Quality Designation (RQD) are recorded on the test boring logs, as well as the NYCBC Class of Material for each core run. The rock descriptions, REC values, and RQD values provide a qualitative understanding of the physical and engineering properties of the rock. The RQD for each run is calculated as the summation of intact core pieces 4-inches or more in length divided by the total length of the core run.

Completed boreholes were left open overnight to observe groundwater levels. Groundwater depths were measured from open boreholes and then backfilled with grout. The measured groundwater depths are recorded on the boring logs.

Investigation derived wastes (IDW), including soil cuttings and drilling fluids, were contained in 55-gallon steel drums. Our drilling subcontractor transported the drums to a designated area within the plant at the completion of the drilling program. Neither environmental testing of IDW nor disposal of IDW were included in our scope of services.

The approximate boring locations are shown on **Figure 3**. The boring logs, Boring Log Key, and photos of the rock cores are provided in **Appendix B**.

3.2 SEISMIC CONE PENETROMETER TESTING

Craig of Mays Landing, New Jersey performed five SCPT soundings at the Site. The SCPT's were conducted to depths ranging from approximately 22.51 to 44.23 feet and were advanced using a 20-ton truck-mounted cone penetration rig. As the cone was advanced below the ground surface, the tip resistance, sleeve friction and dynamic pore water pressure were recorded at approximately 2-inch intervals. Shear wave velocity measurements were taken at approximately 3 feet intervals in SCPT soundings SCPT-GZ-01, SCPT-GZ-05, SCP-GZ-20, SCPT-GZ-38. The Craig data report, including the results of the soundings and shear wave velocity testing is included in **Appendix C**. The approximate SCPT sounding locations are shown on **Figure 2**.

4.0 GEOTECHNICAL LABORATORY TESTING PROGRAM

Selected soil and rock core samples were sent to Thielsch Engineering, of Cranston, Rhode Island to perform geotechnical laboratory testing to check our field classifications and provide data on the material properties of soil and bedrock. The geotechnical laboratory testing program included the following:

- 3 Water Content Tests, ASTM D2216
- 6 Liquid Limit and Plastic Limit Tests, ASTM D4318

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- 11 Grain Size Analysis (sieve only) Tests, ASTM D6913
- 3 Organic Content of Soil Tests, ASTM D2974
- 5 Corrosivity Suite, including pH, Chloride Content, Sulfide Content, Sulfate Content and Redox Potential
- 11 Soil Electrical Resistivity Tests using the 4-Pole Werner Method, ASTM G57
- 2 Unconfined Compressive Strength of Rock Tests, ASTM D7012

The testing program provided data used in the development of our geotechnical engineering recommendations. The laboratory test results are summarized below. The test results have been included in **Appendix D**.

4.1 LABORATORY TESTING RESULTS

Index Testing

The results of the index tests have been incorporated into the subsurface conditions section of this report and are reflected in the applicable descriptions on the boring logs contained in **Appendix B**.

Liquid/Plastic Limits and Organic Content Testing

Organic content, liquid limits and moisture content test results are provided in the following table.

Organic Content Testing Summary

| Boring | Sample | | Moisture | | Plastic Limit | Organic |
|--------|------------|---------------|-------------|------------------|---------------|-------------|
| Number | Depth (ft) | Stratum | Content (%) | Liquid Limit (%) | (%) | Content (%) |
| GZ-01 | 65 – 67 | Clay and Silt | 31.4 | 30 | 22 | - |
| GZ-01 | 70 – 72 | Clay and Silt | 25.5 | 39 | 29 | - |
| GZ-37 | 12 – 14 | Clay | 36.3 | 34 | 19 | - |
| GZ-41 | 10 – 12 | Organic Silt | 124.8% | 143 | 58 | 14.0 |
| GZ-41 | 14 – 16 | Organic Silt | - | - | - | 1.5 |
| GZ-41 | 20 – 22 | Organic Silt | - | - | - | 4.9 |

Soil Electrical Resistivity Testing

The table below summarizes the electrical resistivity testing results.

Electrical Resistivity Testing Summary

| Licetrical Resistivity resting Summary | | | | | | |
|--|----------------------|------------|---|---|--|--|
| Boring Number | Sample Depth (ft) | Stratum | Electrical Resistivity As Received (Ohm-cm) | Electrical Resistivity Saturated (Ohm-cm) | | |
| GZ-04 | 6 – 8 | Fill | 3,270 | 3,140 | | |
| GZ-05 | 25 – 27 | Lower Sand | 8,910 | 8,680 | | |
| GZ-29 | 4 – 6 | Fill | 10,100 | 9,270 | | |
| GZ-29 | 12 – 14 | Fill | 18,400 | 15,300 | | |
| GZ-29 | 25 – 27 | Lower Sand | 11,500 | 9,920 | | |
| GZ-33 | 6 – 8 | Fill | 6,450 | 6,350 | | |
| GZ-33 | 30 – 32 | Gravel | 8,910 | 8,680 | | |
| GZ-37 | 12 – 14 | Clay | 1,210 | 1,120 | | |
| GZ-37 | 25 – 27 | Upper Sand | 2,710 | 2,460 | | |



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Corrosion Potential Testing

Corrosion Potential Testing Summary

| | Corrosion Fotential Testing Summary | | | | | | | |
|------------|-------------------------------------|------------|-------------|---------|----------|---------|----------------|------|
| | Sample | | Resistivity | Sulfate | Chloride | Sulfide | Redox | |
| Boring ID | Depth (ft) | Stratum | (ohm – cm) | (ppm) | (ppm) | (ppm) | Potential (mv) | рН |
| GZ-04 | 6 – 8 | Fill | 3,270 | 17 | 89 | ND | 104.3 | 5.89 |
| GZ-05 | 25 – 27 | Lower Sand | 8,910 | 26 | 27 | ND | 183.1 | 8.45 |
| GZ-29 | 4 – 6 | Fill | 10,100 | 8 | 22 | ND | 254.9 | 6.6 |
| GZ-33 | 6-8 | Fill | 6,450 | 78 | ND | ND | 228.5 | 7.97 |
| ND = Not D | ND = Not Detected | | | | | | | |

5.0 SUBSURFACE CONDITIONS

5.1 GENERALIZED SOIL STRATIGRAPHY

Based on the results of the exploration program, the generalized subsurface stratigraphy at the site consists of the following strata, in order of increasing depth:

- <u>Surface Cover Materials</u>: The borings generally encountered approximately 1- to 2-inches of gravel. Borings GZ-19, GZ-40, GZ-41 and GZ-42 encountered approximately 2-inches of asphalt.
- <u>FILL (NYCBC 7)</u>: Below surface cover materials, about 7.8 to 23.4 feet (ft) of Fill was encountered in the borings, extending to approximately El. 8.9 ft to 22.7 ft. The Fill generally consisted of tan, gray, brown, and black fine to coarse sand and gravel with varying amounts of organic silt, organic clay and wood, concrete, brick, coal, and cinder fragments. Measured SPT N-values generally varied from about 1 to 68 blows per foot (bpf), with an average of 10 bpf, indicating medium dense soil. The Fill soils generally classify as GC, GM, SC, SM, OH and OL, according to the USCS.

The SCPT's indicated an average shear wave velocity of 696 feet per seconds (fps) in the Fill.

Photo Ionization Detector (PID) readings in the Fill ranged from 0.1 parts per million (ppm) to 381.1 ppm, from samples collected from between depth 0 feet to 16 feet in test borings GZ-01, GZ-02, GZ-03, GZ-04, GZ-05, GZ-15, GZ-19, GZ-35, GZ-37, GZ-39, GZ-40, GZ-41, GZ-42 and GZ-43.

• <u>CLAY (NYCBC 6)</u>: Test borings GZ-35, GZ-37, GZ-39, GZ-42 and GZ-43 encountered a Clay stratum beneath the fill material, approximately 6 ft to 11.5 ft thick, and extending to approximately El. -2.9 to 2.6. The Clay generally consisted of gray clay with up to 35 percent silt, 20 percent sand, 10 percent gravel, and varying amounts of roots and wood fragments. Measured SPT N-values generally varied from Weight of Hammer (WOH) to 7 bpf, with an average of 3 bpf, indicating soft soil. Pocket penetrometer readings ranged from 0.3 tons per square foot (tsf) to 1.7 tsf. Based on SCPT correlations the average Over Consolidation Ratio (OCR) of the stratum is 1.6. The Clay soils generally classify as CL and CH, according to the USCS.

Photo Ionization Detector (PID) readings in the Clay ranged from 0.8 ppm to 2.7 ppm, from samples collected between depths 8 feet to 16 feet in test borings GZ-35 and GZ-39.





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• ORGANIC SILT (NYCBC 6): Test boring GZ-41 encountered an Organic Silt stratum beneath the fill material, approximately 13.5 ft thick, and extending to approximately El. 1.3 ft. The Organic Silt generally consisted of dark gray silt with up to 10 percent sand, roots, and shell fragments. Measured SPT N-values generally varied from Weight of Rod (WOR) to 11 bpf, with an average of 6 bpf, indicating medium stiff soil. The Clay soils generally classify as MH and OH, according to the USCS.

Laboratory testing for three Organic Silt soil samples include organic contents of 1.5 percent to 14 percent. The measured moisture content for one sample from this stratum is 124.8 percent. Based on empirical relationships related to Atterberg Limits tests, the Organic Silt soils are anticipated to exhibit a high potential for moisture-related volume change (shrink/swell behavior).

• <u>UPPER SAND (NYCBC 3a/3b/6)</u>: Test borings GZ-01, GZ-03, GZ-04, GZ-05, GZ-19, GZ-20, GZ-33, GZ-35, GZ-37, GZ-38, GZ-40, and GZ-42 encountered an Upper Sand stratum beneath the Fill/Clay stratum, approximately 5.5 ft to 21.5 ft thick, and extending to approximately El. -14.1 ft to 2.3 ft. The Upper Sand generally consisted of tan, brown, and gray, fine to coarse sand, with up to about 50 percent Silt, and up to about 10 percent Gravel. Measured SPT N-values generally varied from WOR to 30 bpf, with an average of 6 bpf, indicating very loose soil. The Upper Sand soils generally classify as SM, according to the USCS.

The SCPT's indicated an average shear wave velocity of 585 fps in the Upper Sand.

Photo Ionization Detector (PID) readings in the Upper Sand ranged from 0.1 ppm to 0.4 ppm, from samples collected from 12 feet to 22 feet deep in test borings GZ-03 and GZ-19.

• LOWER SAND (NYCBC 3a/3b): A Lower Sand Stratum was encountered in the test borings beneath the Fill/Clay/Organic Silt/Upper Sand stratum, approximately 5 ft to 43 ft thick, and extending to approximately El. -21.7 ft to 10.8 ft. Test borings GZ-33 and GZ-40 did not encounter the Lower Sand stratum. The Lower Sand generally consisted of tan, brown, and gray, fine to coarse sand, with up to about 50 percent Silt, and up to about 10 percent Gravel. Measured SPT N-values generally varied from 11 to 70 bpf, with an average of 27 bpf, indicating medium dense soil. The Upper Sand soils generally classify as SM, according to the USCS.

The SCPT's indicated an average shear wave velocity of 961 fps in the Lower Sand.

- <u>CLAY AND SILT (NYCBC 4a/4b):</u> Test boring GZ-01 encountered a Clay and Silt Stratum beneath the Lower Sand stratum, approximately 10.5 ft thick, and extending to approximately El. -50.3 ft. The Clay and Silt generally consisted of green, brown, white and dark gray clay and silt with up to 35 percent sand. Measured SPT N-values generally varied from 26 to 46 bpf, with an average of 36 bpf, indicating hard soil. The Clay and Silt soils generally classify as ML and CL, according to the USCS.
- GRAVEL (NYCBC 2b/6): Test boring GZ-33 encountered a Gravel Stratum beneath the Upper Sand stratum, at approximately El. -10.9 ft. Test boring GZ-33 terminated in this stratum. The Gravel generally consisted of gray and white gravel with up to 35 percent sand and 10 percent silt. Measured SPT N-values generally varied from 6 to 20 bpf, with an average of 15 bpf, indicating medium dense soil. The Gravel soils generally classify as GP and GM, according to the USCS.



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• WEATHERED ROCK (NYCBC 1d): Weathered Rock was defined for this project as an intermediate material with an SPT N-value between 45 blows per foot and refusal exhibiting relic rock structure, or as rock that was cored but had an RQD value less than 35 percent. Weathered Rock was encountered at each test boring location, except for Borings GZ-33, GZ-35 and GZ-37. The table below summarizes the approximate depths and corresponding approximate elevations to top of weathered rock.

Estimated Depth and Elevation of Weathered Rock

| Boring | Approximate | Approximate Depth | Approximate | Approximate Thickness |
|--------------|----------------|---------------------|---------------------|-----------------------|
| Number | Ground Surface | to Top of Weathered | Elevation to Top of | of Weathered Rock |
| | Elevation (ft) | Rock (ft) | Weathered Rock (ft) | Layer (ft) |
| GZ-01 | 13.25 | 74.00 | -60.75 | 2.10 |
| GZ-02 | 12.74 | 44.00 | -31.26 | 1.10 |
| GZ-03 | 11.95 | 38.50 | -26.55 | 11.70 |
| GZ-04 | 11.83 | 38.50 | -26.67 | 1.60 |
| GZ-05 | 10.88 | 32.00 | -21.12 | 3.10 |
| GZ-15 | 22.79 | 55.00 | -32.21 | 2.00 |
| GZ-19 | 12.05 | 40.00 | -27.95 | 0.50 |
| GZ-20 | 12.25 | 43.50 | -31.25 | 6.50 |
| GZ-29 | 10.01 | 35.00 | -24.99 | 3.60 |
| GZ-33 | 12.61 | N/E | N/E | N/E |
| GZ-35 | 9.13 | N/E | N/E | N/E |
| GZ-37 | 10.56 | N/E | N/E | N/E |
| GZ-38 | 11.72 | 33.50 | -21.78 | 4.60 |
| GZ-39 | 11.27 | 47.50 | -36.23 | 2.60 |
| GZ-40 | 11.74 | N/E | N/E | N/E |
| GZ-41 | 11.27 | 33.50 | -22.23 | 2.00 |
| GZ-42 | 10.64 | 38.50 | -27.86 | 6.60 |
| GZ-43 | 9.48 | 30.00 | -20.52 | 3.00 |
| N/E = Not En | countered | | | |

• <u>BEDROCK (NYCBC 1a/1b/1c)</u>: Bedrock was generally identified by roller bit refusal and/or sampler refusal, and subsequent coring. The bedrock encountered at the site generally consisted of medium to hard, slightly to moderately weathered, slightly to moderately fractured Schist. Bedrock was encountered in all the selected test boring that were cored except GZ-33. The measured recoveries were between about 63 percent and 100 percent with measured RQD values between about 37 and 100 percent. The table below summarizes the approximate depths and corresponding approximate elevations to the top of bedrock.



| Boring | Approximate Ground Surface | Approximate Depth to Top | Approximate Elevation of Top |
|--------|----------------------------|-----------------------------|---------------------------------|
| Number | Elevation (ft) | of Bedrock (ft) | of Bedrock (ft) |
| GZ-01 | 13.25 | 76.10 | -62.85 |
| GZ-02* | 12.74 | 45.10 | -32.36 |
| GZ-03 | 11.95 | 50.20 | -38.25 |
| GZ-04* | 11.83 | 40.10 | -28.27 |
| GZ-05 | 10.88 | 35.10 | -24.22 |
| GZ-15* | 22.79 | 57.00 | -34.21 |
| GZ-19* | 12.05 | 40.50 | -28.45 |
| GZ-20 | 12.25 | 50.00 | -37.75 |
| GZ-29* | 10.01 | 38.60 | -28.59 |
| GZ-33 | 12.61 | N/E | N/E |
| GZ-35 | 9.13 | 34.00 | -24.87 |
| GZ-37 | 10.56 | 35.10 | -24.54 |
| GZ-38* | 11.72 | 38.10 | -26.38 |
| GZ-39* | 11.27 | 50.10 | -38.83 |
| GZ-40 | 11.74 | 35.00 | -23.26 |
| GZ-41 | 11.27 | 35.50 | -24.23 |
| GZ-42* | 10.64 | 45.10 | -34.46 |
| GZ-43 | 9.48 | 33.00 | -23.52 |

N/E = Not Encountered

Unconfined compressive strength testing and bulk density testing were performed on selected samples from the rock cores. The results of these tests are summarized in the table below.

Unconfined Compressive Strength of Rock Testing Summary

| Boring Number | Rock Type | Approximate Sample Depth (ft) | Approximate Sample Elevation (ft) | Unit Weight (pcf) | Compressive Strength (psi) |
|------------------|-----------|-------------------------------|--------------------------------------|----------------------|-------------------------------|
| GZ-03 | Schist | 50.2 - 55.2 | -38.3 to -43.3 | 169.2 | 9,040 |
| GZ-37 | Schist | 35.1 – 40.1 | -24.5 to -29.5 | 174.2 | 5,526 |

5.2 **GROUNDWATER**

Groundwater depths were measured in open boreholes at depths of about 3.1 to 9.0 feet below grade, corresponding to about El 3.3 ft to El 7.3 ft. The average measured groundwater depth was at about El 6.3 ft, or El. 5.2 ft. The measured depths were obtained approximately one to three days after completion of drilling, to allow for drilling mud to dissipate. The measured groundwater depths are summarized in the table below.

It should be noted that changes in groundwater elevation will occur due to variations in seasonal influences, tidal river levels, precipitation amounts, local pumping, surface runoff, utility leakage, and other factors different from those existing at the time the observations were made.

^{* =} Top of Bedrock determined by SPT spoon/roller bit refusal (no rock coring).





Measured Groundwater Depth and Elevation

| | | | rater beptil and Elev | Approximate | Approximate |
|---------------|------------|-----------------------|-----------------------|-------------|--------------|
| | | Approximate | Groundwater | Depth to | Elevation of |
| Boring | Completion | Ground Surface | Reading Date and | Groundwater | Groundwater |
| Number | Date | Elevation (ft) | Time | (ft) | (ft) |
| GZ-01 | 5/20/2022 | 13.25 | 5/23/2022 7:15 | 9.0 | 4.3 |
| SCPT-GZ-01 | 7/06/2022 | 13.3 | 7/06/2022 | 9.0 | 4.3 |
| GZ-02 | 5/13/2022 | 12.74 | 5/16/2022 7:20 | 7.2 | 5.5 |
| GZ-03 | 5/13/2022 | 11.95 | 5/16/2022 7:25 | 7.3 | 4.7 |
| GZ-04 | 5/12/2022 | 11.83 | 5/13/2022 7:10 | 7.5 | 4.3 |
| GZ-05 | 5/12/2022 | 10.88 | 5/13/2022 7:15 | 7.6 | 3.3 |
| SCPT-GZ-05 | 7/06/2022 | 10.9 | 7/06/2022 | 8.0 | 2.9 |
| GZ-19 | 5/11/2022 | 12.05 | 5/12/2022 7:07 | 7.0 | 5.1 |
| GZ-20 | 5/19/2022 | 12.25 | 5/20/2022 7:10 | 7.6 | 4.7 |
| SCPT-GZ-20 | 7/06/2022 | 12.3 | 7/06/2022 | 8.0 | 4.3 |
| GZ-29 | 5/18/2022 | 10.01 | 5/19/2022 7:30 | 4.0 | 6.0 |
| GZ-33 | 5/10/2022 | 12.61 | 5/11/2022 7:05 | 5.3 | 7.3 |
| GZ-35 | 5/23/2022 | 9.13 | 5/24/2022 8:10 | 3.1 | 6.0 |
| GZ-37 | 5/23/2022 | 10.56 | 5/24/2022 8:14 | 3.8 | 6.8 |
| SCPT-GZ-37 | 7/06/2022 | 10.5 | 7/06/2022 | 6.0 | 4.5 |
| GZ-38 | 5/9/2022 | 11.72 | 5/10/2022 7:10 | 4.7 | 7.0 |
| SCPT-GZ-38 | 7/06/2022 | 11.7 | 7/06/2022 | 8.0 | 3.7 |
| GZ-39 | 5/16/2022 | 11.27 | 5/18/2022 7:30 | 7.5 | 3.8 |
| GZ-40 | 5/11/2022 | 11.74 | 5/12/2022 7:10 | 7.2 | 4.5 |
| GZ-41 | 5/10/2022 | 11.27 | 5/11/2022 7:08 | 4.5 | 6.8 |
| GZ-42 | 5/9/2022 | 10.64 | 5/10/2022 7:12 | 7.0 | 3.6 |
| N/A = Not Obt | ained | | | | |

6.0 DESIGN SOIL PARAMETERS

The tables below provide the recommended design soil parameters for the project. The parameters were developed using the results of the subsurface exploration program and the soil laboratory testing program. Correlations between SPT and engineering properties provided in FHWA *Geotechnical Engineering Circular 5, Evaluation of Soil and Rock Properties* (FHWA 2002) were considered where applicable laboratory or in situ test results were not available. The value of the subgrade modulus, k, has been provided for lateral pile analysis considering the American Petroleum Institute (API) method for sand. The Clayey SILT and GRAVEL strata described in the *Generalized Subsurface Stratigraphy* section above have been omitted from the design soil profile due to the limited number of borings in which they were encountered.



6.1 GEOTECHNICAL DESIGN PARAMETERS

Recommended Design Soil Parameters

| | | | | Effective St Strength Pa | | Modulus of |
|----------------------------|-------------|-------------|------------|-----------------------------|--------------|-------------|
| | | Typical | Moist Unit | Friction | | Subgrade |
| | Approximate | Measured N- | Weight, γ | Angle, Ø' | Cohesion, c' | Reaction, k |
| Stratum | Depth (ft) | Value Range | (pcf) | (deg) | (psf) | (pci) |
| Fill | 0 – 18 | 1 – 68 | 115 | 28 | N/A | 50 |
| New/Structural Fill | N/A | N/A | 120 | 32 | N/A | 100 |
| Clay | 8 – 18 | 0 – 15 | 95 | N/A | 200 | 25 |
| Organic Silt | 10 – 23.5 | 1 – 11 | 95 | N/A | 200 | 25 |
| Upper Sand | 10 – 33.5 | 0 – 30 | 115 | 30 | 250 | 50 |
| Lower Sand | 12 – 55 | 11 – 70 | 125 | 32 | 350 | 150 |
| Clay and Silt | 63.5 – 74 | 26 – 46 | 110 | N/A | 2,500 | 150 |
| Weathered Rock | 29.5 – 76.1 | >100 | 135 | 36 | N/A | 250 |
| Bedrock | 33 – 76.1 | N/A | 175 | N/A | N/A | N/A |
| Note: N/A = Not Applicable | | | | | | |

6.2 <u>DESIGN GROUNDWATER</u>

Design of the CHPE Astoria Converter Station should use a design groundwater elevation of El 13 ft, considering the site location in FEMA flood zone AE.

7.0 FOUNDATION RECOMMENDATIONS

7.1 KEY GEOTECHNICAL ISSUES

The project site sits on man-made, backfilled land which had been part of the East River. The subsurface conditions encountered at the CHPE Astoria Converter Site generally consist of fill over loose to medium dense sands, underlain by weathered rock and bedrock, with the depth to the top of rock varying from about 33 to 76 feet below existing grade and varies between El. -23 and El. 63. Layers of organic silt and clay were encountered between the upper and lower sand stratums.

Historic structures may have been present at the project site in the past; foundations and other below-grade portions of those structures may still be present. The location and extent of historic structures is unknown but should be anticipated.

We detected fuel-like odors and recorded higher PID readings in some of the Fill and Upper Sand samples. Working with and disposing of environmentally contaminated soil will likely impact the schedule and project budget. For planning purposes, the Contractor should be prepared to test over-excavated soil for environmental contaminants prior to receiving approval for soil waste disposal facility acceptance. We understand that the owner is currently in the process of removing contaminated soils on site, but the depth of the soil removal is unknow at the time of preparing this report.

Proposed grading at the site will consist of fill placement of up to about 6 feet. Based on the presence of construction debris in the Fill and the potential for environmentally impacted on-site Fill soils, imported fill will likely be needed for site grading purposes. Fill placement is to be performed by the owner prior to site development.





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Based on our understanding of the subsurface conditions at the converter station site and the anticipated loading, we recommend supporting settlement sensitive structures and equipment with on deep foundations bearing in the Weathered Rock or Bedrock strata. Pursuant to the requirements of the *Technical Specification*, we have included deep foundation recommendations for driven steel H-piles as well steel pipe-piles. The lighter, ancillary structures could be supported on shallow foundations; however, to meet service limit settlement tolerance criteria and the requirements of the NYCBC, areas in which the foundation subgrade materials consist of fill may need to be over-excavated and replaced with newly compacted granular fill.

The following sections of the report provide our foundation design and construction recommendations, as well as recommendations associated with earthwork, pavement design, and groundwater control.

7.2 DEEP FOUNDATIONS

7.2.1 Driven Piles

We recommend supporting the more heavily-loaded and settlement-sensitive structures on driven steel H-pile or pipe pile foundations. The steel piles should be driven to refusal in the Weathered Rock or Rock stratum. We recommend an allowable design capacity of 80 tons for HP12x53 or 12.75-inch dia. x 0.5-inch (HSS12.75X0.5) pipe piles. The allowable axial design capacity of the pile will be governed by the requirements of the NYCBC, which specifies the maximum allowable pile load based on the type of pile and the anticipated bearing stratum. The NYCBC contains a provision which allows for the exceedance of the basic maximum allowable pile loads based on the results of a load testing program. Our design recommendations consider the NYCBC maximum pile load without considering the exceedance provision. If the pre-production test pile program is performed during design, the results of the load tests can be incorporated into our recommendations and serve as the basis for the allowable pile capacity used in design.

We anticipate difficult driving conditions through the Fill as well as in the Weathered Rock strata. Therefore, we recommend the use of steel driving tips to reduce the potential for damage during installation.

We recommend considering a minimum pile tip embedment of 5 feet into the decomposed rock for planning purposes to estimate pile lengths. Estimated pile tip elevations are presented in the table below. The estimated tip elevations provided below should be considered as preliminary and should be used for planning purposes only. During construction, the piles may encounter refusal at embedded depths of less than 5 feet. Pile tip elevation recommendations should be established based on an evaluation of the data from the control pile and load test programs discussed in the *Construction Recommendations* section of this report.



Estimated Pile Tip Elevations and Estimated Pile Lengths

| | | Estimated | Approximate | |
|----------------------|--------------------------|-----------------------|---------------------|----------------|
| Boring | Associated Building or | Ground Surface | Elevation of top of | Estimated Tip |
| Location | Structure | Elevation (ft) | Weathered Rock (ft) | Elevation (ft) |
| GZ-01 | Storage Building | 13.25 | -60.75 | -65.8 |
| GZ-02 | DC Hall | 12.74 | -31.26 | -36.3 |
| GZ-03 | DC Hall | 11.95 | -26.55 | -31.6 |
| GZ-04 | DC Hall | 11.83 | -26.67 | -31.7 |
| | MVS Buildings, Auxiliary | | | |
| | Transformers, & | | | |
| GZ-05 | Retaining Wall | 10.88 | -21.12 | -26.1 |
| GZ-15 | AC Area | 22.79 | -32.21 | -37.2 |
| | Service Building & | | | |
| GZ-19 | Retaining Wall | 12.05 | -27.95 | -33. |
| GZ-20 | AC Area | 12.25 | -31.25 | -36.3 |
| GZ-29 | AC Area | 10.01 | -24.99 | -30.0 |
| GZ-33 ⁽¹⁾ | Cooling Radiators | 12.61 | - | - |
| GZ-35 ⁽²⁾ | AC Area | 9.13 | - | -24.9 |
| GZ-37 ⁽²⁾ | Relay Building | 10.56 | - | -24.5 |
| GZ-38 | Fire Fighting Water Tank | 11.72 | -21.78 | -26.8 |
| GZ-39 | Retaining Wall | 11.27 | -36.23 | -41.2 |
| | Service Building & | | | |
| GZ-40 | Retaining Wall | 11.74 | - | -23.3 |
| GZ-41 | Retaining Wall | 11.27 | -22.23 | -27.2 |
| GZ-42 | Retaining Wall | 10.64 | -27.86 | -32.9 |
| GZ-43 | Retaining Wall | 9.48 | -20.52 | -25.5 |
| Notos | | | | |

Notes:

- 1. Boring was not advanced to weathered rock.
- 2. Weathered Rock not encountered. Pile anticipated to be bear on bedrock.

Settlement of steel piles driven to refusal in the Weathered Rock layer will be approximately equal to the elastic shortening of the piles plus a very small displacement at the top of the pile. Settlement at the top of similarly loaded end-bearing piles of different lengths will be approximately proportional to their lengths. For our evaluation of the elastic shortening of the piles, we considered the anticipated design pile lengths between 30 feet and 50 feet under an applied axial load of 80 tons. The anticipated settlement of HP 12 x 53 and 12.75-inch dia. x 0.5-inch steel piles under the allowable design loads is expected to be approximately ½ inch. Differential settlement is expected to be less than half of this value.

We recommend maintaining a minimum pile spacing of at least three pile widths to provide a group efficiency equal to at least one, with no corresponding loss in axial compressive capacity. With at least a three-pile width spacing, the capacity of the pile group should be at least equal to the individual pile capacity times the number of piles in the group. The capacity of a group with closer pile spacing will be lower and the associated reduction due to group effects should be evaluated based on the pile cap and pile dimensions. We do not recommend closer pile spacing. The project structural engineer will need to design an appropriate system for transferring the loads to the piles through the pile caps.

Piles driven to refusal in the Weathered Rock and/or Rock strata can be subject to downdrag forces; however, the magnitude of the downdrag forces will not result in pile failure or excessive deformation.



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Based on the corrosion laboratory results the on-site soils are not expected to be corrosive to steel elements. A protective coating does not need to be applied to steel H-piles or Pipe-piles installed at the Site.

7.2.1.1 Uplift Forces

The allowable uplift capacity of the driven steel piles will vary depending on the length of the pile. The estimated allowable uplift capacity of a 30-foot long and 50-foot-long piles are summarized in table below.

| Pile | Length of Pile (ft) | Allowable Uplift Capacity (Tons) |
|--------------|------------------------|----------------------------------|
| UD12vE2 | 30 | 11 |
| HP12x53 | 50 | 30 |
| UCC12 75v0 5 | 30 | 8 |
| HSS12.75x0.5 | 50 | 30 |

These values consider a factor of safety of three. A lower factor of safety may be used to estimate the allowable uplift capacity; however, the design uplift capacity would need to be verified through a tensile/uplift load testing program.

7.2.1.2 <u>Driven H-Pile and Pipe-Pile Lateral Pile Analysis</u>

We understand that the structural analysis for lateral loading of the proposed Astoria Converter Building has not yet been completed. We performed a preliminary lateral pile analysis using the computer program LPILE (v.2019) to estimate the lateral load-displacement relationships of a 40-foot long, HP 12 x 53 steel H-pile with load applied along the strong axis and weak axis and 12.75-inch dia. x 0.5-inch steel pile. We summarized the soil data into categories according to the subsurface stratigraphy and assigned strength properties based on the Design Soil Properties presented in this report.

Per the requirements of the New York City Building Code, the maximum pile deflection under "fixed-head" conditions is about 3/8-inch. In a "free-head" condition, the maximum allowable lateral load is one-half of the nominal load that deflects the pile 1-inch. The results of the lateral analyses are presented below. We considered both conditions with maximum pile head deflections for "fixed head" condition between 1/4-inch and 1-inch under the full axial design load of 80 tons. To maintain a group efficiency equal to at least one, with no corresponding loss in lateral capacity, a minimum center-to-center spacing of eight pile widths must be maintained. It is often unreasonable to maintain an eight-width spacing for foundation layout, requiring a lateral capacity reduction of the individual piles in the group. We accounted for group effects in our analyses by modeling a single pile with different soil-resistance factors (the p-y multiplier) based on pile spacing. We considered the lateral capacity of piles with a center-to-center spacing varying between three, five, and eight pile widths/diameters, representing a reduced lateral capacity and the full lateral capacity.

The results of the lateral analyses are summarized in the tables below. These values are nominal maximum capacity values that will need to be factored for structural loading conditions. The piles should be designed with sufficient embedment and connection detail to address the bending moment defined in the tables below.



Lateral Loading Summary for Driven H-Piles

| | Pile Center- | | Jillinary Tor Di | | | Maximum |
|------------------------|---------------|----------------|------------------|--------|--------------------|--------------|
| | to-Center | | | Axial | Maximum | Moment (ft- |
| | Spacing (Pile | Loading | Deflection | Load | Shear Load | kips) |
| Pile | Diameters) | Condition | (inches) | (Tons) | (kips) | (fixed-head) |
| | | | 0.25 | 80 | 16.3 | 75 |
| | | Fixed- | 0.375 | 80 | 22.3 | 106 |
| | | Head | 0.5 | 80 | 28.0 | 137 |
| | 3D | | 1.0 | 80 | 37.9 | 177 |
| | | | 0.25 | 80 | 3.1 ⁽¹⁾ | - |
| | | Free-Head | 1.0 | 80 | 8.3 | - |
| | | | 0.25 | 80 | 18.2 | 80 |
| | | Fixed- | 0.375 | 80 | 24.8 | 114 |
| HP12x53 | | Head | 0.5 | 80 | 31.0 | 146 |
| (Strong Axis) | 5D | | 1.0 | 80 | 40.6 | 177 |
| | | | 0.25 | 80 | 3.5 ⁽¹⁾ | - |
| | | Free-Head | 1.0 | 80 | 9.3 | - |
| | | | 0.25 | 80 | 19.3 | 83 |
| | | Fixed- | 0.375 | 80 | 26.4 | 119 |
| | | Head | 0.5 | 80 | 32.7 | 150 |
| | 8D | | 1.0 | 80 | 42.2 | 177 |
| | | Free-Head | 0.25 | 80 | 3.7 ⁽¹⁾ | - |
| | | | 1.0 | 80 | 9.9 | - |
| | 3D | Fixed- Head | 0.25 | 80 | 10.0 | 37 |
| | | | 0.375 | 80 | 13.5 | 52 |
| | | | 0.5 | 80 | 16.5 | 65 |
| | | | 1.0 | 80 | 22.7 | 89 |
| | | Free-Head | 0.25 | 80 | 1.9 ⁽¹⁾ | - |
| | | | 1.0 | 80 | 4.7 | - |
| | | Fixed- Head | 0.25 | 80 | 11.2 | 40 |
| | | | 0.375 | 80 | 15.0 | 56 |
| HP12x53 (Weak Axis) | | | 0.5 | 80 | 18.3 | 69 |
| | 5D | | 1.0 | 80 | 24.4 | 90 |
| | | E I I I | 0.25 | 80 | 2.1 ⁽¹⁾ | - |
| | | Free-Head | 1.0 | 80 | 5.3 | - |
| | 25 | | 0.25 | 80 | 12.0 | 41.9 |
| | | Fixed- Head | 0.375 | 80 | 15.9 | 58.2 |
| | | | 0.5 | 80 | 19.3 | 71.9 |
| | 8D | | 1.0 | 80 | 25.4 | 90.1 |
| | | | 0.25 | 80 | 2.3 ⁽¹⁾ | - |
| | | Free-Head | 1.0 | 80 | 5.6 | - |

Notes:

1. Maximum lateral load is one-half of the nominal load that deflects the pile 0.25-inchs.



Lateral Loading Summary for Driven Pipe-Piles

| | Pile Center- to-Center Spacing (Pile | Loading | Deflection | Axial Load | Maximum Shear Load | Maximum Moment (ft- kips) |
|-----------------------------|--|-----------|------------|---------------|-----------------------|---------------------------------|
| Pile | Diameters) | Condition | (inches) | (Tons) | (kips) | (fixed-head) |
| | • | Fixed- | 0.25 | 80 | 17.3 | 84 |
| | | | 0.375 | 80 | 23.0 | 114 |
| | 3D | Head | 0.5 | 80 | 27.3 | 135 |
| | טנ | | 1.0 | 80 | 27.3 | 149 |
| | | Free-Head | 0.25 | 80 | 3.2 ⁽²⁾ | - |
| | | | 1.0 | 80 | 7.0 | - |
| | 5D | Fixed- | 0.25 | 80 | 19.2 | 89 |
| | | | 0.375 | 80 | 25.3 | 120 |
| HSS12.75x0.5 ⁽¹⁾ | | Head | 0.5 | 80 | 29.7 | 139 |
| | | | 1.0 | 80 | 35.2 | 149 |
| | | Free-Head | 0.25 | 80 | 3.6 ⁽²⁾ | - |
| | | | 1.0 | 80 | 7.6 | - |
| | 8D | | 0.25 | 80 | 20.4 | 93 |
| | | Fixed- | 0.375 | 80 | 26.7 | 124 |
| | | Head | 0.5 | 80 | 31.1 | 141 |
| | | | 1.0 | 80 | 36.5 | 149 |
| | | Free-Head | 0.25 | 80 | 3.8 ⁽²⁾ | - |
| | | | 1.0 | 80 | 8.0 | - |

Notes:

- 1. Assuming the top 5 feet of pipe pile will be filled with concrete.
- 2. Maximum lateral load is one-half of the nominal load that deflects the pile 0.25-inchs.

The maximum allowable lateral load of a pile per the NYCBC is 1 ton (2 kips), unless verified in the field by a lateral load test. If horizontal loads greater than 1 ton will be exerted on the piles, the lateral pile capacity should be confirmed in the field by performing a load test in accordance with ASTM D3966 and the NYCBC. A minimum of two piles shall be load tested per pile type based on the footprint of the structure. Additional recommendations for pile load testing are provided in the Construction Considerations section of this report.

7.2.1.3 Driven Pile Spring Constants

Static pile spring stiffness constants for HP 12 x 53 H-pile and 12.75-inch dia. x 0.5-inch steel pipe pile are summarized in table below.

| Pile | Length of Pile (ft) | Axial Compressive Static Spring Stiffness (kips/inches) |
|--------------|------------------------|---|
| HP12x53 | 30 | 1240 |
| (80 tons) | 50 | 740 |
| HSS12.75x0.5 | 30 | 1100 |
| (80 tons) | 50 | 660 |

The shear pile stiffness will depend on the pile head fixity condition and the orientation of the weak/strong axis.





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7.2.1.4 Pile Group Uplift Capacity

The uplift capacity of a pile group is dependent on the number of piles in the group, the length of piles, cap thickness/dimensions, and soil conditions. In general, the uplift capacity is equal to the sum of the uplift capacity of the individual piles in the group.

7.3 SHALLOW FOUNDATIONS

We recommend supporting lightly loaded equipment and miscellaneous structures on shallow foundations consisting of shallow spread footings or mat foundations constructed in accordance with the NYCBC. The shallow foundations should be constructed to bear on new compacted granular fill placed after excavation and replacement of existing Fill soils and/or unsuitable natural soils. We recommend shallow foundations bearing on these materials be designed for a net allowable soil bearing pressure of 2,000 pounds per square foot (psf).

We expect most of the smaller equipment throughout the converter station will be supported on mat foundations or slabs. Mat foundations may be designed using a modulus of subgrade reaction of 100 pounds per cubic inch, referenced to a 1-foot by 1-foot plate area. The recommended modulus value is contingent on subgrade preparation work being performed as described in the *Construction Recommendations* section of this report.

The mat should be designed to resist hydrostatic uplift pressure with a factor of safety of at least 1.5. Considering the sites location in FEMA Flood Map Zone AE, the recommended design groundwater elevation is El 13 ft (NAVD 88). Resistance to uplift can be provided by thickening the base slab, by extending the mat slab beyond the limits of the structure/equipment considering both the weight of the concrete and the soil above the extended portion of the slab, and/or by using tiedown anchors.

We recommend that footings and mat bearing grades be at least 4 feet below the adjacent exterior grade for frost protection. Interior footings in heated building areas may be founded at nominal depths below floor slabs.

If unsuitable fill or soft/loose natural soils are encountered at the proposed shallow foundation bearing grades, we recommend over excavating to reach suitable subgrade soils, and replacing the over-excavated soil with new compacted granular fill. We recommend a maximum over-excavation and replacement depth of 3 feet. All over-excavations should extend laterally at least 12-inches beyond the footing or mat in all directions. Granular Fill should meet the gradation requirements outlined in Table 1 (included at the end of this report). If excavation sidewalls remain stable, over-excavated subgrades can be backfilled with 300 psi flowable fill or lean concrete in lieu of new granular fill. All excavated subgrades should be observed by the Geotechnical Engineer prior to placement of granular fill to evaluate whether subgrade materials are consistent with the requirements of this report.

We recommend an allowable coefficient of sliding friction of 0.4 for foundations bearing on native material or on new compacted granular fill. We recommend minimum factors of safety against sliding and overturning of 1.5 based on Service Loads and allowable bearing or friction factors.

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7.3.1 **Shallow Foundation Settlement**

Settlement estimates indicate that shallow foundations supported on properly placed compacted fill (raised grades) are not expected to exceed about 1 inch. The table below provides our estimate of total settlement of various mat foundation sizes.

| Mat Foundation Size | Approximate Settlement (inches) | | |
|---------------------|---------------------------------|--|--|
| 4 ft x 4 ft | ½-inch | | |
| 6 ft x 6 ft | ½-inch | | |
| 8 ft x 8 ft | ¾-inch | | |
| 10 x 10 ft | 1-inch | | |

These settlement values may be acceptable depending on the settlement tolerances of the structures/equipment being supported. Settlement magnitude estimates should be updated once the dimensions, locations, and loading have been determined. Flexible utility connections may be needed to address settlement concerns.

7.3.2 Foundations for Lighter Loads

To support lighter loads such as pipe supports, pile sleepers, and light poles (all structures which are not particularly sensitive to settlement), we recommend 30-inch diameter circular foundations. We have assumed a maximum service load at each foundation of 5 kips in axial compression and 1 kip in lateral force; uplift capacity was not required. The circular foundation should be constructed to bear on the suitable Fill soils. We recommend circular foundations bearing on these materials be designed for a net allowable soil bearing pressure of 2,000 pounds per square foot (psf). The steel reinforcement ratio of each circular foundation shall be greater than 1%.

We recommend that the bottom of each foundation should be at least 5 feet below the adjacent grade. Due to uncontrolled, erratic nature of the Fill stratum supporting the foundations, the anticipated settlement of 30-inch diameter circular foundation under the allowable design loads is expected to vary from less than about \%-inch to several inches. Periodic maintenance may be required, including adjustments with steel wedges or similar means to accommodate foundation settlement.

The lateral capacity for each isolated foundation is up to 1 kip, which is half of the force that is estimated to deflect the top of the foundation by 1 inch.

7.4 FLOOR SLAB SUPPORT

We recommend slab-on-grade construction for any interior building floor slabs after preparation of subgrades. Slabs-ongrade should be supported on new compacted granular fill placed after excavation and replacement of unsuitable Fill soils and/or unsuitable natural soils are encountered at the slab elevation. We understand that existing contaminated soils within the site to be excavated by TDI and replaced with clean Fill and approximately 5 to 6 feet of Fill will be installed at the site prior to foundation and slab construction. We have assumed the Fill will be in accordance with this report. Slabson-grade bearing on compacted granular fill may be designed using a modulus of subgrade reaction of 100 pounds per cubic inch, referenced to a 1-foot by 1-foot plate area.

A 4-inch-thick crushed stone base course should be placed over the slab subgrade. The crushed stone should meet the gradation requirements of Table 1 and compaction requirements of Table 2.



7.5 CORROSION CONSIDERATIONS

Corrosion potential testing was performed on soil samples collected from multiple borings at various depths as presented below. Testing included sulfates, chlorides, pH, and electrical resistivity. The purpose of these tests was to evaluate the corrosivity of the soil against steel and concrete foundations. The results are presented in Appendix D and discussed below.

Comparison of Corrosion Testing Results

| | | Corrosive Based on | Corrosivity Cr | iteria ^[1] | Corrosive Based on | |
|------------------------|-------------|---------------------------|----------------|-----------------------|---|--|
| Parameter | CalTrans | AASHTO | NYCBC | FHWA | Laboratory Results Compared to Corrosivity Criteria? | |
| Electrical Resistivity | Below 1,000 | Below | Below 1,000 | Below 3,000 | No | |
| (ohm-cm) | ohm-cm | 2,000 ohm-cm | ohm-cm | ohm-cm | NO | |
| pН | Below 5.5 | Below 5.5; or Between 5.5 | Below 5.5 | Below 5 and | No | |
| | | and 8.5 for organic soils | | above 10 | | |
| Sulfate (ppm) | Above 2,000 | Above 1,000 ppm | Above 1,000 | Above 200 | No | |
| Juliate (ppili) | ppm | Above 1,000 ppm | ppm | ppm | 140 | |
| Chloride (ppm) | Above 500 | No Criteria | No Criteria | Above 100 | No | |
| Chioride (ppin) | ppm | No Cifteria | NO CITTETIA | ppm | NO | |

Based on the results of the sulfate content there are no type restrictions and both Type I and II cement would be appropriate for foundations. The chloride content is low suggesting low risk of chloride attach to carbon steel and cast iron. The pH range of 5.5 to 8.5 are not considered to be the dominant variable affecting corrosion rates therefor the steel piles do not require additional corrosion protection or protective coating. Based on the electrical resistivity measurements the soils are considered to have minor potential for corrosion affecting buried metal structures. We recommend Type II cement be considered for use for all foundations.

8.0 SEISMIC ASSESSMENT

8.1 SEISMIC DESIGN PARAMETERS

Based on the shear wave velocity data measured in the SCPT soundings which are more reliable and more directly measure the soil's response to seismic ground motion, we recommend adopting a Seismic Site Class D for calculation of seismic loading and the corresponding response spectrum as defined in the NYCBC.

Pursuant to Section 1813 of the NYCBC, we plotted SPT N-values normalized to an energy efficiency of 60 percent versus depth to assess whether evaluation of liquefaction was required. The data indicated that a liquefaction evaluation was required at this site. We performed a site-specific analysis using the methodology set forth by Idriss & Boulanger (2008)

^[1] Four references used to evaluate corrosion test criteria herein included:

⁻CalTrans Publication entitled "Memo to Designers 3-1 July 2008." CalTrans considers a site to be corrosive if one or more of the parameters listed in the table are exceeded.

⁻AASHTO LRFD Bridge Design Specifications (Fifth Edition 2010). AASHTO considers site conditions to be indicative of a potential pile deterioration or corrosion situation if one or more of the parameters listed on the table are exceeded.

⁻FHWA Publication No. FHWA NHI-05-039 entitled "Micropile Design and Construction" December 2005. FHWA uses the criteria listed in the table to determine whether the ground is classified to have strong corrosion potential or is aggressive if any one of the conditions listed is exceeded.

⁻NYCBC Section 1812.2.1 Corrosion Testing Requirements





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considering the SPT N-values, overburden stress, hammer energy, fines content, and anticipated earthquake magnitude / an anticipated earthquake magnitude of 5.7. The results of the site-specific analysis are discussed below

The following seismic design parameters were evaluated for the site in accordance with the NYCBC, considering a Site Class D and the Building Risk Category IV.

- Peak Ground Acceleration (PGA) = 0.24 g
- Mapped spectral accelerations for short periods (S_s) = 0.281 g
- Mapped spectral accelerations for a 1-second period (S₁) = 0.073 g
- Maximum considered earthquake spectral response accelerations for short period (S_{MS}) = 0.441 g
- Maximum considered earthquake spectral response accelerations for 1-second period (S_{M1}) = 0.175 g
- Design spectral coefficient at 0.2-second period (S_{DS}) = 0.294 g
- Design spectral coefficient at 1-second period (S_{D1}) = 0.117 g

8.2 LIQUEFACTION POTENTIAL

Liquefaction is a phenomenon where loose, granular soils below the water table experience a sudden reduction in shear strength in response to strong earthquake shaking over successive cycles of ground motion. Liquefaction of granular soil layers may result in excessive settlements of shallow foundations, and/or downdrag on deep foundations, and global instability of slopes and retaining walls.

We performed a liquefaction analysis of the Site using the empirical methodology set forth by Idriss and Boulanger (2008) considering the seismic site class, SPT N-values, overburden stress, hammer energy, fines content and an anticipated design earthquake. Our analysis indicated that an isolated pocket (approximately 2 to 4 feet thick) within the loose Upper SAND and Fill stratum are considered susceptible to liquefaction with a factor of safety below 1.2 which could lead to negligible settlement. The surrounding soils above and below the isolated pocket have a factor of safety greater than 1.2 thus settlement due to liquification should not be a concern.

9.0 RETAINING STRUCTURES AND BELOW GRADE WALLS

9.1 BRACED WALLS AND LATERAL EARTH PRESSURES

We anticipate that below-grade structures, utility connection pits, oil containment areas, and below grade tanks will be required at the site. We also understand that a 5-foot-tall retaining wall is proposed along majority of the perimeter of the development excluding portions along the northwest and northeast limits of the site to accommodate proposed changes in grade.

Based on the results of the subsurface exploration along the proposed location of the retaining wall, soft organic soils were encountered at a depth of about 8 to 10 feet below existing grade and are anticipated to be about 4 to 6 feet below the proposed bottom of retaining wall foundations. The proposed retaining wall may be supported on shallow foundations. Considering an applied bearing pressure of 1,200 psf, the estimated settlement will be approximately 1-inche, approximately half of this settlement will occur during construction and the remainder over time.

Permanent rigid foundation walls with unbalanced loading should be designed to resist lateral earth pressures due to soil weight, neighboring foundation loads, and other surcharges. Our recommendations consider that retaining walls are



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backfilled with free-draining material. Free-draining material should consist of material classifying as SP-SM, SW-SM, SP, SW, GW-GM, GP-GM, GP, or GW according to ASTM D-2487, with less than 10 percent passing a number 200 sieve.

An additional uniform horizontal pressure equal to one-half of the anticipated surcharge load should be used for design of temporary and permanent walls due to temporary surcharges from construction equipment, service vehicles, or temporary structures.

Design active and at-rest earth pressure parameters for free draining backfill, along with design passive earth pressure parameters and friction factors for new compacted granular fill, and on-site materials are included in the table below. Design of retaining structures should be performed using the earth pressure coefficients and friction factors provided in the table below and the design soil parameters included in this report. All walls should be backfilled with free-draining backfill material. The design passive earth pressure coefficient should be selected based on the anticipated subgrade bearing material.

Recommended Earth Pressure Coefficients and Friction Factors

| | Earth Pressure | Earth Pressure | Friction |
|------------------------|-------------------|-------------------|----------|
| Material Type | Condition | Coefficient | Factor |
| | Active | 0.36 | |
| Free-Draining Backfill | At-Rest | 0.53 | N/A |
| | Passive | 2.8 | |
| | Active | 0.31 | |
| New Granular Fill | At-Rest | 0.47 | 0.4 |
| | Passive | 3.3 | |

We have assumed that below grade walls will be waterproofed to prevent the contents from leaking into the surrounding soils and groundwater from infiltrating. Hydrostatic pressure should be considered if drainage is not provided behind the walls using the design groundwater elevation provided in this report. We recommend free-draining backfill and wall subdrainage behind any site retaining walls to allow water to drain away and not collect behind the wall. Subdrainage should consist of a perimeter subdrain with either free draining backfill or geocomposite drainage panels.

As an alternative to subdrains, weepholes can be used as subdrainage. Weepholes should be provided at the base of the wall, on 10 ft centers. The weepholes should consist of 2-inch diameter holes in the walls with a 1 cubic foot aggregate filter placed behind the weepholes. The filter should be wrapped in a drainage geotextile such as Mirafi 140N.

10.0 PAVEMENT DESIGN RECOMMENDATIONS

As part of the proposed development, access roads connecting the site to the adjacent roadways will be necessary. The Contractor should prepare pavement subgrades and place compacted granular fill for pavement support as described in the Earthwork and Grading recommendations section of this report. Dense-graded aggregate or Sand-Gravel fill placed as pavement base course should be compacted to at least 95 percent of maximum dry density, as determined by the Modified Proctor Test (ASTM D1557).

We developed the recommended pavement section based on the methodology presented in the New York State Comprehensive Pavement Design Manual, considering a conventional pavement design based on traffic volume and the percentage of trucks. We were not provided with traffic data or anticipated vehicle loading information; however, based





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on understanding of the project, we considered an annual average daily traffic (AADT) of less than 4,000 vehicles and 100 percent truck traffic.

We recommend the following design for the asphalt pavement, based on a HL-93 truck loading as per the AASHTO LRFD Bridge Manual, 9th Edition:

Asphalt Pavement Surface Course: 1.5 InchesAsphalt Pavement Binder Course: 2.0 Inches

• Base Course: 3.0 Inches

• Subbase Course (Compacted Aggregate): 12.0 Inches

Final pavement subgrades should be proof-rolled under the observation of the Geotechnical Engineer prior to placing subbase or aggregate base course to evaluate their suitability to support the pavement. If soft, wet, or otherwise unsuitable soils are encountered at the pavement subgrade elevations, over-excavation of the soils will be necessary. The area surrounding pavements should be graded to direct surface water away from paved areas.

We recommend that reinforced concrete pavement be used in any dumpster pad, dumpster approach pad areas, and other areas where repeated heavy vehicle traffic may occur. Reinforced concrete pads should be designed based on a modulus of subgrade reaction value, k, of 100 pci.

11.0 CONSTRUCTION RECOMMENDATIONS

11.1 DEMOLITION

At the time of preparing this report we understand that the owner is in the process of demolishing the site and removing existing site features including roadways, tanks, underground utilities, footings, slabs, etc. It is our understanding that upon removal of existing site features the owner is to backfill the site and provide a graded site at El 15 to KEG. Based on the proposed construction, we do not anticipate that any existing structures, foundations, or slabs will be removed from the site to facilitate construction of the new CHPE Astoria Converter Station. Site drainage should be re-routed as needed. Any below-grade utilities designated to remain should be protected during construction activities. Any relocated or removed below-grade utilities should be over-excavated, and the excavation should be backfilled with granular fill meeting the gradation and compaction requirements of Table 1 and Table 2, respectively.

11.2 EARTHWORK AND GRADING RECOMMENDATIONS

11.2.1 Site Preparation

Surface cover, asphalt, and utilities should be completely removed from subgrades prior to placement of granular fill for the buildings, ancillary equipment, and/or pavement support. We understand that TDI is to demolish the existing site features and excavate existing contaminated soils and replace with clean soils. The depth of the excavation to remove the contaminated soils is not known at the time of preparing this report. After the soil is excavated TDI will backfill the site to about elevation 11 ft and will meet the existing perimeter elevations of the site prior to construction of the converter station facility.





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Asphalt pavement surface cover encountered within the footprint of the proposed CHPE Converter Station should be removed prior to pile driving and foundation construction activities. Following installation of piles, voids developed around piles should be backfilled with granular fill or gravel.

11.2.2 Fill, Pavement, and Unpaved Road Subgrade Preparation

The fill encountered at the site generally consists of loose to medium dense sands and gravel. The fill includes materials that were likely placed during prior power station expansion. While the results of this study indicate that most of these materials should be suitable for support of new compacted granular fill, the likelihood of areas of very loose or otherwise unsuitable soil is typically greater with fill than with naturally deposited soils. At this time the extent of excavation is not known, once the soil is excavated TDI should place Fill in accordance with this report. The Geotechnical Engineer should evaluate the suitability of the fill subgrades prior to fill placement at the site.

Where the existing site soils are not excavated the stripped subgrades should be proof-rolled with a loaded dump truck to evaluate the subgrade suitability for support of compacted granular fill. Any existing foundations encountered in the proposed pavement or access road areas should be removed to at least 3 feet below the design subgrade elevation. Existing roadway base course and crushed stone encountered along the existing site access roads may be left in place and evaluated during proof-rolling. Any weak or soft soils identified during proof-rolling by excessive pumping, weaving, or rutting should be scarified, dried and recompacted, or excavated and replaced with compacted granular fill.

We recommend evaluating the volume of over-excavated and undercut soil volumes by cross-sectioning. Other methods such as counting trucks are generally less accurate and may result in additional earthwork expenses.

11.2.3 Shallow Foundation Subgrade Preparation

The exposed shallow foundation subgrades should be compacted to a stable and firm consistency with a minimum of four passes of a vibratory walk behind double drum roller, or other heavy compaction equipment. Areas of unstable ground observed during proof-rolling should be over-excavated until the exposed ground is stable and firm. The over-excavated soils should be replaced with compacted granular fill. Foundation subgrade soils should be compacted to at least 95 percent of their maximum dry density, as determined by the Modified Proctor Test (ASTM D1557).

Subgrades should be kept free of standing water, debris, and ice. Subgrades should be protected from frost, and fill should not be placed over frozen soil. If frozen soils are present at design subgrade levels, they should be removed and replaced with new compacted granular fill.

All foundation subgrades should be observed by the Special Inspector, per the NYCBC Section 1704.7.1, prior to placement of concrete to evaluate the condition of the subgrade materials and check for consistency with the recommendations of this report.

Shallow foundation subgrades should be protected in their as-approved condition until concrete is poured. A 2-inch-thick lean concrete mix or a 'mud-mat' may be poured over the approved soil subgrade to protect the subgrade from disturbance and deterioration.

11.2.4 Fill Placement and Compaction

Fill material should consist of granular fill and/or sand-gravel fill that meets the gradation requirements outlined in Table 1. Compacted granular fill placed for support of shallow foundations and pavement support should be compacted to at least 95 percent of its maximum dry density, as determined by the Modified Proctor Test (ASTM D1557). Compacted fill





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placed for general site grading should be compacted to 90 percent of its maximum dry density, according to the same standard. The recommended maximum loose lift thickness of fill and minimum number of passes of compaction equipment are presented in Table 2.

Crushed stone, where used below proposed slabs, should be compacted to a firm, stable configuration, and should be wrapped all around in non-woven filter fabric, such as Mirafi 140N. The crushed stone should be compacted in place with at least two passes of a hand-operated vibratory plate, light roller, or other suitable walk-behind vibratory compaction equipment.

We understand that TDI will import fill to bring site grades to approximately El. 11 after removal of existing contaminated soils. We understand that the overall site grades will be brought up to approximately El. 15. Imported granular fill should meet the gradation requirements outlined in Table 1 and should not contain particles larger than 3-inches. We recommend performing at least one gradation and one moisture-density test per each 500 cubic yards of imported fill.

11.2.5 Reuse of Existing Material

The on-site Fill soils are generally considered suitable for reuse as site grading fill provided they are culled of any organics, boulders and debris and they meet the gradation requirements of Table 1. We recommend performing at least one gradation and one moisture-density test per each 200 cubic yards of existing on-site soil to be reused to confirm that the on-site material meets the gradation requirements of Table 1. Grading fill should meet the compaction requirements as outlined in Section 11.2.4.

11.2.6 Flowable Fill

Flowable fill is also considered suitable for use as backfill on this project. The required strength should be established depending on the type of loading to be supported. We recommend a minimum compressive strength of 200 psi be used, with a minimum of 300 psi within the zone of influence of footings or mats. ACI 229R-13, Controlled Low-Strength Materials (CLSM) should be used when specifying flowable fill.

11.2.7 Pipe Bedding Material

Pipe bedding material beneath PVC/HDPE pipe and wrapped steel piping with a diameter of up to one foot shall consist of a minimum of 6-inches of granular fill meeting the gradation requirements outlined in Table 1. Utilities with a diameter of up to three feet shall be underlain by at least 8-inches of Sand-Gravel fill. The maximum grain size should not exceed 1/10 of the maximum diameter of the utility. The Sand-Gravel bedding shall be nominally compacted with a hand-operated vibratory plate or light roller to at least 95 percent of its maximum dry density, as determined by the Modified Proctor Test (ASTM D1557).

11.3 PILE FOUNDATIONS

11.3.1 <u>Driven Pile Installation</u>

Due to the presence of construction debris and other deleterious materials encountered in the borings as well as the existing structures on site, the contractor should be prepared to drill through the upper 10 feet of soil if obstructions are encountered during pile installation. The cross-sectional area of the auger used to pre-drill should be at least 2 inches less than the pile being installed.

Any voids around the pile created during the construction due to drilling or pile driving should be backfilled with soil or grout to the satisfaction of the geotechnical engineer.





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11.3.1.1 <u>Test Pile Program – Driven Piles</u>

Prior to the start of production pile driving, the Contractor shall perform a test pile program using dynamic pile testing (PDA) and signal matching in accordance with ASTM D4945, and static axial and lateral load tests to meet the requirements of the NYCBC. The location of test piles shall be checked by the Geotechnical Engineer after the completion of a foundation plan. The test pile program will also allow for the estimation of anticipated pile lengths across the site and demonstration of pile capacities. If the load test program is performed during design document development, the results of the load tests can be incorporated into the pile design to value engineer the allowable pile capacity.

The Contractor should perform a wave equation (WEAP) analysis of the pile and pile hammer system to check the driving criteria prior to installing test piles. The wave equation analyses shall be provided to the Geotechnical Engineer for review. The wave equation analysis should include an estimate of the anticipated driving resistance and pile stresses during driving. The Contractor should drive all test piles and production piles using the same hammer.

Pile driving analysis (PDA) and CAPWAP analysis shall be performed by the Contractor for each of the test piles. The results of the test pile installation, PDA testing, and CAPWAP analysis shall be submitted to the Geotechnical Engineer for review and approval. The Contractor shall install the production piles based on the results of the test pile program and the pile driving criteria approved by the Geotechnical Engineer. We recommend PDA testing be performed on non-production piles used for load test and five percent of the production piles. The Geotechnical Engineer should recommend pile tip elevations and installation criteria based on an evaluation of the data from the control pile and load test programs.

11.3.2 Pile Load Testing Program

In accordance with Section 1808.3 of the NYCBC, static axial load tests (ASTM D1143) will be required for any design loads exceeding 40 tons. The number of pile load tests are based on the combined footprint area of the proposed structure (Relay Building, Service Building, Storage Building and Converter Building). Considering the anticipated footprint of 86,000 SF, we recommend conducting at least five static axial load tests for the selected pile type. A test pile cannot be used as a production pile.

The NYCBC requires lateral load testing for any piles with lateral loads greater than 2 kips (1 ton). The lateral load tests should be performed in accordance with ASTM D3966, Procedure B, with loading increments applied until a measured deflection of 1-inch is observed to evaluate pile response to simulated structural loads. One-half of the load observed at a deflection of 1-inch will establish the allowable lateral load for production piles.

We have provided uplift capacity based on a factor of safety of 3.0 which does not require an uplift load test. However, if a lower factor of safety is required to increase the capacity then uplift load tests will be required. To verify the uplift design capacities, at least five uplift load tests will be required to satisfy the NYCBC based on the combined footprint of the buildings (86,000 SF). The tensile uplift load tests should be performed in accordance with ASTM D3689.

The installation contractor must provide a detailed design for the axial, lateral, and tensile load testing, including the load test locations, construction details for the load test frames and hold-down piles (if needed), loading and monitoring procedures, and recommended evaluation procedures. An independent, calibrated load cell must be used to measure the load on the pile head; reliance solely on a calibrated jack to measure the load is not acceptable. The detailed design must be signed and sealed by a Professional Engineer registered in New York.



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11.3.3 Pile Observation

Special Inspection of pile installation must be provided by a qualified Professional Engineer in accordance with Section 1704.8 of the NYCBC. We recommend that GZA be retained to provide these services due to our familiarity with the subsurface conditions at the project site and the project design to date. In addition, GZA should review the Contractor's submittals for the proposed pile design/installation.

During installation of the test pile and the production piles, the Special Inspector must record the minimum following data:

- Pile Identification Number
- Installation Equipment
- Pile Material Properties/Lengths
- Installation Start and Finish Time
- Installation Depth
- Cutoff Elevation and tip elevation (to be provided by surveyor)

11.4 SHALLOW FOUNDATIONS

All shallow foundation subgrades should be observed by the Geotechnical Engineer prior to concrete placement to evaluate whether the subgrades have been prepared as recommended in this report. All foundation subgrades should be kept clean of loose or soft soils. Over-excavated foundation subgrades can be concreted at the elevation of the undercut or backfilled with new compacted granular fill to the original design elevation.

Shallow foundation concrete should be placed as soon as possible after excavation and cleaning of subgrades to limit the potential for moisture infiltration. Concrete mud mats should be used to protect foundation subgrades from weather and construction traffic during reinforcing steel placement. Final Site grades should incorporate positive drainage away from the power block so that water does not accumulate around the foundations.

11.5 TEMPORARY EXCAVATIONS

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our Client. Under no circumstances should the information provided below be interpreted to mean that GZA is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and shall not be inferred.

Based on the granular nature of the existing Fill, it is anticipated that the soil exposed in excavations would generally be classified as Type C soil in accordance with OSHA regulations. For Type C soils, OSHA recommends a maximum slope inclination of 1.5H:1V. Excavation slopes should be checked regularly for signs of instability and should be shored or flattened as required. Temporary slopes should be protected from surface run-off erosion to promote stability of the slope, by means of berms and swales located along the top of the slope, a flattened slope inclination and/or plastic sheeting placed over the slope.





41.0163020.00

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As an alternative to temporary slopes, vertical excavations can be temporarily shored. The Contractor or the Contractor's specialty subcontractor would be responsible for the design of the temporary shoring in accordance with applicable regulatory requirements but the recommendations of this report will serve as a minimum requirement.

11.6 TEMPORARY GROUNDWATER CONTROL

Grading activities and foundation construction are not expected to encounter groundwater at the site. However, if temporary dewatering is needed, pumping from submersible pumps (sumps) will likely be effective in controlling groundwater or surface water infiltration. Sumps should be able to lower the groundwater to at least 2 ft below the base of the excavation. Dewatering methods should be the responsibility of the Contractor.

11.7 ASSESSMENT AND MONITORING OF ADJACENT STRUCTURES

The NYCBC requires the documentation of the conditions of adjacent structures prior to excavation or foundation construction and requires monitoring of structures if either excavation depths exceed five feet or if the excavation depths exceed the depths of the footings of adjacent buildings. A Professional Engineer registered in the State of New York must develop a monitoring plan to comply with the requirements of NYCBC Section 3309.16.

The pre-construction condition of adjacent buildings/structures should be documented prior to the start of any work at the project Site. This includes photographing and measuring all existing conditions and defects to provide a quantifiable baseline record prior to construction. Crack gages, vibration monitors and/or survey points should be installed at applicable locations, and baseline values should be recorded. Crack readings, vibration measurements, and deflections should be measured throughout excavation and construction. This work must be performed on behalf of the Client, not the Contractor.

11.8 SPECIAL INSPECTION REQUIREMENTS

We recommend that GZA, who is knowledgeable in soils and foundations and the requirements of the NYCBC be retained to observe earthwork, SOE (if required), and foundation construction. We anticipate that the following NYCBC Special Inspections will be required for work discussed in this report:

- Subgrade Inspection [BC 1704.7.1]
- Subsurface Conditions Fill Placement & In-Place Density [BC 1704.7.2 / 1704.7.3]
- Deep Foundation Elements [BC 1704.8]
- Excavations Sheeting, Shoring and Bracing [BC 1704.20.2]

The required "Subsurface Investigation (Borings)" special inspection will be completed as a part of our subsurface exploration program (after Phase 2 completion). Special Inspections must be performed by a Special Inspection Agency retained by the Owner. Due to our project familiarity, we believe that our services will reduce unexpected circumstances during the bidding and construction process and should expedite resolution if unanticipated conditions are encountered.





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11.9 RECOMMENDED ADDITIONAL SERVICES

All quality assurance and testing during construction should be performed in accordance with the applicable building codes. Based on our familiarity with the proposed development and the subsurface conditions at the project site, we recommend that GZA be retained to perform the following supplemental services:

- Preparation of geotechnical specifications, including deep foundations and earthwork
- Review of foundation related structural drawings
- Pre-construction condition documentation prior to the beginning of construction
- Instrumentation monitoring of nearby buildings and structures
- Review of contractor foundation-related submittals
- Attendance of project meetings with the design team upon request
- Special Inspections of foundation construction and excavation support as noted above
- Pile load testing and installation oversight





12.0 REFERENCES

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USGS (1956). "Central Park Quadrangle New York – New Jersey 7.5 Minute Series (Topographic)." Scale 1:24,000. U.S. Geologic Survey, Washington, D.C.

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TABLES



Table 1: Recommended Use and Gradation Criteria For Fill Materials

USE OF FILL MATERIAL

<u>Granular Fill:</u> Below footings and slab base course, and 3 feet laterally behind walls provided that amount passing Sieve No. 200 is less than 8 percent.

<u>Sand-Gravel:</u> Slab base course and 3 feet laterally behind walls

<u>Crushed Stone:</u> Drain line backfill and foundation protective layer. Crushed stone should be wrapped in non-woven filter

fabric.

GRADATION REQUIREMENTS

| Sieve | Size | Percent Finer by Weight | | | | | |
|----------------------|-----------------------|---|--|--|--|--|--|
| | | | | | | | |
| <u>Granular Fill</u> | Shall be free from | ice and snow, roots, sod, rubbish and other | | | | | |
| | deleterious or orga | anic matter. Granular Fill shall conform to the | | | | | |
| | following gradation | n requirements: | | | | | |
| 2/3 of the loos | e lift thickness | 100 | | | | | |
| No. | . 10 | 30 – 95 | | | | | |
| No. | . 40 | 10 – 70 | | | | | |
| No. | 200 | *0 – 15 | | | | | |
| | | *0 – 8 where used behind walls | | | | | |
| | | | | | | | |
| Sand-Gravel | | able sand and gravel and shall be free from ice | | | | | |
| | and snow, roots, | sod, rubbish and other deleterious or organic | | | | | |
| | matter. Sand-Gra | avel shall conform to the following gradation | | | | | |
| | requirements: | | | | | | |
| 3 ir | nch | 100 | | | | | |
| ½ iı | nch | 50 – 85 | | | | | |
| No |). 4 | 40 – 75 | | | | | |
| No. | . 40 | 10 – 35 | | | | | |
| No. | 200 | 0 – 8 | | | | | |
| | | | | | | | |
| <u>Crushed Stone</u> | Shall consist of dura | able crushed rock or durable crushed gravel stone | | | | | |
| | and shall be free fr | om ice and snow, roots, sod, rubbish and other | | | | | |
| | deleterious or org | anic matter or material. Crushed Stone shall | | | | | |
| | conform to the follo | owing gradation requirements: | | | | | |
| 1 ir | nch | 100 | | | | | |
| 3⁄4 iI | nch | 90 – 100 | | | | | |
| ½ iı | nch | 10 – 50 | | | | | |
| 3/8 | inch | 0 – 20 | | | | | |
| No |). 4 | 0-5 | | | | | |
| No. | 200 | 0-1 | | | | | |



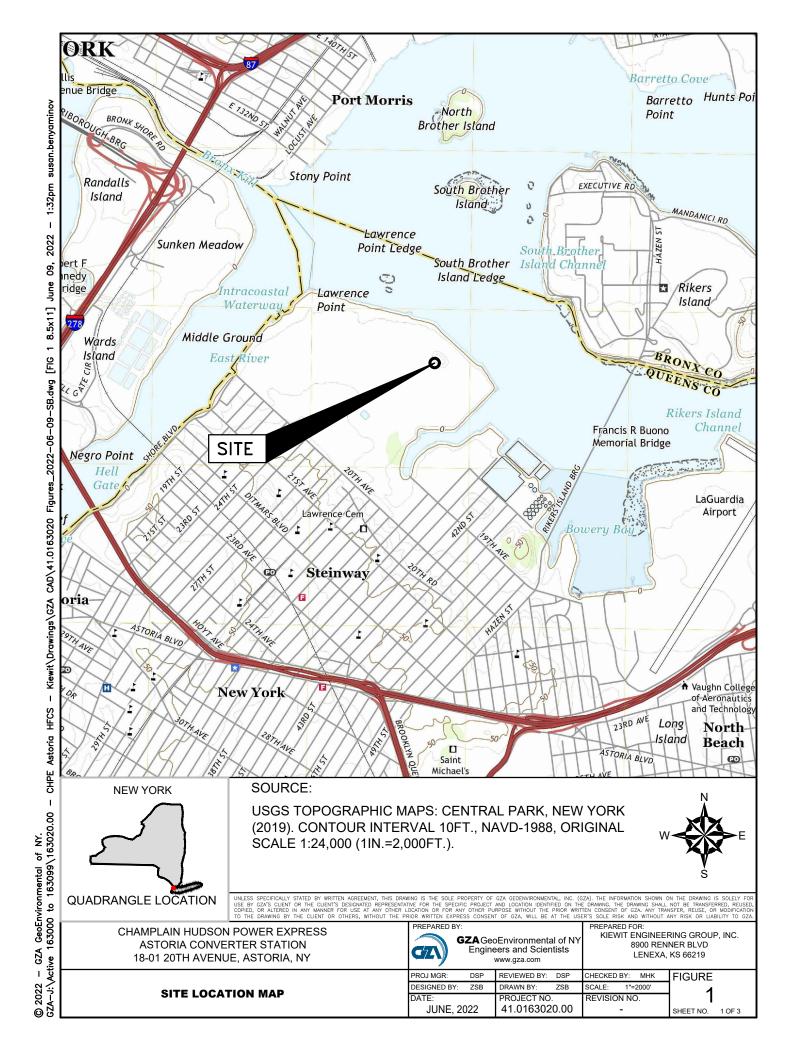
Table 2: Compaction Methods

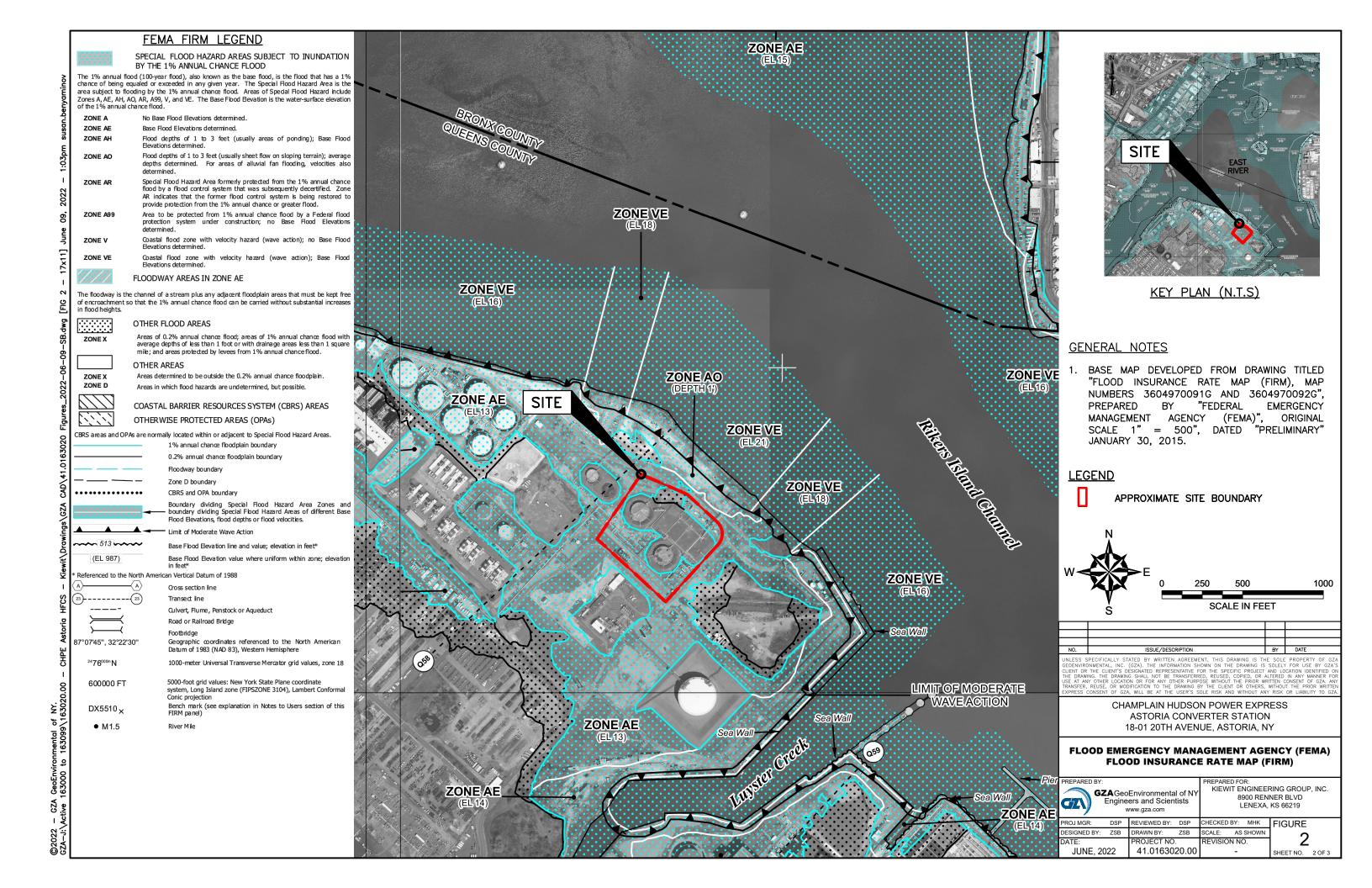
| | | lable 2: Co | mpaction Met | noas | | | | |
|---------------------|--------------------|-------------|----------------|-----------|-------------------|----------|--|--|
| | | | Maximum Lo | oose Lift | Minimum Number of | | | |
| | | Max. | Thickno | ess | Passes | | | |
| | | Stone | Below | Less | Below | Less | | |
| Compact | ion Method | Size* | Structures | Critical | Structures | Critical | | |
| | | | and | Area | and | Area | | |
| | | | Pavement | | Pavement | | | |
| | GRANULAR FILL, | SAND-GRA | VEL FILL, CRUS | SHED STOP | NE | | | |
| Hand-operated vi | ibratory plate or | 4" | 6" | 8" | 4 | 4 | | |
| light roller in con | fined areas | 4 | 0 | ٥ | 4 | 4 | | |
| Hand-operated vi | bratory drum | | | | | | | |
| rollers weighing a | nt least 1,000# in | 6" | 10" | 12" | 4 | 4 | | |
| confined areas | | | | | | | | |
| Light vibratory dr | um roller | | | | | | | |
| Min. weight at | Min dynamic | 8" | 12" | 18" | 4 | 4 | | |
| drum 3000# | force 10,000# | | | | | | | |
| Medium vibrator | y drum roller | | | | | | | |
| Min. weight at | Min dynamic | 8" | 18" | 24" | 6 | 6 | | |
| drum 10,000# | force 20,000# | | | | | 1 | | |
| | | | | | | | | |

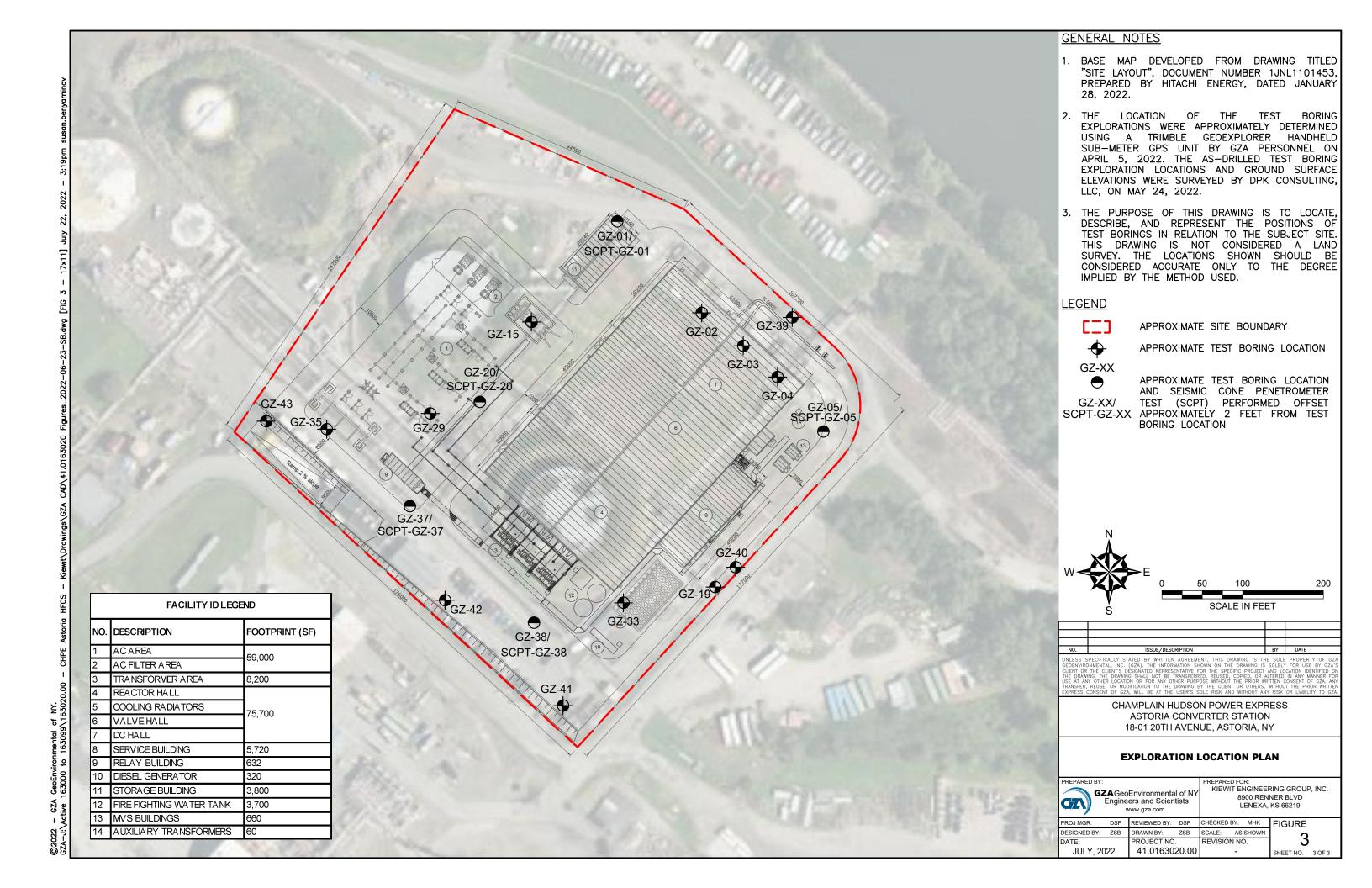
^{*} Indicates not to exceed more than 2/3 the lift thickness



FIGURES









APPENDIX A – GEOTECHNICAL LIMITATIONS



USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

- 2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.
- 3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.
- 4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

SUBSURFACE CONDITIONS

- 5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.
- 6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.
- 7. Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.
- 8. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.



Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical
engineering aspects of seepage control. These recommendations may not preclude an environment that allows the
infestation of mold or other biological pollutants.

COMPLIANCE WITH CODES AND REGULATIONS

10. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

COST ESTIMATES

11. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

ADDITIONAL SERVICES

12. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.



| APPENDIX B –BORING LOG KEY, BORING LOGS, AND ROCK CORE PH | IOTO LOGS |
|---|-----------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

LOG KEY



BURMISTER SOIL CLASSIFICATION

| COMPONENT | NAME | PROPORTIONAL | PERCENT BY | IDENTIFICATION OF FINES | | | | | |
|---------------|------------------------|----------------|----------------|-----------------------------------|--|--|--|--|--|
| | | TERM | WEIGHT | Material PI Atterberg Thread Dia. | | | | | |
| MAJOR | GRAVEL, SAND, FIN | | >50 | SILT ₀ Cannot Roll | | | | | |
| Minor | Gravel, Sand, Fines* | G. 1 G | 35 - 50 | Clayey SILT 1-5 1/4" | | | | | |
| | | some little | 20-35 10-20 | SILT & CLAY 5-10 1/8" | | | | | |
| *See identifi | cation of fines table. | trace | 0-10 | CLAY & SILT 10-20 1/16" | | | | | |
| | | | | Silty CLAY 20-40 1/32" | | | | | |
| | | | | CLAY >40 1/64" | | | | | |

| | AVEL & SAND |
|--|---|
| GRADATION DESIGNATION | Blows/Ft. SPT N-Value |
| Fine to coarse Medium to coarse Fine to medium Coarse Medium | Dense < 4 4 - 10 Dense 10 - 30 30 - 50 nse > 50 |
| Medium to coarse Fine to medium Coarse | Dense |

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) (ASTM D 2487)

| MAJOR DIVISIONS | | Gro | up Symbols |
|---|---|--|----------------------|
| Coarse Grained Soils More than 50% of material larger than No. 200 sieve. | Gravel More than 50% larger than No. 4 sieve. | Clean Gravels (Little or no fines) | GW GP |
| 0 | 3 | Gravels with Fines (Appreciable amount of fines) | GM GC |
| | Sand More than 50% smaller than No. 4 sieve. | Clean Sands (Little or no fines) | SW SP |
| | | Sands with Fines (Appreciable amount of fines) | SM SC |
| Fine Grained Soils More than 50% of material | | Silts and Clays Liquid Limit <50 | ML CL |
| smaller than No. 200 sieve. | | Silts and CLays Liquid Limit >50 | OL MH CH OH |
| | | Highly Organic Soils | Pt |

ORGANIC SOIL CLASSIFICATION

Fibrous PEAT (Pt) - Lightweight, spongy, mostly visible organic matter, water squeezes readily from sample. Typically near top of deposit. Fine Grained PEAT (Pt) - Lightweight, spongy, little visible organic matter, water squeezes readily from sample. Typically below fibrous peat. Organic Silt (OL) - Typically gray to dark gray, often has strong H2S odor. Typically contains shells or shell fragments. Lightweight. Usually found near coastal regions. May contain wide range of sand fractions.

Organic Clay (OH) - Typically gray to dark gray, high plasticity. Usually found near coastal regions. May contain wide range of sand fractions. Need organic content test for final identification.

ABBREVIATIONS

MR = Mud Rotary HSA = Hollow Stem Auger SSA = Solid Stem Auger SS = Split Spoon Sampler

U = Undisturbed Sample (Shelby Tube)
MC = Modified California Sampler

V = Vibracore

M = Macrocore

USCS = Unified Soil Classification System (ASTM D2487)

NYCBC = New York City Building Code

WOR = Weight of Rods

WOH= Weight of Hammer

SPT = Standard Penetration Test (ASTM D1586)

Tv = Field Vane Shear Test (Torvane) Shear Strength

PP = Pocket Penetrometer Shear Strength

PI = Plasticity Index

Wn = Moisture Content CO = Consolidation

UC = Unconfined Compression Test

UU = Unconsolidated Undrained (Triaxial) Test

SI = Sieve Analysis
DS = Direct Shear

PID = Photoionization Detector

ppm = Parts Per Million REC = Recovery

RQD = Rock Quality Designation
= Measured Water Level

N-Value = Cumulative number of uncorrected blows for the middle two six-inch intervals (blows/foot).

GZA GeoEnvironmental of New York Engineers and Scientists

Finish: 5/16/2022

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 1 of 3

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. P. Mullins Foreman:

Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Sampler Type: SS

Sampler O.D. (in.): 2.0

Rock Core Size: NQ

Sampler Length (in.): 24

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 13.25 Final Boring Depth (ft.): 81.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226218.94 Easting: 1011906.42

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/16/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | Casing | | | Samp | ole | | | 0 1 5 111 65 6 | ırk | Field | £ Stratum > ○ |
|---------------|----------------|------|----------------|--------------|--------------|----------------------|--------------|---|--------|--------------|------------------------|
| Depth (ft) | Blows/ Core | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ໄ 🔂 🚅 Description 🚊 🛫 |
| | Rate | S-1 | 0.0- | 24 | 12 | 7 7 | | S-1: Top 1": Gravel. | | Juntan | 0.1 GRAVEL 13.2 |
| - | | | 2.0 | | | 9 11 | 16 | Medium dense, brown/back, fine to medium SAND, little | 1 | | |
| _ | | S-2 | 2.0- | 24 | 18 | 6 7 | | Gravel, little Silt, occasional coal fragments. (PID = 2.2 ppm) | | | |
| _ | | S-3 | 4.0 | 24 | 7 | 7 8 | 14 | S-2: Medium dense, brown/yellow, fine to coarse SAND, some Gravel, little Silt, occasional coal and brick | | | |
| 5 _ | | S-3 | 4.0- 6.0 | 24 | ' | 2 7 5 5 | 12 | fragments. (PID = 4.1) S-3: Medium dense, brown, fine to coarse SAND and | | | |
| - | | S-4 | 6.0- | 24 | 5 | 4 4 | | GRAVEL, little Silt, occasional brick fragments. | | | |
| - | | | 8.0 | | | 6 4 | 10 | S-4: Medium dense, brown, fine to coarse SAND, some Gravel, little Silt, occasional brick fragments. (PID = 0.0) | | | |
| 10 | | S-5 | 8.0- 10.0 | 24 | 5 | 1 4 5 4 | 9 | S-5: Loose, tan/brown, fine GRAVEL, some SAND, trace Silt. (PID = 0.0) | | | FILL (7) |
| - 10 | | S-6 | 10.0- 12.0 | 24 | 4 | 2 2 2 5 | 4 | S-6: Loose, tan/brown, fine GRAVEL, some Sand, trace Silt. (PID = 0.0) | | | |
| - | | S-7 | 12.0- | 24 | 8 | 3 6 | | S-7: Medium dense, gray, fine to coarse SAND, little | | | |
| - | | | 14.0 | | | 6 7 | 12 | Gravel, little Silt, occasional cinders and brick fragments. | | | |
| 15 _ | | S-8 | 14.0- 16.0 | 24 | 16 | 1 WOH 1 1 | 1 | (PID = 0.0) S-8: Very loose, brown, fine to medium SAND, little varved Clay, little Silt, trace Gravel. (PID = 0.0) | 2 | | |
| - | | | | | | | | | | | 184.8 |
| - | | | | | | | | | | | |
| 20 _ | | S-9 | 20.0- 22.0 | 24 | 14 | 2 4 3 3 | 7 | S-9: Loose, tan/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | UPPER SAND (6) |
| - | | | | | | | | | | | 23.510.3 |
| 25 _ | | S-10 | 25.0- | 24 | 12 | 3 6 | | S-10: Medium dense, tan, fine to medium SAND, trace | | | |
| - | | | 27.0 | | | 8 8 | 14 | Silt. (PID = 0.0) | | | LOWER SAND (3b) |
| - | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Color change in drilling fluid at approximately 14.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-01

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: GZ-01 2 of 3 SHEET:

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins

Finish: 5/16/2022

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 13.25 Final Boring Depth (ft.): 81.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226218.94 **Easting:** 1011906.42

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/16/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Groundwater Depth (ft.) Date Time **Water Depth** Stab. Time See Report for Groundwater Readings

| | Casing | Sample | | | | | | | 0 1 5 111 25 2 | ž | Field | € Stratum > |
|-------------------|------------------------|--------|----------------|--------------|--------------|------|---------|--------------|---|--------|--------------|---------------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | (per | | SPT Value | | Remark | Test Data | ਲੇ≓ Description ⊈ ≓ |
| - | | S-11 | 30.0- 32.0 | 24 | 15 | l | 7 13 | 20 | S-11: Medium dense, gray, fine to medium SAND, trace Silt. (PID = 0.0) | | | |
| 35 | | S-12 | 35.0- 37.0 | 24 | 14 | l | 8 12 | 19 | S-12: Medium dense, tan, fine to medium SAND, trace Silt. (PID = 0.0) | | | |
| 40 _ | | S-13 | 40.0- 42.0 | 24 | 16 | | 8 13 | 22 | S-13: Medium dense, tan, fine to medium SAND, trace Silt. (PID = 0.0) | | | |
| 45 _ - | | S-14 | 45.0- 47.0 | 24 | 15 | l | 8 11 | 19 | S-14: Medium dense, tan, fine to medium SAND, trace Silt. (PID = 0.0) | | | LOWER SAND (3b) |
| 45 | | S-15 | 50.0- 52.0 | 24 | 14 | | 7 12 | 17 | S-15: Medium dense, tan, fine to medium SAND, trace Silt. (PID = 0.0) | | | |
| - 55 - - | | S-16 | 55.0- 57.0 | 24 | 16 | | 8 11 | 19 | S-16: Medium dense, tan, fine to medium SAND, trace Silt. (PID = 0.0) | | | |
| 60 | | | | | | | | | | | | |

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-01

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

Type of Rig: ATV

Sampler Type: SS

Sampler O.D. (in.): 2.0

Rock Core Size: NQ

Sampler Length (in.): 24

Rig Model: CME 750X

EXPLORATION NO.: SHEET: 3 of 3

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins

Drilling Method: Date Start: 5/16/2022 Finish: 5/16/2022 Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.):

Ground Surface Elevation (ft.): 13.25 Final Boring Depth (ft.): 81.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226218.94 Easting: 1011906.42

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| Blows/ Core Rate | No. | Depth | Pen. | Rac | Diama | | | l (O | Field | € Stratum > |
|------------------------------|----------------------|--------------------------------|--|--------------------|-----------------------|--|--|---|---|---|
| | | (ft.) | (in) | (in) | | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | O Stratum (#.) |
| | S-17 | 60.0- 62.0 | 24 | 11 | 15 10 19 24 | 29 | S-17: Medium dense, tan, fine to coarse SAND, little Silt, trace Gravel, trace Clay pockets. (PID = 0.0) | | - | LOWER SAND (3b) |
| | S-18 | 65.0- 67.0 | 24 | 8 | 8 10 16 18 | 26 | S-18: Very stiff, green/brown/white CLAY, trace Sand. (PID = 0.0, PP = 0.5) | 3 | | |
| | S-19 | 70.0- 72.0 | 24 | 23 | 16 20 26 31 | 46 | S-19: Hard, green/dark gray Clayey SILT, some Sand. (PID = 0.0) | | | CLAY AND SILT (4a/4b) |
| 2:53 3:28 3:46 3:48 | S-20 C-1 | 75.0- 76.1 76.1- 81.1 | 13 60 | l | | R | S-20: Hard, green/dark gray SILT, some Sand, trace Decomposed Rock fragments, micaceous. (PID = 0.0) C-1: Hard, slightly to very slightly weathered, dark gray, fine grained SCHIST with closely spaced, moderately to subhorizontaly dipping fractures. | 4 | | 74 -60.8 WEATHERED ROCK (1d) 76.1 -62.9 BEDROCK (1a) |
| 4:36 | | | | | | | End of exploration at 81.1 feet. | 5 | | 81.1 -67.9 |
| | | | | | | | | | | |
| _ | 3:28 3:46 3:48 | S-19 S-20 2:53 3:28 3:46 3:48 | S-19 70.0-72.0 S-2:53 C-1 76.1-76.1-81.1 3:46 3:48 | S-19 70.0- 24 72.0 | S-19 70.0- 24 23 72.0 | S-19 70.0- 24 23 16 20 26 31 S-20 75.0- 13 12 33 50 50/1" C-1 76.1- 81.1 76.1- 81.1 81.1 76.3- 81.1 76.1 76. | S-19 70.0- 24 23 16 20 26 31 46 S-20 75.0- 13 12 33 50 50/1" REC=97% RQD=97% RQD=97% | S-19 70.0- 72.0 24 23 16 20 26 31 46 (PID = 0.0, PP = 0.5) S-19: Hard, green/dark gray Clayey SILT, some Sand. (PID = 0.0) S-20: Hard, green/dark gray SILT, some Sand, trace Decomposed Rock fragments, micaceous. (PID = 0.0) S-20: Hard, green/dark gray SILT, some Sand, trace Decomposed Rock fragments, micaceous. (PID = 0.0) C-1: Hard, slightly to very slightly weathered, dark gray, fine grained SCHIST with closely spaced, moderately to subhorizontaly dipping fractures. | S-19 70.0- 24 23 16 20 26 31 46 (PID = 0.0, PP = 0.5) S-19 70.0- 24 23 16 20 26 31 46 (PID = 0.0) S-19: Hard, green/dark gray Clayey SILT, some Sand. (PID = 0.0) S-20 75.0- 76.1 76.1 76.1 76.1- 81.1 81.1 81.1 81.1 81.1 81.1 81.1 8 | S-19 70.0- 24 23 16 20 26 31 46 (PID = 0.0, PP = 0.5) S-19 70.0- 72.0 24 23 16 20 26 31 46 (PID = 0.0) S-19: Hard, green/dark gray Clayey SILT, some Sand. (PID = 0.0) S-20 75.0- 76.1 76.1 76.1- 81.1 81.1 81.1 81.1 81.1 81.1 81.1 8 |

3 - Pocket penetrometer reading in tons per square feet (tsf).

4 - Hard drilling at approximately 74.0 feet.

5 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-01

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Drilling Method: Date Start: 5/13/2022 Finish: 5/13/2022 Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.74 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226105.17 **Easting:** 1012010.97

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Type of Rig: ATV

Rig Model: CME 750X

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | 41. | Casing | Sample Sample Sample Description and Identification | | | | | | | | | € Stratum > |
|---|--|------------------------|---|----------------|--------|--------|----------------------------|--------------|---|---------|--------------|------------------|
| | eptn (ft) | Blows/ Core Rate | No. | Depth (ft.) | (in) | | Blows (per 6 in.) | SPT Value | | Remark | Test Data | Description ⊕ ± |
| | | | S-1 | 0.0- | 24 | 16 | 2 3 | | S-1: Top 1": Gravel. | Ī | 1 | 0.1 GRAVEL 12 |
| | + | | | 2.0 | | | 8 9 | 11 | Medium dense, brown/gray, fine to medium SAND, little | 1 | | |
| | 4 | | | 2.0 | 24 | 40 | 4.5 | | Silt, trace Gravel, occasional coal, brick and concrete | - | | |
| | | | S-2 | 2.0- | 24 | 18 | 4 5 | | fragments. (PID = 0.0 ppm) | | | |
| | ٦ | | | 4.0 | | | 5 4 | 10 | S-2: Loose, brown/black, fine to medium SAND, little | | | |
| | _ 1 | | S-3 | 4.0- | 24 | 9 | 2 2 | | Gravel, little Silt. (PID = 0.0) | | | |
| | 5 _ | | | 6.0 | | | 2 15 | 4 | S-3: Loose, brown/black, fine to medium SAND, little | | | |
| | | | | | | | | | Gravel, little Silt. (PID = 0.0) | | | |
| | | | S-4 | 6.0- | 24 | 7 | 2 2 | | S-4: Very loose, gray/brown, fine to coarse SAND, little | 2 | | |
| | 1 | | | 8.0 | | | 1 2 | 3 | Gravel, little Silt. (PID = 57.7) | | | |
| | - | | S-5 | 8.0- | 24 | 10 | 2 2 | | S-5: Loose, gray/brown, fine to medium SAND and SILT, | 2 | | |
| | 4 | | | 10.0 | | . • | 3 3 | 5 | trace Gravel. (PID = 1.2) | - | | |
| - | 10 | | | | | | | " | | | | |
| | | | S-6 | 10.0- | 24 | 5 | 1 WOH | | S-6: Very loose, gray/brown, fine to coarse SAND, little | 2 | | |
| 7 | + | | | 12.0 | | | 1 WOH | 1 | Gravel, little Silt. (PID = 2.6) | | | |
| 0.G | 4 | | S-7 | 12.0- | 24 | 11 | 2 1 | | S. 7: Vany loons gray/brown fine to seems SAND little | | | FILL (7) |
| 20.0 | | | 3-1 | 14.0 | 24 | ' ' | 2 3 | , | S-7: Very loose, gray/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.6) | | | |
| 630 | | | | 14.0 | | | 2 3 | 3 | Sill, liace Gravel. (FID = 0.0) | | | |
| 1.0 | ٦ ٦ | | S-8 | 14.0- | 24 | 11 | 1 2 | | S-8: Stiff, gray/brown, Silty CLAY, some Gravel, trace | 3 | | |
| 00/4 | 15 _ | | | 16.0 | | | 9 9 | 11 | Sand. (PID = 0.0, PP = 3.3) | | | |
| 630 | 4 | | | | | | | | | | | |
| 1.01 | | | | | | | | | | | | |
| ES/4 | ٦ | | | | | | | | | | | |
| 3ASI | + | | | | | | | | | | | |
| 26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPU | 4 | | | | | | | | | | | |
| 2 | 20 _ | | | | | | | | | | | |
| | | | S-9 | 20.0- | 24 | 7 | 1 2 | | S-9: Loose, gray, fine to coarse SAND, little Silt, trace | 4 | | |
| 8 | 1 | | | 22.0 | | | 2 1 | 4 | Gravel. (PID = 0.0) | | | |
| Ä | + | | | | | | | | | | | |
| 9 | 4 | | | | | | | | | | | 23.5 -10 |
| , 80 | | | | | | | | | | | | |
| 13:2 | 25 | | | | | | | | | | | |
| , 122 | | | S-10 | 25.0- | 24 | 10 | 12 14 | | S-10: Medium dense, tan/brown, fine to coarse SAND, | | | |
| 6/10 | \dashv | | | 27.0 | | | 10 9 | 24 | little Silt, trace Gravel. (PID = 0.0) | | | |
| DT - | _ | | | | | | | | • | | | LOWER SAND (3b) |
| 9.6 | | | | | | | | | | | | |
| 01_2 | 1 | | | | | | | | | | | |
| ! | , † | | | | | | | | | | | |
| GZA 2016 | 30 | C | nla | oons sala | for | latile | organia sa | m n = : :: | de using a photo ignization detector (DID). Desults | <u></u> | | r million (nr) |
| -GZ | 1 2 | | | | | | organic co 4, S-5, S-6- | | nds using a photo ionization detector (PID). Results reported | ın pa | arts pe | r million (ppm). |
| 9 | | - Pock | et per | netromet | ter re | ading | in tons per | squa | re feet (tsf). | | | |
| | 4 - No recovery. 3-inch split spoon advanced for sample recovery. | | | | | | | | | | | |
| STE | 3 - Pocket penetrometer reading in tons per square feet (tsf). 4 - No recovery. 3-inch split spoon advanced for sample recovery. | | | | | | | | | | | |
| TEMPLATE TEST BORING | x | | | | | | | | | | | |
| HE- | \perp | | , - | | | | | | | | . | |
| MPI | appro | oximate | e Koun | daries b | etwe | en so | il and bedro | ock 'tvi | on and identification procedures. Stratification lines repr bes. Actual transitions may be gradual. Water level readings | have | e I - | Exploration No.: |
| | peen | made | at the | times a | and u | nder | the condition | ons sta | ated. Fluctuations of groundwater may occur due to other fa | actor | s | GZ-02 |
| ξZ t | nan ' | uiose p | resen | i ai ine t | umes | ιne r | neasureme | IIIS WE | ене плаце. | | | |

- 1 Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).
- 2 Petroleum odor in sample: S-4, S-5, S-6.
- 3 Pocket penetrometer reading in tons per square feet (tsf).
- 4 No recovery. 3-inch split spoon advanced for sample recovery.

GZA GeoEnvironmental of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-02 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Finish: 5/13/2022

Type of Rig: ATV
Rig Model: CME 750X
Drilling Method:

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.74 Final Boring Depth (ft.): 45.1 H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226105.17 Easting: 1012010.97

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/13/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: NQ

Groundwater Depth (ft.)

Date Time Water Depth Stab. Time
See Report for Groundwater Readings

| | Casing | | | Samp | ole | | | | ĸ | Field | Stratum |
|---------------|----------------|------|----------------|------|-----|----------------------|---------|---|--------|--------------|--------------------------|
| Depth (ft) | Blows/ Core | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | Oegustin Description (#) |
| | Rate | S-11 | 30.0- | 24 | 14 | 9 10 | , value | S-11: Medium dense, tan/brown, fine to coarse SAND, | 14 | Data | |
| _ | | | 32.0 | | | 12 13 | 22 | little Silt, trace Gravel. (PID = 0.0) | | | |
| _ | | | | | | | | , (, | | | |
| | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 35 <u> </u> | | S-12 | 35.0- | 24 | 9 | 10 12 | | S-12: Medium dense, tan/brown, fine to coarse SAND, | | | |
| _ | | 0-12 | 37.0 | 24 | 3 | 10 12 | 22 | little Silt, trace Gravel. (PID = 0.0) | | | |
| | | | 07.0 | | | 10 13 | 22 | intic ont, trace draver. (Fib = 0.0) | | | LOWED CAND (26) |
| _ | | | | | | | | | | | LOWER SAND (3b) |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 10 _ | | | 40.0 | | 4- | 5 40 | | 0.40 14 15 1 | | | |
| | | S-13 | | 24 | 15 | 5 10 | | S-13: Medium dense, brown, fine to coarse SAND, some | | | |
| | | | 42.0 | | | 13 20 | 23 | Silt, trace Gravel. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| _ | | | | | | | | | 5 | | WEATHERED ROCK |
| 45 _ | | | | | | | | | | | 45.1 (1d) -32 |
| | | S-14 | | 1 | 1 | 50/1" | J_R_ | S-14: Very dense, gray/black/white, fine to coarse SAND, | 6 | | |
| _ | | | 45.1 | J | | | | little Silt. (PID = 0.0) | _ | | |
| - | | | | | | | | End of exploration at 45.1 feet. | | | |
| - | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| 50 | | | | | | | | | | | |
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| 55 | | | | | | | | | | | |
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| _ | | | | | | | | | | | |
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| - 30 | | | | | | | | | | | |
| OU | I | | ı | 1 | 1 | 1 | 1 | | 1 | 1 | I |

5 - Hard drilling at approximately 44.0 feet.

6 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-02

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-03 SHEET: 1 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Finish: 5/13/2022 Drilling Method: Mud Rotary

Type of Rig: ATV

Rig Model: CME 750X

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.95 Final Boring Depth (ft.): 55.2 H. Datum: NAD 83V. Datum: NAVD 88Northing: 226064.48Easting: 1012062.5

Stab. Time

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/13/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: NQ

Groundwater Depth (ft.)

Date Time Water Depth
See Report for Groundwater Readings

| D 41- | Casing | | | Samp | le | | | O-mark Day minting and Markitian time | 꽃 | Field | - Stratum - |
|----------------|----------------|------|---------------------|--------------|--------------|----------------------|--------------|---|--------|--------------|------------------------|
| Depth (ft) | Blows/ Core | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | O Stratum . (:) |
| | Rate | S-1 | 0.0- | 24 | 17 | 11 12 | Value | S-1: Top 1": Gravel. | I. | Data | 0.1 GRAVEL 11.9 |
| - | | | 2.0 | | | 10 9 | 22 | Medium dense, brown, fine to coarse SAND, little Silt, occasional concrete and coal fragments. (PID = 0.0 ppm) | 1 | | |
| _ | | S-2 | 2.0- 4.0 | 24 | 18 | 6 7 14 12 | 21 | S-2: Medium dense, gray/brown, fine to coarse SAND, little Gravel, little Silt, occasional cinders and coal | | | |
| 5 <u> </u> | | S-3 | 4.0- 6.0 | 24 | 11 | 1 1 1 1 | 2 | fragments. (PID = 0.0) S-3: Very loose, gray, fine to coarse SAND, little Silt, | 2 | | |
| - | | S-4 | 6.0 - 8.0 | 24 | 5 | 1 1 4 6 | 5 | trace Gravel, occasional wood chips. (PID = 137.3) S-4: Loose, black/gray, fine to coarse SAND, little Silt, occasional wood chips. (PID = 4.0) | 2 | | |
| - 10 | | S-5 | 8.0- 10.0 | 24 | 16 | 1 WOH 1 1 | 1 | S-5: Very soft, black, Silty CLAY, occasional roots. (PID = 7.8, PP = 0.7) | 3 | | |
| - 10 | | S-6 | 10.0- 12.0 | 24 | 4 | WOR WOR | 0 | S-6: Very loose, gray/brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.4) | 2 | | |
| - | | S-7 | 12.0- 14.0 | 24 | 12 | WOR 1 2 2 3 4 | 5 | S-7: Loose, gray/brown, fine to medium SAND and SILT. (PID = 0.4 ppm) | | | FILL (7) |
| - 15 _ - | | S-8 | 14.0- 16.0 | 24 | 12 | 2 2 2 5 | 4 | S-8: Loose, gray/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| - - | | | | | | | | | 4 | | |
| 20 _ - - | | S-9 | 20.0-22.0 | 24 | 13 | 2 1 1 2 | 2 | S-9: Very loose, gray/brown, fine to medium SAND, little Silt. (PID = 0.0) | | | |
| - - 25 _ | | S-10 | 25.0- | 24 | 1 | 2 2 | | S-10: No recovery. | | | 26 -14.1 |
| - | | | 27.0 | | | 7 9 | 9 | | | - | UPPER SAND (6) |
| - 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample: S-3, S-4, S-6.

3 - Pocket penetrometer reading in tons per square feet (tsf).

4 - Color change in drilling fluid at approximately 18.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-03

52A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J.:GINT PROJECT DATABASES'41.0163000/41.0163020.00.GPJ

GZA GeoEnvironmental of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-03 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Groundwater Depth (ft.)

55.2

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Date Start: 5/13/2022 **Finish:** 5/13/2022

Type of Rig: ATV Rig Model: CME 750X

Drilling Method:Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.95 H. Datum: NAD 83V. Datum: NAVD 88Northing: 226064.48Easting: 1012062.5

Stab. Time

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: NQ

Final Boring Depth (ft.):

| | Casing | | | Samp | le | | | | Ĭ | Field | Stratum Stratum |
|---------------|------------------------|------|----------------|--------------|--------------|----------------------|--------------|---|--------|--------------|---|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | O Stratum (:) Description (:) (:) |
| | | S-11 | 30.0- | 24 | 5 | 2 3 | | S-11: Loose, brown, fine to coarse SAND, little Silt, trace | | | |
| | | | 32.0 | | | 2 3 | 5 | mica fragments. (PID = 0.0) | | | UPPER SAND (6) |
| _ | | | | | | | | | | | 20.5 |
| _ | | | | | | | | | | - | 33.5 |
| 35 _ | | S-12 | 35.0- | 24 | 14 | 6 6 | | S-12: Medium dense, tan/brown, fine to coarse SAND, | | | |
| - | | | 37.0 | | | 6 11 | 12 | little Silt. (PID = 0.0) | | | LOWER SAND (3b) |
| - | | | | | | | | | | | 2011211 (0, 1112 (00) |
| - | | | | | | | | | | | |
| 40 _ | 2:41 | | | | | | | | | | 39.5 |
| | 0:34 | C-1 | 40.0- 45.0 | 60 | | REC=40% RQD=10% | | C-1: Top 12": Hard, slight to very slightly weathered, fine grained, gray SCHIST, closely dipping horizontal fractures. | 5 | | |
| 5 - | 0:35 | | | | | | | Bottom 12": Brown, fine to medium SAND and SILT, little | | | |
| - | 0:40 | | | | | | | Gravel, trace Decomposed Rock fragments. | | | |
| - | 1:33 | | | | | | | | | | WEATHERED ROCK |
| 45 _ | 4:30 | S-13 | 45.1- | 2 | 2 | 50/2" | R | S-13: Very dense, gray/black Decomposed Rock | | | (1d) |
| - | 7:25 | C-2 | 45.2 45.2- | 60 | 42 | REC=70% RQD=33% | | fragments. (PID = 0.0) C-2: Moderately hard, moderately to slightly weathered, | | | |
| - | 8:17 | | 50.2 | | | 11QD=3370 | | dark gray, fine grained SCHIST with closely spaced | | | |
| - | 4:08 3:24 | | | | | | | subhorizontaly dipping fractures. | | | |
| 50 _ | 3:40 | C-3 | 50.0 | 60 | | REC=100% | | C. 2. Madamatahuhandaa handadhintahuta yanu alimbih. | | - | 50.2 -38.3 |
| - | 2:30 | C-3 | 50.2- 55.2 | 60 | 80 | RQD=97% | | C-3: Moderately hard to hard, slightly to very slightly weathered, dark gray, fine grained SCHIST with closely | | | |
| - | 3:07 | | | | | | | spaced, horizontaly to subhorizontaly dipping fractures. | | | BEDROCK (1a) |
| - | 2:43 | | | | | | | | | | 222110 011 (1.0.) |
| 55 _ | 2:36 | | | | | | | | | | 55.2 -43.3 |
| - | | | | | | | | End of exploration at 55.2 feet. | 6 | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 60 | | | | | | | | | | | |
| , <u> </u> | | | | | | | | | | | |

5 - Hard drilling between 39.0 to 40.0 feet.

6 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-03

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Finish: 5/12/2022

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: **GZ-04**

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman: P. Mullins

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:** Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.83 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226025.8 **Easting:** 1012105.07

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Date Start: 5/12/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| Sample S | | Cooina | | | O | 1. | | _ | | 12 | | |
|--|----------------|---------|--------|---------|-------|------|---------------|---------|---|-------|--------|-------------------|
| S-1 0.0 24 18 11 11 20 9 11 10 9 18 9 11 20 9 11 10 9 8 19 11 20 9 11 10 9 8 19 11 10 9 8 19 11 10 11 10 10 10 10 | Denth | | | | | | | | Sample Description and Identification | arl | | 들 Stratum > 🤝 |
| S-1 0.0 24 18 11 11 20 9 11 10 9 18 9 11 20 9 11 10 9 8 19 11 20 9 11 10 9 8 19 11 10 9 8 19 11 10 11 10 10 10 10 | (ft) | Core | No. | | | | | | (Modified Rurmister Precedure) | em | | 항변 Description 음변 |
| S-2 2.0 | ` ' | Rate | C 1 | \ / | · / | ` ' | , , | value | | 8 | Dala | |
| S-2 2.0 24 20 11 10 9 8 19 11 10 9 8 19 19 11 10 5.2 Medium dense, brown, fine to medium SAND, little Silt, trace Silt, occasional coal and concrete fragments. (PID = 0.0 pm) 5.2 Medium dense, brown, fine to medium SAND, little Silt, occasional coal and concrete fragments. (PID = 0.0) 5.3 Very loose, brown, fine to medium SAND, little Silt, occasional coal and brick fragments. (PID = 0.0) 5.4 Very loose, brown, fine to medium SAND, some Silt. FILL (7) FILL (7 | | | S-1 | | 24 | 10 | | | i i i i i i i i i i i i i i i i i i i | | ۱ ' | OIVAVEE II |
| S-2 2.0 24 20 11 10 9 8 15 5 5 6 10 24 9 WOH 11 11 10 10 5 5 8.0 24 16 1 11 1 10 2 3 3 (PID = 0.0) 5 5 Very loose, brown, fine to medium SAND, little Silt, tocasional coal and price fragments. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to medium SAND, some Silt, Very loose, brown, fine to med | 7 | | | 2.0 | | | 9 11 | 20 | | 1 | | |
| Sa | 4 | | 6.0 | 2.0 | 24 | 20 | 11 10 | | , | | | |
| S-3 4.0 24 9 WOH | | | 3-2 | | 24 | 20 | | 40 | S-2: Medium dense, brown, fine to medium SAND, little | | | |
| 5 6.0 24 16 1 1 1 1 1 1 1 1 | 1 | | | 4.0 | | | 9 8 | 19 | Gravel, trace Silt, occasional coal and concrete fragments. | | | |
| S-4 6.0 24 16 11 1 WOH 1 1 1 WOH 1 1 1 WOH 1 1 1 WOH 1 1 | + | | S-3 | 4 0- | 24 | a | WOH | | (PID = 0.0) | | | |
| S-4 6.0- 24 16 1 1 1 1 NOH 1 1 1 1 Social coal and brick fragments. (PID = 0.0) S-4: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-5: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-6: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-6: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-6: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-6: Very loose, brown, fine to medium SAND, some Silt. S-7: Loose, brown, fine to medium SAND, some Silt. S-8: Very loose, brown, fine to medium SAND, some Silt. S-8: Very loose, brown, fine to medium SAND, some Silt. S-8: Loose, brown, fine to medium SAND, some Silt. S-8: Loose, brown, fine to medium SAND, some Silt. S-9: Loose, brown, fine to medium SAND, some Silt. S-10: Loose, brown, fine to medium SAND, some Silt. S-10: Loose, brown, fine to medium SAND, some Silt. S-10: Loose, brown, fine to | 5 _ | | 0-0 | | ~ | | | 4 | S-3: Very loose, brown, fine to medium SAND, little Silt, | | | |
| S-4 6.0 24 16 1 WOH 1 1 1 (PID = 0.0) S-5 8.0 24 15 1 1 1 (PID = 0.0) S-6 10.0 24 15 1 1 2 1 3 S-5: Very loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-6 10.0 24 21 2 1 3 S-6: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-7 12.0 24 5 2 2 S-7: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-8 14.0 24 10 2 2 3 4 Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 Gravel. (PID = 0.0) S-9: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 S-9: Loose, brown, fine to medium SAND, some Silt. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-2 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-2 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) | | | | 0.0 | | | | ' | occasional coal and brick fragments. (PID = 0.0) | | | |
| S-5 8.0 | 1 | | S-4 | 6.0- | 24 | 16 | | | | | | FILL (7) |
| S-5 8.0- 24 15 1 1 3 S-5: Very loose, brown, fine to medium SAND, some Silt. 2 S-6 10.0- 24 21 2 1 3 trace Gravel. (PID = 12.7) S-7 12.0- 24 5 2 2 S-7: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-8 14.0- 24 10 2 2 3 4 Gravel. (PID = 0.0) S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 S-8: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0- 24 5 6 3 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0- 24 5 6 3 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) | 4 | | | | | | | 1 | | | | |
| S-6 10.0 24 21 2 1 3 S-6 Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 12.7) S-7 12.0 24 5 2 2 S-7: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-8 14.0 24 10 2 2 S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 S-9: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) | | | | 0.0 | | | 1 1 | ' | (112 0.0) | | | |
| S-6 10.0 24 21 2 1 3 3 3 (PID = 0.0) S-6: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 12.7) S-7 12.0 24 5 2 2 3 4 Gravel. (PID = 0.0) S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-8 14.0 24 10 2 2 S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) | 1 | | S-5 | 8.0- | 24 | 15 | 1 1 | | S-5: Very loose, brown, fine to medium SAND, some Silt. | 2 | | |
| S-6 10.0 24 21 2 1 3 S-6: Very loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 12.7) S-7 12.0 24 5 2 2 3 4 Gravel. (PID = 0.0) S-8 14.0 24 10 2 2 S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 For explaining trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 For explaining trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-9 20.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 25.0 24 5 6 3 For explaining trace Gravel. (PID = 0.0) S-10 25.0 25.0 25.0 25.0 25.0 25.0 25.0 25. | 4 | | | 10.0 | | | 2 3 | 3 | (PID = 0.0) | | | |
| 12.0 24 5 2 2 2 3 4 5.7 12.0 24 5 2 2 2 2 3 4 5.7 14.0 24 10 2 2 2 3 4 5.8 14.0 24 10 2 2 2 3 4 5.8 16.0 24 16.0 2 3 4 5.8 16.0 2 4 16.0 2 5 2 5 3 4 5.8 16.0 2 6 16.0 2 7 3 4 5.8 16.0 2 8 1 | 0 | | | | | | | | , | | | |
| S-7 12.0- 24 5 2 2 4 5 2 2 4 5 Gravel. (PID = 0.0) S-8 14.0- 24 10 2 2 3 4 5 Gravel. (PID = 0.0) S-8 14.0- 24 10 2 2 3 4 5 Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 2 2 4 5 Gravel. (PID = 0.0) S-9 22.0- 24 6 4 2 2 2 4 5 Gravel. (PID = 0.0) S-9 22.0- 24 5 6 3 5 6 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have learn and at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors Exploration No.: GZ-04 | | | S-6 | 10.0- | 24 | 21 | 2 1 | | S-6: Very loose, brown, fine to medium SAND, little Silt, | | | |
| S-7 12.0 24 5 2 2 3 4 5 7 12.0 24 10 2 2 3 4 5 5 2 2 2 3 4 5 5 2 2 2 3 4 5 5 2 2 2 3 4 5 5 2 2 3 4 5 5 2 2 3 4 5 5 2 2 3 4 5 5 2 2 3 4 5 5 2 2 3 4 5 5 2 2 4 5 5 2 2 4 5 5 2 2 4 5 5 2 2 4 5 5 2 2 4 5 5 5 5 5 5 5 5 5 | + | | | 12.0 | | | 2 1 | 3 | trace Gravel. (PID = 12.7) | | | |
| S-8 14.0 24 10 2 3 4 Gravel. (PID = 0.0) S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-9: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 3 5 6 trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. Even Log Key for exploration of sample description and identification procedures. Stratification lines represent proximate boundaries between soil and bedrock types, Actual transitions may be gradual. Water level readings have en made at the times and under the conditions stated. Fluctualtors of groundwater may occur due to other factors GZ-04 | | | | | | | | | | | | 12 - |
| S-8 14.0 24 10 2 2 3 4 S-8: Loose, brown, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) S-9 20.0 24 6 4 2 2 2 4 trace Gravel. (PID = 0.0) S-9 22.0 24 5 6 3 3 5 6 trace Gravel. (PID = 0.0) S-10 25.0 24 5 6 3 3 5 6 trace Gravel. (PID = 0.0) Table 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors Exploration No.: GZ-04 | | | S-7 | 12.0- | 24 | 5 | | | | | | |
| S-9 20.0- 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 3 5 6 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent proximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings had under the conditions stated. Fluctualitions of groundwater may be cure use to techer factors GZ-04 | 1 | | | 14.0 | | | 2 3 | 4 | Gravel. (PID = 0.0) | | | |
| S-9 20.0- 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-9 20.0- 24 6 4 2 2 4 trace Gravel. (PID = 0.0) S-10 25.0- 24 5 6 3 3 5 6 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent proximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings had under the conditions stated. Fluctualitions of groundwater may be cure use to techer factors GZ-04 | 4 | | | 440 | | 4.0 | | | 0 0 1 | | | |
| S-9 20.0- 24 6 4 2 S-9: Loose, brown, fine to medium SAND, some Silt, 3 UPPER SAND (6) S-10 25.0- 24 5 6 3 S-10: Loose, brown, fine to medium SAND, some Silt, 1 trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures, Stratification lines represent proximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have learn made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-04 | 5 | | S-8 | | 24 | 10 | | | | | | |
| S-9 20.0- 24 6 4 2 2 4 | | | | 16.0 | | | 2 3 | 4 | Gravel. (PID = 0.0) | | | |
| S-9 20.0- 24 6 4 2 2 2 4 4 4 2 2 2 | 4 | | | | | | | | | | | |
| S-10 25.0- 24 5 6 3 3 5 6 S-10: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-04 | 20 _ - - | | S-9 | | 24 | 6 | | 4 | | 3 | | UPPER SAND (6) |
| 1 - Sample scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent performance boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have een made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-04 | - | | S-10 | | 24 | 5 | | 6 | | | | |
| 2 - Petroleum odor in sample. 3 - Color change in drilling fluid between 16.0 to 20.0 feet. See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors Exploration No.: GZ-04 | 30 | | | | | | | | | | | |
| approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-04 | ග 2 | - Petro | leum | odor in | samp | le. | Ü | • | 0 1 | n par | ts per | million (ppm). |
| approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-04 | \perp | | | | | | | | | | . 1 = | |
| veen made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors GZ-U4 | | | | | | | | | | | | |
| | been | made | at the | times a | and u | nder | the condition | ons sta | ated. Fluctuations of groundwater may occur due to other fa | actor | š | GZ-04 |
| | | | | | | | | | | | | |

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-04 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Date Start: 5/12/2022 **Finish:** 5/12/2022

Type of Rig: ATV
Rig Model: CME 750X
Drilling Method:

B
B
S
G

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.83 Final Boring Depth (ft.): 40.1 H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226025.8 Easting: 1012105.07

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Mud Rotary

| | Casing | | ; | Samp | ole | | | | Ιž | Field | ⊆ Stratum |
|---------------------|------------------------|------|----------------|------|------------|----------------------|--------------|--|--------|--------------|---|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ଳ ⊭ Description ≗ ⊭ |
| - | Ivate | S-11 | 30.0- 32.0 | 24 | 8 | 4 2 2 2 | 4 | S-11: Loose, brown, fine to medium SAND, some Silt, trace Gravel. (PID = 0.0) | | | UPPER SAND (6) |
| - 35 _ - - | | S-12 | 35.0- 37.0 | 24 | 10 | 11 11 16 21 | 27 | S-12: Medium dense, brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | 335 |
| - 40 _ | | S-13 | 40.0- | 1 1 | 1 1 | 100/1" | R | S-13: Very dense, gray/yellow/white, fine SAND, trace | 4 | - | 38.5 -26.7 WEATHERED ROCK 40.1 (1d) -28.3 |
| - | | | 40.1 | | | | | Silt, frequent Decomposed Rock fragments. (PID = 0.0) End of exploration at 40.1 feet. | | | |
| - 45 _ - | | | | | | | | | | | |
| - - 50 _ | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 55 _ - - | | | | | | | | | | | |
| - - 30 | | | | | | | | | | | |

4 - Hard drilling at approximately 38.5 feet.

5 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-04

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-05 SHEET: 1 of 2

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Date Start: 5/12/2022 **Finish:** 5/12/2022

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan
Stationing (ft.): Offset (ft.):
Ground Surface Elevation (ft.): 10.88
Final Boring Depth (ft.): 40.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225958.25 Easting: 1012161.73

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

| | Casing | | | Samp | ole | | | 0 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | ž | Field | € Stratum > |
|---------------|------------------------|------|----------------|--------------|------|----------------------|--------------|---|--------|--------------|---------------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | 🛱 ≓ Description 🖭 ≓ |
| | | S-1 | 0.0- | 24 | 15 | 10 11 | | S-1: Top 1": Gravel | | ١ | 0.1 GRAVEL 10.8 |
| - | | | 2.0 | | | 17 10 | 28 | Medium dense, black/brown, medium to coarse SAND, | 1 | | |
| _ | | S-2 | 2.0- | 24 | 14 | 6 5 | | little Gravel, occasional coal and brick fragments. (PID = | | | |
| _ | | 0-2 | 4.0 | 24 | '- | 7 7 | 12 | 0.0 ppm) | | | |
| _ | | | | | | | '- | S-2: Medium dense, dark brown, fine to medium SAND, little Silt, trace Gravel, occasional coal fragments. (PID = | | | |
| 5 | | S-3 | 4.0- | 24 | 14 | 1 2 | _ | 30.3) | | | FUL (7) |
| | | | 6.0 | | | 5 5 | 7 | S-3: Loose, brown/tan, fine to coarse SAND, little Gravel, | | | FILL (7) |
| - | | S-4 | 6.0- | 24 | 9 | 5 4 | | little Silt, occasional coal fragments. (PID = 0.0) | | | |
| - | | | 8.0 | | | 7 8 | 11 | S-4: Medium dense, tan, fine to coarse SAND, little | | | |
| _ | | S-5 | 8.0- | 24 | 6 | 2 2 | | Gravel, little Silt, trace mica fragments, occasional | | | |
| _ | | 3-3 | 10.0 | 24 | 0 | 3 4 | 5 | cinders. (PID = 0.4) | | | |
| 10 | | | 10.0 | | | | 3 | S-5: Medium dense, tan, fine to coarse SAND, little | | | 10 0. |
| | | S-6 | 10.0- | 24 | 5 | 2 3 | | Gravel, little Silt, occasional cinders. (PID = 0.0) S-6: Loose, tan/gray, fine to coarse SAND, little Silt, trace | | | |
| - | | | 12.0 | | | 4 4 | 7 | Gravel. (PID = 0.0) | | | |
| - | | S-7 | 12.0- | 24 | 12 | 1 1 | | S-7: Loose, tan/gray, fine to coarse SAND, little Silt, trace | | | |
| - | | | 14.0 | | | 1 6 | 2 | Gravel. (PID = 0.0) | | | |
| - | | 0.0 | 110 | | 40 | 0.0 | | C.O. Vanulassa sunsu fina ta madii una CAND little Cit | | | UPPER SAND (6) |
| 15 _ | | S-8 | 14.0- 16.0 | 24 | 13 | 2 3 5 8 | 8 | S-8: Very loose, gray, fine to medium SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| 15 | | | 10.0 | | | 3 6 | 0 | Trace Graver. (FID = 0.0) | | | |
| | | | | | | | | | | | |
| - | | | | | | | | | | | 40 7 |
| - | | | | | | | | | 2 | | 18 |
| - | | | | | | | | | | | |
| 20 _ | | 0.0 | 00.0 | | | | | CO. Madiana dana ana dia ana fina ta ana ana CAND | | | |
| _ | | S-9 | 20.0- 22.0 | 24 | 11 | 5 5 7 8 | 40 | S-9: Medium dense, gray/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| | | | 22.0 | | | 1 0 | 12 | Illue Silt, trace Graver. (FID = 0.0) | | | |
| _ | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | LOWER SAND (3b) |
| 25 _ | | S-10 | 25.0- | 24 | 12 | 6 6 | | S-10: Medium dense, brown, fine to medium SAND, | | | |
| _ | | 0-10 | 27.0 | 24 | '2 | 6 6 | 12 | some Gravel, little Silt. (PID = 0.0) | | | |
| _ | | | | | | | '- | | | | |
| | | | | | | | | | | | |
| _ |] | | | | | | | | | | |
| - | | | | | | | | | | | |
| 30 | | | | | | | | | L | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Color changed in drilling fluid at approximately 17.5 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-05

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins

Finish: 5/12/2022

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 10.88 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225958.25 Easting: 1012161.73

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/12/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | Casing | | ; | Samp | ole | | | | ΙΞ̈́ | Field | ⊆ Stratum |
|---------------|------------------------|------|----------------|------|-----|-------------------|--------------|---|----------|--------------|----------------------|
| Jepth (ft) | Blows/ Core Rate | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ਲ ਦ Description ੰਦ ਦ |
| _ | Rate | S-11 | 30.0- 32.0 | 24 | 14 | 20 15 16 15 | 31 | S-11: Dense, gray/brown, fine to medium SAND, some Gravel, little Silt. (PID = 0.0) | <u> </u> | | LOWER SAND (3b) |
| - | | | | | | | | | 3 | - | WEATHERED ROCK |
| 35 _ | 3:03 | S-12 | 35.0- | 1 | 1 | 50/1" | R | S-12: Decomposed Rock fragments. (PID = 0.0) | | - | 35.1 -24.2 |
| - | 3:02 | C-1 | 35.1 | 60 | 1 | REC=95% | | C-1: Hard to very hard, slight to very slightly weathered, | | | |
| - | 3:15 | | 35.1- 40.1 | | | RQD=72% | | dark gray, fine grained SCHIST, with closely spaced, horizontaly dipping fractures. | | | BEDROCK (1b) |
| - | 3:02 | | | | | | | | | | |
| 40 _ | 3:34 | | | | | | | | | | 40.1 -29.2 |
| _ | | | | | | | | End of exploration at 40.1 feet. | 4 | | |
| _ | | | | | | | | | | | |
| - | - | | | | | | | | | | |
| - | | | | | | | | | | | |
| 45 _ | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| | | | | | | | | | | | |
| 50 _ | | | | | | | | | | | |
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| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 55 _ | <u> </u> | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 60 | ĺ | | | | | | | | | | |

3 - Hard drilling between 32.0 to 35.0 feet.

4 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-05

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Finish: 5/20/2022

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. P. Mullins Foreman:

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 22.79 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226093.95 Easting: 1011800.11

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/20/2022

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | | | | | | | | | 1., | | |
|---------------|--------------|--------|----------------|--------------|--------------|---|--------------|--|--------------|--------------|---------------------------|
| D = 41= | Casing | | | Samp | le | | | Communication and Identification | 풅 | Field | £ _ Stratum .: _ |
| Depth (ft) | Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | Stratum . (±) |
| | Nate | S-1 | 0.0- | 24 | 14 | 7 12 | | S-1: Top 1": Gravel | | ١ ١ | 0.1 GRAVEL 22. |
| 4 | | | 2.0 | | | 8 9 | 20 | Medium dense, gray/brown, fine to coarse SAND, little | | | |
| | | | | | | | 20 | Silt, trace Gravel, occasional coal fragments. (PID = 0.1 | 1 | | |
| 1 | | S-2 | 2.0- | 24 | 11 | 6 7 | | ppm) | | | |
| 4 | | | 4.0 | | | 8 9 | 15 | | | | |
| | | | | | | | | S-2: Medium dense, brown, fine to medium SAND, little | | | |
| _] | | S-3 | 4.0- | 24 | 8 | 4 8 | | Silt, trace Gravel, occasional coal fragments. (PID = 0.1) | | | |
| 5 _ | | | 6.0 | | | 7 6 | 15 | S-3: Medium dense, brown, fine to coarse SAND, little | | | |
| | | | | | | | | Silt, trace Gravel, occasional coal fragments. (PID = 0.0) | | | FILL (7) |
| | | S-4 | 6.0- | 24 | 8 | 4 8 | | S-4: Loose, brown, fine to coarse SAND, little Gravel, little | | | 1 122 (7) |
| ┪ | | | 8.0 | | | 7 6 | 15 | Silt, occasional brick fragments. (PID = 0.0) | | | |
| 4 | | ۰. | 0.0 | | 4.0 | - 0 | | 0.5 14 15 1 1 16 5 1 0 0 1 1 1 1 1 | | | |
| | | S-5 | 8.0- | 24 | 10 | 5 6 | | S-5: Medium dense, brown/tan, fine to coarse SAND, little | | | |
| _ 1 | | | 10.0 | | | 5 4 | 11 | Gravel, little Silt. (PID = 0.0) | | | |
| ۵ ــا | | S-6 | 10.0- | 24 | 2 | 3 4 | | S. 6: Modium dance grow fine CRAVEL trace Sand (DID | | | |
| | | S-0 | | 24 | 2 | | | S-6: Medium dense, gray fine GRAVEL, trace Sand. (PID | | | |
| ٦ | | | 12.0 | | | 7 15 | 11 | = 0.0) | | | 40 |
| 4 | | S-7 | 12.0- | 24 | 11 | 16 16 | | S-7: Medium dense, brown/tan, fine to coarse SAND and | | - | 12 10 |
| | | 0 , | 14.0 | | ' ' | 21 18 | 37 | SILT, little Gravel. (PID = 0.0) | | | |
| | | | 14.0 | | | 21 10 | 31 | SILT, IIIIIE GIAVEI. (FID = 0.0) | | | |
| _ 1 | | S-8 | 14.0- | 24 | 10 | 10 13 | | S-8: Medium dense, brown/tan, fine to coarse SAND and | 2 | | |
| 5 _ | | | 16.0 | | | 14 12 | 27 | SILT, little Gravel. (PID = 0.0) | - | | |
| | | | 10.0 | | | 17 12 | 21 | OIL1, made Gravon. (1 15 0.0) | | | |
| 20 | | S-9 | 20.0- 22.0 | 24 | 11 | 5 8 8 9 | 16 | S-9: Medium dense, tan, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | LOWER SAND (3a/3 |
| 25 _ | | S-10 | 25.0- 27.0 | 24 | 13 | 8 14 17 17 | 31 | S-10: Dense, tan/brown, fine to coarse SAND, some Gravel, little Silt. (PID = 0.0) | | | |
| | | | | | | | | nds using a photo ionization detector (PID). Results reported sample recovery. | in pa | arts pe | r million (ppm). |
| See appro | made | at the | times a | and u | nder ' | sample de il and bedro the condition measureme | ns sta | on and identification procedures. Stratification lines reproces. Actual transitions may be gradual. Water level readings ated. Fluctuations of groundwater may occur due to other factor made. | eser have | e E | Exploration No.: GZ-15 |

GZA GeoEnvironmental of New York Engineers and Scientists Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-15 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Offset (ft.):

Logged By: A. Amador
Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Date Start: 5/20/2022 **Finish:** 5/20/2022

Type of Rig: ATV
Rig Model: CME 750X

Boring Location: See Plan
Stationing (ft.):

Off

Drilling Method: Ground Surface Elevation (ft.): 22.79
Mud Rotary Final Boring Depth (ft.): 57

H. Datum: NAD 83
V. Datum: NAVD 88
Northing: 226093.95
Easting: 1011800.11

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

| Casing | | | Sama | No. | | _ | | | | |
|-----------------------------------|------|---------------|----------------------|-----|----------------------|--------------|--|--------------|-----------------------|--------------------|
| Depth Blows/ (ft) Core Rate | No. | | Samp Pen. (in) | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Field Test Data | Description 🚊 🛨 |
| - | S-11 | 30.0- 32.0 | 24 | 11 | 10 8 10 14 | 18 | S-11: Medium dense, tan, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | _ | | |
| 35 _ | S-12 | 35.0- 37.0 | 24 | 13 | 12 12 14 16 | 26 | S-12: Medium dense, tan, fine to coarse SAND, little Gravel, little Silt. (PID = 0.0) | | | |
| 40 | S-13 | 40.0- 42.0 | 24 | 14 | 10 11 13 16 | 24 | S-13: Medium dense, tan/brown, fine to coarse SAND, little Gravel, little Silt. (PID = 0.0) | | | LOWER SAND (3a/3b) |
| 45 | S-14 | 45.0- 47.0 | 24 | 13 | 13 13 14 16 | 27 | S-14: Medium dense, tan, fine to coarse SAND, some Gravel, little Silt. (PID = 0.0) | | | |
| 50 | S-15 | 50.0- 52.0 | 24 | 7 | 11 8 24 31 | 32 | S-15: Dense, tan/brown, fine to coarse SAND, some Gravel, little Silt. (PID = 0.0) | | | |
| 55 | S-16 | 55.0- 55.7 | 8 | 8 | 28 50/2" | R | S-16: Very dense, gray, fine to coarse SAND, trace Silt, frequent Decomposed Rock fragments. (PID = 0.0) End of exploration at 57 feet. | 3 | - | 55 |
| 60 | | | | | | | End of exploration at of feet. | 7 | | |

3 - Hard drilling between 55.0 to 57.0 feet. Roller bit could not advance below 57.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-15

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

^{4 -} Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

Drilling Method:

Sampler Type: SS

Mud Rotary

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Date Start: 5/11/2022 Finish: 5/11/2022 Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.05

40.5

Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225765.51 Easting: 1012027.77

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Rock Core Size: N/A

| | Groundw | ater Depth (ft.) | |
|--------------|-------------|------------------|------------|
| Date | Time | Water Depth | Stab. Time |
| See Report f | or Groundwa | ter Readings | |

| | Casing | | | Comp | مام | | | | 12 | | _ |
|-------------|-----------------|---------|----------|---------|----------|--------------|-----------|--|--------|---------|-------------------------|
| Depth | Blows/ | | | Samp | | DI | ODT | Sample Description and Identification | Jar | Field | € Stratum |
| (ft) | Core | No. | Depth | | | Blows | SPT | (Modified Burmister Procedure) | Remark | Test | Stratum Stratum Stratum |
| ` ' | Rate | | (ft.) | (in) | (in) | , , | Value | , | Ř | Data | |
| | | S-1 | 0.0- | 24 | 17 | 11 15 | | S-1: Top 2": Asphalt | | ١ ١ | 0.2 ASPHALT 11 |
| + | | | 2.0 | | | 19 16 | 34 | Dense, brown/black, fine to coarse SAND, some Gravel, | 1 | | |
| | | | | | | | | little Silt, occasional coal fragments. (PID = 0.0 ppm) | ' | | |
| | | S-2 | 2.0- | 24 | 21 | 12 11 | | S-2: Medium dense, black/gray, fine to coarse SAND, | | | |
| + | | | 4.0 | | | 10 10 | 21 | | | | |
| | | | | | | | | little Gravel, little Silt, occasional cinder and coal | | | |
| _] | | S-3 | 4.0- | 24 | 17 | 1 2 | | fragments. (PID = 0.0) | | | |
| 5 _ | | | 6.0 | | | 3 4 | 5 | S-3: Loose, brown, fine to medium SAND, little Silt, trace | | | |
| | | | | | | | | Gravel, occasional cinders.(PID = 0.0) | | | |
| 1 | | S-4 | 6.0- | 24 | 6 | 2 3 | | S-4: Loose, brown, fine to medium SAND, little Silt, trace | | | |
| - 4 | | | 8.0 | | | 2 2 | 5 | Gravel, occasional cinders.(PID = 0.0) | | | FILL (7) |
| | | | | | | | | , | | | |
| ٦ | | S-5 | 8.0- | 24 | 9 | 1 1 | | S-5: Very loose, black, fine to medium SAND, little Silt, | 2 | | |
| - | | | 10.0 | | | 1 1 | 2 | trace Gravel. (PID = 3.6) | | | |
| | | | | | | | _ | - (| | | |
| | | S-6 | 10.0- | 24 | 3 | 1 WOH | | S-6: Very loose, black, fine to medium SAND, little | | | |
| 4 | | | 12.0 | | | 1 1 | 1 | Gravel, little Silt. (PID = 2.4) | | | |
| | | | | | | | • | 2, | | | |
| 1 | | S-7 | 12.0- | 24 | 4 | 1 2 | | S-7: Very loose, black, fine to medium SAND, little | | | |
| 4 | | | 14.0 | | | 2 2 | 4 | Gravel, little Silt. (PID = 29.3) | | | |
| | | | | | | | · | | | | 14 - |
| _ 1 | | S-8 | 14.0- | 24 | 6 | 1 1 | | S-8: Loose, brown, fine to coarse SAND, little Silt, trace | | | |
| 5 _ | | | 16.0 | | | 3 4 | 4 | Gravel. (PID = 0.2) | | | |
| | | | | | | | | , | | | |
| ٦ | | | | | | | | | | | |
| 4 | | | | | | | | | 2 | | |
| | | | | | | | | | 3 | | |
| 1 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
|) | | | | | | | | | | | |
| | | S-9 | 20.0- | 24 | 7 | 2 3 | | S-9: Loose, tan/brown, fine to coarse SAND, little Silt, | | | |
| + | | | 22.0 | | | 4 4 | 7 | trace Gravel. (PID = 0.1) | | | |
| | | | | | | | | , | | | UPPER SAND (6) |
| | | | | | | | | | | | OFFER SAND (0) |
| + | | | | | | | | | | | |
| | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| ′⊢ | | S-10 | 25.0- | 24 | 7 | 4 4 | | S-10: Loose, tan/brown, fine to coarse SAND, little Silt, | | | |
| | | • | 27.0 | | | 5 5 | 9 | trace Gravel. (PID = 0.0) | | | |
| | | | 27.0 | | | 3 3 | 9 | trace Graver. (1 ID = 0.0) | | | |
| - | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| | | | | | | | | | | | |
| ્⊤ | | | | | | | | | | | |
|) | | | | | \vdash | | | | | | |
| | | | | | | organic coi | mpour | nds using a photo ionization detector (PID). Results reported | in pa | arts pe | r million (ppm). |
| | | | odor in | | | at approvin | aataly | 17.0 foot | | | |
| د ا کِ | - C010 | cnan | gea in a | iriiing | ilula | at approxin | nately | 17.0 leet. | | | |
| 3 1 1 | | | | | | | | | | | |
| <u> </u> | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| | | | | | | | | | | | |
| ee | Log K | ey fo | r explor | rațion | of s | sample des | scription | on and identification procedures. Stratification lines repr | eser | nt E | Exploration No.: |
| ppro | oximate made | boun | daries b | etwee | en so | II and bedro | ock typ | oes. Actual transitions may be gradual. Water level readings ated. Fluctuations of groundwater may occur due to other fa | hav | e I | GZ-19 |
| | | | | | | neasureme | | | JULUI | ٦ | ~ _ .• |
| | | . 55571 | | | | | *** | | | | |

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. P. Mullins Foreman:

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Sampler Type: SS

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.05 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225765.51 Easting: 1012027.77

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/11/2022

Sampler O.D. (in.): 2.0 Hammer Fall (in.): 30 Sampler Length (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Rock Core Size: N/A

Finish: 5/11/2022

| | Groundw | ater Depth (ft.) | |
|--------------|-------------|------------------|------------|
| Date | Time | Water Depth | Stab. Time |
| See Report f | or Groundwa | ter Readings | |

| | Casing | | , | Samp | ole | | | | ĸ | Field | ⊆ Stratum : |
|---------------------|------------------------|-------------------|----------------|------|-----|----------------------|--------------|---|----------|-------|---|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test | Stratum Stratum (#) |
| - - | rate | S-11 | 30.0- 32.0 | 24 | 9 | 7 5 6 7 | 11 | S-11: Medium dense, tan/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | <u>u</u> | | UPPER SAND (6) |
| - 35 _ - - | | S-12 | 35.0- 37.0 | 24 | 7 | 5 7 20 27 | 27 | S-12: Very stiff, gray/brown SILT, little Gravel, little Sand. (PID = 0.0 ppm) | 4 | - | LOWER SAND (3b) |
| - 40 _ - - | | S-13 _, | 40.0- 40.4 | 5 | 5 | 100/5" | R | S-13: Hard brown/black SILT, little Sand, occasional Decomposed Rock fragments. (PID = 0.0) End of exploration at 40.5 feet. | 5 | - | ⁴⁰ 4W FEATHERED ROC K (1d) |
| - 45 _ - | | | | | | | | | | | |
| - - 50 _ - | | | | | | | | | | | |
| - - 55 _ | | | | | | | | | | | |
| - - - 60 | | | | | | | | | | | |

4 - Hard drilling at approximately 37.0 feet.

5 - Hard drilling; rig chattered at approximately 40.5 feet.

Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-19

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:28 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: GZ-20 SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

P. Mullins Foreman:

Date Start: 5/18/2022 Finish: 5/19/2022 Type of Rig: ATV Rig Model: CME 750X

Drilling Method: Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.25 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225994.96 Easting: 1011735.97

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Groundwater Depth (ft.) Sampler Type: SS Date Time Water Depth Stab. Time Sampler O.D. (in.): 2.0 See Report for Groundwater Readings Sampler Length (in.): 24 Rock Core Size: NQ

| | Casing | | | Camp | .lo | | _ | | 노 | | |
|-------|--------|------|-------|------|----------|-------------|-------|--|--------|-------|--------------------|
| Depth | Blows/ | | | Samp | | | | Sample Description and Identification | ā | Field | € Stratum > |
| (ft) | Core | No. | | Pen. | | Blows | SPT | (NA adifical Diamaiatan Dagasadiana) | Remark | Test | |
| (11) | Rate | | (ft.) | (in) | (in) | (per 6 in.) | Value | · | ď | Data | |
| | | S-1 | 0.0- | 24 | 14 | 3 5 | | S-1: Top 1": Gravel | | 1 | 0.1 GRAVEL 12.2 |
| - | | | 2.0 | | | 10 11 | 15 | Medium dense, black/brown, medium to coarse SAND, | 1 | | |
| | | | | | | | | little Gravel, occasional coal and brick fragments. (PID = | ' | | |
| _ | | S-2 | 2.0- | 24 | 11 | 9 8 | | 0.0 ppm) | | | |
| - | | | 4.0 | | | 7 7 | 15 | '' ' | | | |
| | | | _ | | | | | S-2: Medium dense, black/brown, medium to coarse | | | |
| | | S-3 | 4.0- | 24 | 10 | 3 2 | | SAND, little Gravel, occasional coal and brick fragments. | | | |
| 5 _ | | | 6.0 | | | 3 3 | 5 | (PID = 0.0) | | | FILL (7) |
| | | | | | | | | S-3: Loose, black/brown, fine to coarse SAND, little Silt, | | | , , |
| - | | S-4 | 6.0- | 24 | 6 | 3 2 | | trace Gravel, occasional coal fragments. (PID = 0.0) | | | |
| _ | | | 8.0 | | | 3 3 | 5 | S-4: Loose, black/brown, fine to coarse SAND, little Silt, | | | |
| | | | 0.0 | | | | " | trace Gravel, occasional coal fragments. (PID = 0.0) | | | |
| - | | S-5 | 8.0- | 24 | 7 | 3 4 | | | | | |
| _ | | | 10.0 | | | 3 4 | 7 | S-5: Loose, black/brown, fine to coarse SAND, little Silt, | | | |
| 10 | | | 10.0 | | | 0 4 | ′ | trace Gravel, occasional coal fragments. (PID = 0.0) | | | 10 2.3 |
| | | S-6 | 10.0- | 24 | 9 | 1 4 | | S-6: Medium dense, tan/gray, fine to coarse SAND, some | | - | |
| _ | | | 12.0 | - ' | • | 5 4 | 9 | Gravel, little Silt. (PID = 0.0) | | | |
| | | | 12.0 | | | 3 4 | 9 | Graver, little Slitt. (1 ID = 0.0) | | | |
| - | | S-7 | 12.0- | 24 | 9 | 1 4 | | S-7: Loose, tan/brown, fine to coarse SAND, little Silt, | | | |
| _ | | ٠. | 14.0 | - ' | | 5 6 | 9 | trace Gravel. (PID = 0.0) | | | |
| | | | 14.0 | | | 3 0 | 9 | lace Glavel. (LID = 0.0) | | | |
| - | | S-8 | 14.0- | 24 | 7 | 3 8 | | S-8: Medium tan/gray, fine to coarse SAND, some | | | UPPER SAND (6) |
| 15 _ | | 0-0 | 16.0 | ~ | ' | 22 12 | 20 | Gravel, little Silt. (PID = 0.0) | | | |
| | | | 10.0 | | | 22 12 | 30 | Graver, fillie Sift. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| | | | | | | | | | 2 | | 18 -5.8 |
| - | | | | | | | | | | - | |
| _ | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 20 _ | | S-9 | 20.0- | 24 | 5 | 8 8 | | S-9: Medium dense, tan/gray, fine to coarse SAND, little | | | |
| | | 0-9 | | 4 | " | | 4.0 | , , , , , , , , , , , , , , , , , , , | | | |
| | | | 22.0 | | | 8 8 | 16 | Silt, trace Gravel. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| - | | | | | | | | | | | LOWER SAND (3a/3b) |
| 25 | | | | | | | | | | | ' ' |
| | | S-10 | 25.0- | 24 | 7 | 6 6 | | S-10: Medium dense, tan/gray, fine to coarse SAND, little | | | |
| - | | | 27.0 | | | 7 8 | 13 | Silt, trace Gravel. (PID = 0.0) | | | |
| | | | | | | - | | , | | | |
| 15 | | | | | | | | | | | |
| - | | | | | | | | | | | |
| | | | | | | | | | | | |
| 00 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Hard drilling between 17.0 to 20.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-20

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador Drilling Co.: Craig Geotechnical Testing, Inc.

P. Mullins Foreman:

Date Start: 5/18/2022 Finish: 5/19/2022 Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Sampler Type: SS

Sampler O.D. (in.): 2.0

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.25 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225994.96 Easting: 1011735.97

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Sampler Length (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Rock Core Size: NQ

| | Groundw | ater Depth (ft.) | |
|--------------|-------------|------------------|------------|
| Date | Time | Water Depth | Stab. Time |
| See Report f | or Groundwa | ter Readings | |

| | Casing | Sample | | | | | 0 1 5 111 65 6 | ırk | Field | € Stratum > | |
|---------------|--|--------|---------------|--------------|--------------|---------------------|----------------|--|--------|--------------|--------------------------|
| Depth (ft) | Blows/ Core Rate | No. | (ft.) | Pen. (in) | Rec. (in) | | SPT Value | | Remark | Test Data | ା ଇ≓ Description ଅ ≓ |
| - | | S-11 | 30.0- 32.0 | 24 | 5 | 9 6 7 7 | 13 | S-11: Medium dense, tan/gray, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| 35 | | S-12 | 35.0- 37.0 | 24 | 10 | 26 15 25 43 | 40 | S-12: Dense, tan/gray, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | LOWER SAND (3a/3b) |
| 40 | | S-13 | 40.0- 42.0 | 24 | 6 | 13 23 33 37 | 56 | S-13: Very dense, brown/black, fine to coarse SAND, little Silt, occasional Decomposed Rock fragments. (PID = 0.0) | | | |
| 45 - - | 2:12 2:51 3:14 3:08 | C-1 | 45.0- 50.0 | 60 | 34 | REC=57% RQD=22% | l | C-1: Moderately hard, moderately to slightly weathered, dark gray, fine grained SCHIST with closely spaced, moderately dipping fractures. | 3 | - | WEATHERED ROCK (1d) |
| 45 | 3:47 4:01 3:19 3:24 3:25 3:56 | C-2 | 50.0- 55.0 | 60 | | REC=100% RQD=93% | l | C-2: Moderately hard to hard, slight to very slightly weathered, dark gray, fine grained SCHIST with moderately closely to closely spaced, subhorizontaly dipping fractures. | | - | 50 -37.8 BEDROCK (1a) |
| 55 | 0.00 | | | | | | | End of exploration at 55 feet. | 4 | | 55 -42.8 |
| 60 | | | | | | | | | | | |

3 - Hard drilling between 43.0 to 45.0 feet.

4 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-20

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

H. Datum: NAD 83

V. Datum: NAVD 88

Northing: 225980.65

1011674.55

Stab. Time

Logged By: A. Amador Drilling Co.: Craig Geotechnical Testing, Inc.

P. Mullins Foreman:

Date Start: 5/18/2022 Finish: 5/18/2022 Type of Rig: ATV Boring Location: See Plan

Rig Model: CME 750X Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 10.01 **Drilling Method:** Mud Rotary Final Boring Depth (ft.): 38.6

Easting: Groundwater Depth (ft.)

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Date Time **Water Depth** Sampler O.D. (in.): 2.0 See Report for Groundwater Readings Sampler Length (in.): 24 Rock Core Size: N/A

| | | | | | | | | | <u> </u> | | |
|----------|----------------|------|----------------|--------------|--------------|-------------------|-------|--|----------|--------------|--|
| Donth | Casing | | | Samp | | | | Cample Description and Identification | 뚩 | Field | € Stratum > C |
| (ft) | Blows/ Core | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | Stratum Stratu |
| | Rate | S-1 | 0.0- | 24 | 13 | 4 8 | value | S-1: Top 1": Gravel | 2 | Dala | 0.1 GRAVEL 9.9 |
| _ | | 0-1 | 2.0 | 24 | 13 | 7 7 | 4.5 | Medium dense, black, fine to coarse SAND, little Gravel, | | \ \ \ \ | 0.0 |
| | | | 2.0 | | | 1 1 | 15 | | 1 | | |
| - | - | S-2 | 2.0- | 24 | 9 | 2 2 | | little Silt, occasional cinders, coal and brick fragments. | | | |
| _ | | - | 4.0 | | | 2 1 | 4 | (PID = 0.0 | | | |
| | | | 4.0 | | | - ' | - | S-2: Loose, red/brown, fine SAND, some Silt, occasional | | | |
| | 1 | S-3 | 4.0- | 24 | 16 | 2 2 | | coal and brick fragments. (PID = 0.0 ppm) | | | |
| 5_ | - 1 | | 6.0 | | | 5 7 | 7 | S-3: Loose, brown, fine to medium SAND, little Silt, trace | | | |
| _ | | | | | | | | Gravel. (PID = 0.0) | | | |
| | | S-4 | 6.0- | 24 | 17 | 5 8 | | S-4: Medium dense, brown, fine to medium SAND, little | | | |
| - | - | | 8.0 | | | 11 11 | 19 | Silt, trace Gravel. (PID = 0.0) | | | |
| - | | S-5 | 9.0 | 24 | 15 | 1 1 | | S. F. Vany loose brown/gray fine to madium SAND little | | | |
| | | S-5 | 8.0- | 24 | 15 | | | S-5: Very loose, brown/gray, fine to medium SAND, little | | | |
| 10 | | | 10.0 | | | 1 1 | 2 | Silt, trace Gravel. (PID = 0.0) | | | |
| 10 - | 1 | S-6 | 10.0- | 24 | 9 | 1 1 | | S-6: Very loose, brown/gray, fine to medium SAND, little | | | |
| | | | 12.0 | | | 1 1 | 2 | Silt, occasional brick fragments. (PID = 0.0) | | | |
| ; | | | 12.0 | | | | - | one, occasional briok raginario. (1 12 0.0) | | | FILL (7) |
| - | | S-7 | 12.0- | 24 | 6 | 1 WOH | | S-7: Very loose, brown/gray, fine to medium AND, little | | | 1 122 (1) |
| i - | - | | 14.0 | | | 1 1 | 1 | Silt, occasional brick fragments. (PID = 0.0) | | | |
| - | | | | | | | | · , , , | | | |
| 15 | | S-8 | 14.0- | 24 | 7 | 1 WOH | | S-8: Very loose, brown/gray, fine to medium SAND, little | | | |
| ' | | | 16.0 | | | 1 WOH | 1 | Silt, occasional brick fragments. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| | | | | | | | | | | | |
| il - | | | | | | | | | | | |
| - | - | | | | | | | | | | |
| : - | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| | | S-9 | 20.0- | 24 | 7 | 1 WOH | | S-9: Very loose, gray/brown, fine to coarse SAND, little | | | |
| - | | | 22.0 | | | 1 1 | 1 | Silt, trace Gravel. (PID = 0.0) | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| - | | | | | | | | | | | 23.513.5 |
| - | | | | | | | | | | | |
| 25 _ | | | | | | | | | 2 | | |
| _ | | S-10 | 25.0- | 24 | 10 | 9 14 | | S-10: Dense, light gray, fine to coarse SAND, some | | | |
| ; - | | | 27.0 | | | 21 22 | 35 | Gravel, little Silt, trace mica fragments. (PID = 0.0) | | | |
| : | | | | | | | | | | | LOWER SAND (3a/3b) |
| - | | | | | | | | | | | |
| <u>'</u> | 1 | | | | | | | | 3 | | |
| - | | | | | | | | | | | |
| 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Hard drilling at approximately 24.5 feet.3 - Hard drilling at approximately 28.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-29

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-29 SHEET: 2 of 2

SHEET: 2 of 2 PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Finish: 5/18/2022

rg, Inc. Rig Model: CME 750X
Drilling Method:
Mud Rotary

Type of Rig: ATV

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 10.01 Final Boring Depth (ft.): 38.6 H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225980.65 Easting: 1011674.55

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Date Start: 5/18/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

| | Casing | | Sample | | | | | | Ĭ | Field | ⊆ Stratum . |
|----------------|------------------------|-------------------|----------------|--------------|--------------|----------------------|--------------|---|--------|--------------|---------------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | | Remark | Test Data | Stratum Stratum (#) |
| - | | S-11 | 30.0- 32.0 | 24 | 10 | 8 6 7 7 | 13 | S-11: Medium dense, tan/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | LOWER SAND (3a/3b) |
| 35 _ | | S-12 | 35.0- 35.6 | 7 | 4 | 8 50/1" | R | S-12: Very dense, fine to coarse SAND, little Silt, occasional Decomposed Rock fragments. (PID = 0.0) | 4 | | 35 |
| 40 _ | | S-13 _. | 38.0- 38.6 | 7 | 7 | 49 50/1" | R | S-13: Very dense, gray, fine to coarse SAND, little Silt, occasional Decomposed Rock fragments. (PID = 0.0) End of exploration at 38.6 feet. | 5 | | 38.6 -28.6 |
| - - 45 _ | | | | | | | | | | | |
| 50 _ | | | | | | | | | | | |
| 55 _ | | | | | | | | | | | |
| 60 | | | | | | | | | | | |

4 - Hard drilling between 37.0 to 38.0 feet.

5 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-29

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:28 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

Mud Rotary

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Groundwater Depth (ft.)

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman: P. Mullins

Date Start: 5/10/2022 Finish: 5/10/2022 Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.61 **Drilling Method:** Final Boring Depth (ft.): 33.5

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225746.15 **Easting:** 1011914.06

Stab. Time

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Date Time Water Depth Sampler O.D. (in.): 2.0 See Report for Groundwater Readings Sampler Length (in.): 24 Rock Core Size: N/A

| | Cooina | | | <u> </u> | 1. | | | | ~ | | |
|----------------|------------------|------|---------------|------------|------------|--------------------|-------|---|--------|--------------|------------------|
| Depth | Casing Blows/ | | | Samp | | | | Sample Description and Identification | ar | Field | € Stratum |
| (ft) | Core | No. | Depth | | | Blows | SPT | (Modified Rurmister Procedure) | Remark | Test Data | |
| ` , | Rate | S-1 | (ft.) 0.0- | (in) 24 | (in) 11 | (per 6 in.) 4 4 | value | S-1: Top 1": Gravel | ~ | Dala | 0.1 GRAVEL 12.5 |
| - | | 3-1 | 2.0 | 24 | 11 | 4 4 4 | 8 | Loose, black/brown, medium to coarse SAND, occasional | 1 | | U.I OIVAVEE 12.0 |
| _ | | S-2 | 2.0- 4.0 | 24 | 6 | 1 1 1 1 | 2 | coal and brick fragments. (PID = 0.0 ppm) S-2: Very loose, black, medium to coarse SAND, trace Gravel, occasional coal and brick fragments. (PID = 0.0) | | | |
| 5 _ | | S-3 | 4.0- 6.0 | 24 | 10 | 2 2 3 3 | 5 | S-3: Loose, tan/red/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| _ | | S-4 | 6.0- 8.0 | 24 | 12 | 3 3 7 7 | 10 | S-4: Medium dense, brown, fine SAND, some Silt. (PID = 0.0) | | | FILL (7) |
| - | | S-5 | 8.0- 10.0 | 24 | 14 | 9 7 8 17 | 15 | S-5: Medium dense, brown, fine SAND, some Silt. (PID = 0.0) | | | |
| 10 _ | | S-6 | 10.0- 12.0 | 24 | 15 | 2 8 11 12 | 19 | S-6: Top 6": Medium dense, red/brown, fine to medium SAND, little Silt. (PID = 0.0) | | | |
| - | | S-7 | 12.0- 14.0 | 24 | 20 | 22 26 24 20 | 50 | Bottom 9": Medium dense, tan, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) S-7: Dense, red/brown, fine to coarse SAND, little Silt, | | | |
| 15 <u> </u> | | S-8 | 14.0- 16.0 | 24 | 8 | 6 6 6 7 | 12 | trace Gravel. (PID = 0.0) S-8: Medium dense, red/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | 2 | | 14 -1.4 |
| - | | | | | | | | | 3 | | UPPER SAND (6) |
| 20 _ | | S-9 | 20.0- 22.0 | 24 | 8 | 5 4 3 4 | 7 | S-9: Loose, tan, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| = | | | | | | | | | 1 | | 23.510.9 |
| 25 _ - - | | S-10 | 25.0- 27.0 | 24 | 2 | 5 4 2 3 | 6 | S-10: Loose, gray/white, fine GRAVEL, some SAND, trace Silt. (PID = 0.0) | 4 | | GRAVEL (2b/6) |
| 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - No recovery. 3-inch split spoon was advanced for sample recovery. REMARKS

3 - Color changed in drilling fluid at approximately 18.0 feet.

4 - Hard drilling at approximately 24.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-33

3ZA TEMPLATE TEST BORING - GZA 2016

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins Finish: 5/10/2022

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 12.61 Final Boring Depth (ft.): 33.5

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225746.15 Easting: 1011914.06

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Date Start: 5/10/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Groundwater Depth (ft.) Date Time **Water Depth** Stab. Time See Report for Groundwater Readings

| | Casina | | | | | | | | ┯ | | |
|------------|----------------------------------|------|-------|------|---------|----------------------|-------|--|--------|-------|--|
|)enth | Casing Blows/ Core Rate | | T | Samp | ie _ | T | | Sample Description and Identification | Remark | Field | Stratum Stratu |
| /ff) | Core | No. | Depth | Pen. | Rec. | Blows | SPT | Sample Description and Identification (Modified Burmister Procedure) | ΙË | Test | ြစ္ဆဲ≓ Description ஐ |
| (11) | Rate | 110. | (ft.) | (in) | (in) | Blows (per 6 in.) | Value | | ď | Data | |
| | | S-11 | 30.0- | 24 | 8 | 21 8 | | S-11: Medium dense, gray, fine to coarse GRAVEL, some | | | |
| _ | ļ | | 32.0 | | | 12 11 | 20 | Sand, trace Silt. (PID = 0.0) | | | |
| | | | 02.0 | | | '- '' | 20 | (| | | GRAVEL (2b/6) |
| - | | | | | | | | | | | OIVIVEE (25/0) |
| _ | | | | | | | | | | | |
| | | | | | | | | | | | 33.5 |
| _ | | | | | | | | End of exploration at 33.5 feet. | 5 6 | | |
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5 - Hard drilling at approximately 35 feet. Driller tried to advance casing up to 35 feet since the borehole was collapsing. Casing could not be advanced past 33.5 feet. Borehole terminated at approximately 33.5 feet.

6 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-33

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York
Engineers and Scientists

Finish: 5/23/2022

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-35 SHEET: 1 of 2

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** D. Cooke

Testing, Inc.

Testing, Inc.

Type of Rig: ATV
Rig Model: CME 750X
Drilling Method:

Mud Rotary

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 9.13 Final Boring Depth (ft.): 39

Boring Location: See Plan

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225961.14 Easting: 1011546.31

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/23/2022

Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

| | Casing | | | Samp | le | | | 0 1 5 1 11 25 2 | Ĭ | Field | - Stratum - |
|----------------|------------------------|------|----------------|--------------|--------------|-------------------------|--------------|---|--------|--------------|-----------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | Stratum . (±) |
| | raic | S-1 | 0.0- | 24 | 9 | 5 5 | | S-1: Top 2": Gravel. | _ | ١ | 0.2 GRAVEL 8.9 |
| - | | S-2 | 2.0- | 24 | 4 | 5 4 2 2 | 10 | Loose, black, medium to coarse SAND, little Gravel, occasional coal and brick fragments. (PID = 0.0 ppm) S-2: Loose, black, medium to coarse SAND, little Gravel, | 1 | | |
| - | | S-3 | 4.0 | 24 | 0 | 2 2 | 4 | occasional coal and brick fragments. (PID = 0.0) | | | |
| 5 _ | | 5-3 | 4.0- 6.0 | 24 | 8 | 1 1 1 1 | 2 | S-3: Very loose, black, medium to coarse SAND, trace Gravel, occasional coal fragments. (PID = 0.9) | | | E11. (7) |
| _ | | S-4 | 6.0- 8.0 | 24 | 4 | 1 1 1 | 2 | S-4: Very loose, black, medium to coarse SAND, trace Gravel, occasional coal fragments. (PID = 2.1) | | | FILL (7) |
| 10 | | S-5 | 8.0- 10.0 | 24 | 10 | WOR WOR WOR 1 | 0 | S-5: Very soft, dark gray CLAY, occasional roots and coal fragments. (PID = 1.7, PP = 0.8) | 2 | | |
| - | | S-6 | 10.0- 12.0 | 24 | 22 | WOR 1 WOR WOH | 1 | S-6: Very soft, dark gray CLAY, occasional roots and coal fragments. (PID = 1.8, PP = 0.7) | | | 12 -2.9 |
| - | | S-7 | 12.0- 14.0 | 24 | 22 | 1 WOH WOH 1 WOH 1 | 1 | S-7: Very soft, gray CLAY, trace Sand, occasional roots. (PID = 0.0, PP = 0.4) | | - | 12 -2.9 |
| 15 _ - | | S-8 | 14.0- 16.0 | 24 | 20 | WOH 1 WOH 1 | 1 | S-8: Very soft, gray CLAY, little Sand. (PID = 0.0, PP = 0.6) | | | CLAY (6) |
| - | | | | | | | | | | - | 18 |
| 20 _ | | S-9 | 20.0- 22.0 | 24 | 10 | 1 2 4 12 | 6 | S-9: Loose, gray, fine to coarse SAND, little Silt. (PID = 0.0) | | | UPPER SAND (6) |
| - | | | | | | | | | | - | 23.514.4 |
| 25 _ - - | | S-10 | 25.0- 27.0 | 24 | 12 | 91 24 12 13 | 36 | S-10: Dense, gray/brown, fine to coarse SAND, little Gravel, little Silt. (PID = 0.0) | | | LOWER SAND (3a) |
| 30 | | | | | | | | | | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Pocket penetrometer reading in tons per square feet (tsf).

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-35

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

D. Cooke Foreman:

Date Start: 5/23/2022 Finish: 5/23/2022 Type of Rig: ATV Rig Model: CME 750X

Sampler Type: SS

Sampler O.D. (in.): 2.0

Stationing (ft.): Offset (ft.): **Ground Surface Elevation (ft.):** 9.13 **Drilling Method:** Mud Rotary Final Boring Depth (ft.):

Boring Location: See Plan

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225961.14 Easting: 1011546.31

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Sampler Length (in.): 24 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Rock Core Size: NQ

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| D 41- | Casing | Donth Don Doo Blows CDT | | | | | | Commis Description and Identification | ark | Field | - Stratum |
|-------|------------------------|-------------------------|-------|--------------|------|---------|--------------|---|--------|--------------|---------------------|
| (ft) | Blows/ Core Rate | No. | (ft.) | Pen. (in) | Rec. | | SPT Value | | Remark | Test Data | ਨੂਦ Description ਦੂਦ |
| | | S-11 | 30.0- | 24 | 14 | 14 16 | | S-11: Dense, brown/black, fine to coarse SAND, some | | | |
| - | 1 | | 32.0 | | | 18 26 | 34 | Silt. (PID = 0.0) | | | |
| - | | | | | | | | | 3 | | LOWER SAND (3a) |
| - | | | | | | | | | | | |
| _ | 1:10 | | | | | | | | | | 34 |
| 35 | | C-1 | 34.0- | 60 | | REC=63% | | C-1: Moderately hard to hard, moderately weathered, dark | 4 | | |
| | 1:30 | | 39.0 | | | RQD=37% | | gray, fine grained SCHIST with closely spaced, horizontaly to subhorizontaly dipping fractures. | | | |
| - | 2:17 | | | | | | | to subhonzontary dipping fractures. | | | BEDROCK (1c) |
| - | 2:30 | | | | | | | | | | , , |
| - | 4:20 | | | | | | | | | | |
| 40 | | | | | | | | End of exploration at 39 feet. | 5 | | 39 -29.9 |
| 40 _ | 1 | | | | | | | | | | |
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3 - Hard drilling between 32.0 to 34.0 feet.

4 - Driller was unable to advance roller bit below 34.0 feet.

5 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-35

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.:

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

D. Cooke Foreman:

Date Start: 5/23/2022 Finish: 5/23/2022 Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 10.56 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225865.77 Easting: 1011649.4

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Drilling Method:

Mud Rotary

| Date | Time | Water Depth | Stab. Time |
|--------------|-------------|--------------|------------|
| See Report f | or Groundwa | ter Readings | |
| | | | |
| | | | |

Groundwater Depth (ft.)

| | 0 | | | | | | | | ┯ | | |
|-------|------------------|------|----------------|--------------|--------------|----------------------|--------------|--|--------|--------------|--|
| Denth | Casing Blows/ | | | Samp | | | | Sample Description and Identification | ar | Field | - Stratum |
| (ft) | Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | (A) - different Demonstration Demonstration (A) | Remark | Test Data | Stratum Signature Stratum Sign |
| | Nate | S-1 | 0.0- | 24 | 12 | 6 7 | | S-1: Top 2" : Gravel | ┼╨- | | 0.2 GRAVEL 10 |
| - | . | | 2.0 | | | 5 5 | 12 | Medium dense, gray, fine to medium SAND, little Gravel, | 1 | | |
| _ | | | | | | | | occasional coal fragments. (PID = 0.0 ppm) | ' | | |
| | | S-2 | 2.0- | 24 | 14 | 3 4 | | S-2: Loose, black/brown, fine to coarse SAND, trace | | | |
| - | - | | 4.0 | | | 5 6 | 9 | Clay, trace Gravel, occasional coal fragments. (PID = 0.0) | | | |
| _ | . | S-3 | 4.0 | 24 | | 4.4 | | S-3: Very loose, very dark brown, fine to coarse GRAVEL | | | FILL (7) |
| 5 _ | | S-3 | 4.0- | 24 | 6 | 11 | , | | | | |
| | | | 6.0 | | | WOH 1 | 1 | and SAND, occasional coal fragments. (PID = 0.0) | | | |
| - | | S-4 | 6.0- | 24 | 4 | 1 WOH | | S-4: Very loose, very dark brown, fine to coarse GRAVEL | | | |
| _ | - | | 8.0 | | | 1 WOH | 1 | and SAND, occasional coal fragments. (PID = 0.0) | | | |
| _ | | | | | | | | - , , , , | | | 8 2 |
| | | S-5 | 8.0- | 24 | 6 | 1 WOH | | S-5: Very soft, dark gray CLAY, occasional coal | 2 | | |
| | | | 10.0 | | | 1 WOH | 1 | fragments, roots. (PID = 0.0, PP = 0.6) | | | |
| 10 _ | - | S-6 | 10.0- | 24 | 8 | WOH | | S-6: Very soft, dark gray CLAY, occasional coal | | | |
| _ | | 3-0 | 12.0 | 24 | 0 | WOH | 1 | fragments, roots. (PID = 0.0, PP = 0.8) | | | |
| | | | 12.0 | | | 1 WOH | ' | | | | |
| - | - | S-7 | 12.0- | 24 | 22 | WOH | | S-7: Very soft, dark gray CLAY, little Silt, occasional | | | |
| - | - | | 14.0 | | | WOH | 0 | roots. (PID = 0.0, PP = 1.0) | | | CLAY (6) |
| _ | | | | | | WOH | | | | | |
| 15 | | S-8 | 14.0- | 24 | 22 | WOH | | S-8: Very soft, dark gray CLAY, little Silt, occasional | | | |
| _ | | | 16.0 | | | WOH | 0 | roots. (PID = 0.0, PP = 1.0) | | | |
| - | - | | | | | WOH | | | | | |
| _ | . | | | | | WOH | | | | | |
| | | | | | | WOH | | | | | 18 -7 |
| | | | | | | ***** | | | | | |
| - | | | | | | | | | | | |
| 20 _ | . | 0.0 | 20.0 | 24 | 40 | 4.4 | | C.O. Varrelana anno fina ta madiema CAND little Cit | | | |
| | | S-9 | 20.0- | 24 | 12 | 1 1 | | S-9: Very loose, gray, fine to medium SAND, little Silt, | | | |
| | | | 22.0 | | | 2 2 | 3 | trace Gravel. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | UPPER SAND (6) |
| _ | | | | | | | | | | | OTTER GAND (0) |
| 25 | | | | | | | | | | | |
| | | S-10 | 25.0- | 24 | 12 | 1 2 | | S-10: Very loose, gray, fine to medium SAND, some Silt, | | | |
| - | | | 27.0 | | | 2 5 | 4 | trace Gravel. (PID = 0.0) | | | |
| _ | | | | | | | | | | | |
| | | | | | | | | | | | |
| - |] | | | | | | | | | | 28.5 |
| - | | | | | | | | | | | LOWER SAND (3b) |
| 30 | | | | | | | | | | | ` ′ |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Pocket penetrometer reading in tons per square feet (tsf).

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-37

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-37 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: D. Cooke

Date Start: 5/23/2022 **Finish:** 5/23/2022

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 10.56 Final Boring Depth (ft.): 40 H. Datum: NAD 83V. Datum: NAVD 88Northing: 225865.77Easting: 1011649.4

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

| | 0 | | | | | | | | ┶ | | |
|-------|------------------|------|-------|------|------|---------|-------|--|----------|-------|---------------------|
| Denth | Casing Blows/ | | | Şamp | | | | Sample Description and Identification | ar | Field | Ę Stratum ∹ ⊂ |
| (ft) | Core | No. | Depth | Pen. | Rec. | Blows | SPT | (Madified Dimeriates Decades) | Remark | Test | Stratum Stratum (#) |
| (11) | Rate | | (ft.) | (in) | (in) | | Value | | ď | Data | |
| | | S-11 | 30.0- | 24 | 9 | 12 13 | | S-11: Loose, gray/brown, fine to medium SAND, little Silt, | | | |
| - | - | | 32.0 | | | 12 11 | 25 | trace Gravel. (PID = 0.0) | | | |
| | | | | | | | | , | | | |
| _ | 1 | | | | | | | | | | LOWER SAND (3b) |
| _ | | | | | | | | | | | LOWER SAND (Sb) |
| | | | | | | | | | | | |
| - | İ | | | | | | | | 3 | | |
| 35 _ | ļ | | | l . | | | Ь | | - | _ | 35.124. |
| | | S-12 | 35.0- | 1 | 0 | 50/1" | R | S-12: No recovery. | | | |
| - | | C-1 | 35.1 | 60 | 54 | REC=90% | | C-1: Medium to moderately hard, moderately weathered, | | | |
| | | | 35.1- | | | RQD=57% | | dark gray, fine grained SCHIST with closely spaced, | | | |
| | | | 40.1 | | | | | horizontaly to subhorizontaly dipping fractures. | | | BEDROCK (1b) |
| - | | | 40.1 | | | | | Thorizontary to subhorizontary dippling fractures. | | | DEDITOOR (1b) |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 40 _ | | | | | | | | | <u> </u> | | 40.1 -29.5 |
| | | | | | | | | End of exploration at 40 feet. | 4 | | |
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| 4.5 | | | | | | | | | | | |
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3 - Hard drilling between 34.0 to 35.0 feet.

4 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-37

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York
Engineers and Scientists

Finish: 5/9/2022

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-38 SHEET: 1 of 2

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.72 Final Boring Depth (ft.): 38.1 H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225721.4 Easting: 1011803.12

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/9/2022

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

| | Casing | | | | 1_ | | | | <u> </u> | T | |
|-------|--------|------|----------------|--------------|--------------|-------------------|-------|--|----------|--------------|------------------------|
| Depth | Blows/ | | | Samp | | D. | 0.07 | Sample Description and Identification | lar | Field | € Stratum > |
| (ft) | Core | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT | (NA diffical Diametric Decreations) | Remark | Test Data | O Stratum . (:) |
| | Rate | S-1 | 0.0- | 24 | 14 | 5 5 | value | S-1: Top 2": Gravel | ~ | Dala | 0.2 GRAVEL 11.5 |
| _ |] | 3-1 | | 24 | 14 | 6 5 | 44 | Medium dense, black/brown, medium to coarse SAND, | | ' | ON TOTAL |
| | | | 2.0 | | | 0 3 | 11 | | 1 | | |
| - | - | S-2 | 2.0- | 24 | 13 | 5 3 | | little Gravel, occasional cinders, coal and brick fragments. | | | |
| _ | | 0 _ | 4.0 | | . | 6 4 | 9 | (PID = 0.0 ppm) | | | |
| | | | 7.0 | | | 0 4 | " | S-2: Loose, black, medium to coarse SAND, occasional | | | |
| | | S-3 | 4.0- | 24 | 7 | 2 4 | | cinders, coal and brick fragments. (PID = 0.0) | | | |
| 5 _ | - | | 6.0 | | | 5 6 | 9 | S-3: Loose, black, medium to coarse SAND, little Gravel, | | | |
| | | | | | | | • | occasional coal and brick fragments. (PID = 0.0) | | | |
| _ | | S-4 | 6.0- | 24 | 8 | 4 3 | | S-4: Medium dense, brown, medium to coarse SAND, | | | |
| - | | | 8.0 | | | 8 2 | 11 | little Gravel, occasional coal and brick fragments. (PID = | | | |
| _ | | | | | | | | 0.0) | | | |
| | | S-5 | 8.0- | 24 | 17 | 1 1 | | S-5: Very loose, brown, fine to medium SAND, little | | | |
| - | - | | 10.0 | | | 1 1 | 2 | Gravel, occasional coal and brick fragments. (PID = 0.0) | | | FILL (7) |
| 10 _ | | 0 0 | 40.0 | | 00 | 4 WOLL | | į į į į į į į į į į į į į į į į į į į | | | |
| | | S-6 | 10.0- | 24 | 23 | 1 WOH | | S-6: Very loose, brown, fine to medium SAND, some Silt. | | | |
| _ |] | | 12.0 | | | WOH | 0 | (PID = 0.0) | | | |
| - | - | S-7 | 12.0- | 24 | 14 | WOH | | S-7: Very loose, brown, fine to medium SAND, some Silt. | | | |
| _ | | 0-1 | 14.0 | ~ | 1-7 | WOR | 0 | (PID = 0.0) | | | |
| | | | 14.0 | | | WOH | 0 | (FID = 0.0) | | | |
| | - | S-8 | 14.0- | 24 | 14 | WOH | | S-8: Very loose, brown, fine to medium SAND, some Silt. | | | |
| 15 _ | . | - | 16.0 | | | WOH | 3 | (PID = 0.0) | | | |
| | | | | | | WOR | | (* | | | |
| | | | | | | WOH | | | | | |
| - | | | | | | 3 3 | | | | | |
| _ | | | | | | | | | | | 186.3 |
| | | | | | | | | | | | |
| - | - | | | | | | | | | | |
| 20 _ | . | 0 0 | 00.0 | | _ | 4.0 | | O O I I I I I I I I I I I I I I I I I I | | | |
| | | S-9 | 20.0- | 24 | 7 | 4 2 | | S-9: Loose, brown, fine to coarse SAND, little Silt, Gravel. | | | UPPER SAND (6) |
| _ | | | 22.0 | | | 2 1 | 4 | (PID = 0.0) | | | (-) |
| - | - | | | | | | | | | | |
| _ | | | | | | | | | | | |
| | | | | | | | | | | | 23.5 |
| - | | | | | | | | | | | |
| 25 _ | | C 10 | 25.0 | 24 | 44 | 2.6 | | C 10. Madium dance grav/block fine to madium CAND | | | |
| | | S-10 | | 24 | 11 | 3 6 | | S-10: Medium dense, gray/black, fine to medium SAND, | | | |
| | | | 27.0 | | | 12 17 | 18 | little Silt, little Gravel. (PID = 0.0) | | | I OWED SAND (20/2h) |
| - | | | | | | | | | | | LOWER SAND (3a/3b) |
| _ | . | | | | | | | | | | |
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| 30 | i | | | | | | 1 | | 1 | | |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-38

3ZA TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

38.1

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins **Drilling Method:** Date Start: 5/9/2022 Finish: 5/9/2022 Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.72 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225721.4 Easting: 1011803.12

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Type of Rig: ATV

Rig Model: CME 750X

Groundwater Depth (ft.) Date Time **Water Depth** Stab. Time See Report for Groundwater Readings

| | Casing | | | Samp | ole | | | | 논 | Field | C Stratum : |
|---------------|----------------------------------|------|----------------|------|-----|----------------------|--------------|--|--------|--------------|----------------------------------|
| Depth (ft) | Casing Blows/ Core Rate | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ା ଘ ≓ Description 🍳 ≓ |
| - | Nate | S-11 | 30.0- 32.0 | 24 | 12 | 22 23 29 42 | 52 | S-11: Very dense, gray/brown, fine to medium SAND, little Gravel, little Silt. (PID = 0.0) | | | LOWER SAND (3a/3b |
| - 35 | | | | | | | | | 2 | | 33.5 |
| - - - | | S-12 | 35.0- 35.5 | 6 | 5 | 50/5" | R | S-12: Very dense, gray/black/red, fine to medium SAND, some Gravel. (PID = 0.0) | | | WEATHERED ROCK (1d) |
| - | | S-13 | | 1 | 0 | 50/1" | R | S-13: No recovery. | 3 | | 38.1 -26. |
| 40 <u> </u> | | | 38.1 | | | | | End of exploration at 38.1 feet. | | | |
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2 - Hard drilling at approximately 33.5 feet.

3 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-38

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 1 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman: P. Mullins

Date Start: 5/16/2022 Finish: 5/16/2022 Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.27 Final Boring Depth (ft.): 50.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226099.56 **Easting:** 1012123.15

Stab. Time

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5

Groundwater Depth (ft.) Sampler Type: SS Date Time Water Depth Sampler O.D. (in.): 2.0 See Report for Groundwater Readings Sampler Length (in.): 24 Rock Core Size: N/A

| 4h | Casing | | | Şamp | le | | | Carania Dagarintian and Idantification | 뚩 | Field | £ Stratum ; |
|----------------|----------------|------|----------------|--------------|--------------|----------------------|--------------|---|--------|--------------|------------------------|
| Jepin (ft) | Blows/ Core | No. | Depth (ft.) | Pen. (in) | Rec. (in) | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | Description ⊕ ⊭ |
| | Rate | S-1 | 0.0- | 24 | 16 | 76 17 | Value | S-1: Top 1": Gravel | I.C. | Data | 0.1 GRAVEL 11.2 |
| _ | | | 2.0 | | . • | 20 22 | 37 | Dense, black/brown, fine to coarse SAND, some Gravel, | ١, | | |
| - | | S-2 | 2.0- 4.0 | 24 | 22 | 15 32 36 32 | 68 | occasional coal fragments. (PID = 0.2 ppm) S-2: Very dense, black/gray, fine to coarse SAND, some Gravel, little Silt, occasional coal and brick fragments. | 2 | | |
| 5 _ | | S-3 | 4.0- 6.0 | 24 | 8 | 6 13 21 17 | 34 | (PID = 371.3) S-3: Dense, black/gray, fine to medium SAND, little Silt, trace Gravel, occasional wood chips. (PID = 388.1) | | | |
| - | | S-4 | 6.0- 8.0 | 24 | 14 | 8 8 9 8 | 17 | S-4: Medium dense, gray, fine to coarse SAND, little Silt, trace Gravel. (PID = 102.9) | 3 | | FILL (7) |
| - 10 | | S-5 | 8.0- 10.0 | 24 | 7 | 2 3 4 4 | 7 | S-5: Loose, gray, fine to coarse SAND, little Silt, trace Gravel. (PID = 45.0) | | | |
| - | | S-6 | 10.0- 12.0 | 24 | 16 | 2 2 2 1 | 4 | S-6: Top 8": Loose, gray, fine to coarse SAND, little Silt, trace Gravel. (PID = 2.7, PP = 1.7) | 4 | | 12 -0.7 |
| - | | S-7 | 12.0- 14.0 | 24 | 16 | 2 3 4 6 | 7 | Bottom 8": Very soft, gray CLAY, occasional roots and wood chips. (PID = 2.7, PP = 1.7) S-7: Medium stiff, gray CLAY, some Silt, little fine to | | - | -0.7 |
| - 15 - | | S-8 | 14.0- 16.0 | 24 | 15 | 2 2 5 8 | 7 | medium Sand. (PID = 0.8, PP = 1.7) S-8: Loose, gray, fine to coarse SAND and SILT, trace Gravel. (PID = 1.4) | | | |
| - | | | | | | | | | | | CLAY (4c/6) |
| 20 _ - | | S-9 | 20.0- 22.0 | 24 | 7 | 4 6 9 8 | 15 | S-9: Stiff, brown CLAY, little fine to coarse Sand, trace Gravel, trace Silt. (PID = 0.0, PP = 3.2) | 5 | | |
| - | | | | | | | | | | - | 23.5 |
| 25 _ - - | | S-10 | 25.0- 27.0 | 24 | 11 | 12 14 19 21 | 33 | S-10: Dense, tan/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | LOWER SAND (3a/3b) |
| - 30 | | | | | | | | | | | |

REMARKS

- 1 Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).
- 2 Petroleum odor in samples S-2, S-3, S-4, S-5 and S-6. 3 Hard drilling at approximately 7.0 feet.
- 4 Pocket penetrometer reading in tons per square foot (tsf).
- 5 Color changed in drilling fluid at approximately 19.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-39

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins Date Start: 5/16/2022 Finish: 5/16/2022 Mud Rotary

Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X **Drilling Method:**

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.27 Final Boring Depth (ft.): 50.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 226099.56 Easting: 1012123.15

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | Casing | | | Sama | مام | | | - | | × | F: 11 | |
|---------------|------------------------|------|----------------|--------------|------|----|--------------|--------------|--|--------|-----------------------|--------------------------------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. | | ws 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Field Test Data | ີ ປ Description ⊈ ⊭ |
| - | , tate | S-11 | 30.0- 32.0 | 24 | 10 | | 13 11 | 23 | S-11: Medium dense, brown, fine to coarse SAND, little Gravel, little Silt. (PID = 0.0) | | | |
| 35 _ - | | S-12 | 35.0- 37.0 | 24 | 11 | | 10 18 | 21 | S-12: Medium dense, tan/brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | | | |
| 40 _ - | | S-13 | 40.0- 42.0 | 24 | 14 | | 23 26 | 46 | S-13: Dense, brown/gray/black, fine to coarse SAND, some Gravel, trace Silt. (PID = 0.0) | | | LOWER SAND (3a/3b) |
| 45 _ - | | S-14 | 45.0- 47.0 | 24 | 10 | | 40 23 | 70 | S-14: Very dense, brown/black, fine to coarse SAND, some Gravel, trace Silt. (PID = 0.0) | 6 | - | 47.5 |
| 50 _ | | S-15 | 50.0- 50.1 | 1 | 0 | 50 | /1" | R | S-15: No recovery. End of exploration at 50.1 feet. | | | WEATHERED ROCK (1d) 50.1 -38.8 |
| 45 | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | |

6 - Hard drilling at approximately 44.0 feet. 7 - Hard drilling at approximately 47.5 feet.

8 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-39

32A TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Finish: 5/11/2022

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET:

1 of 2 PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman: P. Mullins

Type of Rig: ATV Rig Model: CME 750X **Drilling Method:**

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.74 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225790 Easting: 1012053.15

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/11/2022

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Groundwater Depth (ft.) Time Water Depth Stab. Time See Report for Groundwater Readings

| | | | | | | | | | + - | | |
|----------|------------------------|------|----------------|------|------|-------------------|--------------|--|--------|--------------|-----------------------|
| D = = 4h | Casing | | ; | Şamp | le | | | Canada Dasanintian and Idantification | 높 | Field | ≨ Stratum > |
| (ft) | Blows/ Core Rate | No. | Depth (ft.) | Pen. | Rec. | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ່ 🕳 ≝ Description 🚇 : |
| | Rate | S-1 | 0.0- | 24 | 18 | 15 17 | 1 | S-1: Top 2": Asphalt | | 1 | 0.2 ASPHALT |
| _ | | | 2.0 | | | 20 22 | 37 | Dense, black, medium to coarse SAND, little Gravel, | ١. ١ | | |
| | | | 2.0 | | | 20 22 | 01 | occasional coal and brick fragments. (PID = 2.3 ppm) | 1 | | |
| _ | | S-2 | 2.0- | 24 | 15 | 20 14 | | S-2: Medium dense, black/gray, medium to coarse SAND, | 2 | | |
| - | | | 4.0 | | | 15 13 | 29 | little Gravel, occasional cinders and coal fragments. (PID | | | |
| _ | | | | | | | | = 5.1) | | | |
| 5 | | S-3 | 4.0- | 24 | 10 | 14 15 | | S-3: Dense, gray, fine to coarse SAND, little Gravel, | | | |
| | | | 6.0 | | | 16 12 | 31 | occasional brick fragments. (PID = 0.0) | | | |
| - | | S-4 | 6.0- | 24 | 13 | 4 4 | | S-4: Medium dense, gray/brown, fine to medium SAND, | | | |
| _ | | | 8.0 | | | 6 5 | 10 | little Silt, trace Gravel, occasional cinders. (PID = 0.0) | | | |
| _ | | | | | | | | , , , | | | |
| | | S-5 | 8.0- | 24 | 8 | 2 1 | | S-5: Very loose, gray, fine to coarse SAND, little Silt, | | | |
| - | | | 10.0 | | | 1 2 | 2 | occasional cinders. (PID = 0.0) | | | FILL (7) |
| 10 _ | | S-6 | 10.0- | 24 | 11 | 1 WOH | | S-6: Very loose, gray, medium to coarse SAND, little | | | |
| _ | | | 12.0 | - ' | ' ' | 1 1 | 1 | Gravel, occasional cinders. (PID = 1.0) | | | |
| | | | 12.0 | | | | ' | Graver, essaerenar emaere: (1-12-11.0) | | | |
| _ | | S-7 | 12.0- | 24 | 10 | 1 WOH | | S-7: Very loose, gray, medium to coarse SAND, little | | | |
| - | | | 14.0 | | | 1 1 | 1 | Gravel, occasional cinders. (PID = 0.8) | | | |
| - | | S-8 | 14.0- | 24 | 5 | 1 2 | | S-8: Very loose, gray, medium to coarse SAND, little | | | |
| 15 _ | | 0-0 | 16.0 | 24 | " | 1 2 | 3 | Gravel, occasional cinders. (PID = 0.1) | | | |
| | | | 10.0 | | | ' - | " | Graver, occasional cinders. (112 0.1) | | | |
| | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | - | 18 |
| _ | | | | | | | | | | | |
| 20 | | | | | | | | | 3 | | |
| | İ | S-9 | 20.0- | 24 | 4 | 3 4 | | S-9: Loose, brown, fine to coarse SAND, little Silt, trace | | | |
| - | | | 22.0 | | | 4 4 | 8 | Gravel. (PID = 0.0) | | | |
| _ | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | UPPER SAND (6) |
| | | | | | | | | | | | |
| 25 _ | | S-10 | 25.0- | 24 | 4 | 4 5 | | S-10: Loose, brown, fine to coarse SAND, little Silt, trace | | | |
| _ | | 3-10 | 27.0 | | 7 | 3 3 | 8 | Gravel. (PID = 0.0) | | | |
| | | | 27.0 | | | | " | Oldvol. (1 15 - 0.0) | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | 28.5 |
| - | | | | | | | | | | | LOWER SAND (3a |
| 30 | 1 | | | 1 | | | | | 1 | | LOVELL OAND (Sa |

REMARKS

- 1 Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).
- Petroleum odor in sample.
 Color changed in drilling fluid at approximately 19.0 feet.
 Hard drilling between 29.5 to 30.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-40

3ZA TEMPLATE TEST BORING - GZA 2016 01 26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-40 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Groundwater Depth (ft.)

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Finish: 5/11/2022

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan
Stationing (ft.): Offset (ft.):
Ground Surface Elevation (ft.): 11.74
Final Boring Depth (ft.): 40

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225790 Easting: 1012053.15

Stab. Time

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 4/3.5

Date Start: 5/11/2022

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

DateTimeWater DepthSee Report for Groundwater Readings

| " | | · | | • | , | ., 0.0 | - 10 | | | | | | | | |
|-------|------------------|------|----------------|--------------|------|----------------------|--------------|---|-----------------|-----------|--------|--------------|-----------|-----------------------|--------|
| Depth | Casing Blows/ | | | Samp | | | | Sample Description an | d Identificatio | n | ar | Field | £ (| Stratum Descriptio | ž. Ć. |
| (ft) | Core Rate | No. | Depth (ft.) | Pen. (in) | Rec. | Blows (per 6 in.) | SPT Value | (Madified Durmieter | | | Remark | Test Data | Deg (# | Descriptio | on 음 世 |
| | | S-11 | 30.0- | 24 | 11 | 3 10 | | S-11: Dense, gray/brown, fine to | coarse SAND |), little | 4 | | | | |
| - | 1 | | 32.0 | | | 35 18 | 45 | Gravel, trace Clay. (PID = 0.0) | | | | | | | |
| - | | | | | | | | | | | | | 10 | WER SANI | D (2a) |
| - | - | | | | | | | | | | 5 | | LO | WER SAIN | D (Sa) |
| _ | | | | | | | | | | | ٦ | | | | |
| 35 _ | 1:48 | | | | | | | | | | | | 35 | | -23.3 |
| | | C-1 | 35.0- | 60 | | REC=100% | | C-1: Hard to very hard, slightly to | | | | | | | |
| | 1:57 | | 40 | | | RQD=100% | | dark gray, fine grained SCHIST was subhorizontally dipping fractures. | ith closely sp | aced, | | | | | |
| - | 2:28 | | | | | | | subflorizoritary dippling fractures. | | | | | В | EDROCK (| (1a) |
| - | 1:55 | | | | | | | | | | | | | | ` ' |
| - | 2:50 | | | | | | | | | | | | | | |
| 40 _ | | | | | | | | End of exploration at 40 feet. | | | 6 | | 40 | | -28.3 |
| _ - | - | | | | | | | End of exploration at 40 leet. | | | " | | | | |
| | | | | | | | | | | | | | | | |
| 20.00 | | | | | | | | | | | | | | | |
| 7000 | | | | | | | | | | | | | | | |
| - | 1 | | | | | | | | | | | | | | |

5 - Hard drilling between 33.0 to 35.0 feet.

6 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-40

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J.\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

REMARKS

45

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: **GZ-41**

SHEET: 1 of 2 PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

P. Mullins Foreman:

Date Start: 5/10/2022 Finish: 5/10/2022 Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X

Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.27

Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225618.72 Easting: 1011839.18

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Drilling Method:

Mud Rotary

Groundwater Depth (ft.) Date Time Water Depth Stab. Time See Report for Groundwater Readings

| | Casing | | | Samp | ole | | | 0 1 5 1 11 115 11 | Ĭ | Field | € Stratum > |
|---|------------------------|------------|----------------|-------|--------------|---------------------------|--------------|---|----------|--------------|-------------------|
| Depth (ft) | Blows/ Core Rate | No. | Depth (ft.) | | Rec. (in) | Blows (per 6 in.) | SPT Value | | Remark | Test Data | Description ⊕ ± |
| | | S-1 | 0.0- | 24 | 18 | 7 10 | | S-1: Top 2": Asphalt | | \ | 0.2 ASPHALT 11.1 |
| - | | | 2.0 | | | 12 7 | 22 | Medium dense, black, medium to coarse SAND, | 1 | | |
| - | | S-2 | 2.0 | 24 | 12 | E 1 | | occasional cinders, coal and brick fragments. (PID = 0.0 | | | |
| | | 3-2 | 2.0- 4.0 | 24 | 13 | 5 4 | | ppm) | | | |
| | | | 4.0 | | | 4 4 | 8 | S-2: Loose, black, medium to coarse SAND, occasional | | | |
| | | S-3 | 4.0- | 24 | 0 | 3 1 | | cinders, coal and brick fragments. (PID = 2.4) | | | |
| 5 _ | | | 6.0 | | | 1 2 | 2 | S-3: No recovery. | | | FILL (7) |
| _ | | <u>.</u> . | | l | _ | | | | | | |
| | | S-4 | 6.0- | 24 | 5 | WOR 1 | | S-4: Very loose, black, medium to coarse SAND, little | | | |
| - | | | 8.0 | | | WOH 1 | 1 | Gravel, occasional coal and brick fragments. (PID = 2.7) | | | |
| - | | S-5 | 8.0- | 24 | 12 | 2 4 | | S-5: Loose, gray/black, fine to coarse SAND, little Silt, | | | |
| _ | | | 10.0 | | | 4 4 | 8 | Gravel, occasional brick and coal fragments. (PID = 0.0 | | | |
| 10 | | | | | | | | ppm) | | | 10 1. |
| | | S-6 | 10.0- | 24 | 7 | 1 2 | | S-6: Medium stiff, dark gray, ORGANIC SILT, occasional | 2 | | |
| - | | | 12.0 | | | 3 1 | 5 | roots. (PID = 0.0) | | | |
| - | | S-7 | 12.0 | 24 | | 1 WOL | | , , , , , , , , , , , , , , , , , , , | | | |
| | | 3-1 | 12.0- 14.0 | 24 | 0 | 1 WOH | | S-7: No recovery. | | | |
| | | | 14.0 | | | I WOR | 1 | | | | |
| - ا | | S-8 | 14.0- | 24 | 16 | WOR | | S-8: Very soft, dark gray, ORGANIC SILT, trace Sand, | | | |
| 15 _ | | | 16.0 | | | WOR | 0 | occasional roots. (PID = 0.0) | | | |
| - | | | | | | WOH | | | | | |
| | | | | | | WOH | | | | | ORGANIC SILT (7) |
| - | | | | | | | | | | | |
| - 15 _ - - 20 _ - - 25 _ | | | | | | | | | | | |
| - | | | | | | | | | | | |
| 20 _ | | | | | | | | | | | |
| | | S-9 | 20.0- | 24 | 1 | 5 5 | | S-9: Stiff, dark gray, ORGANIC SILT, occasional shells | 3 | | |
| - | | | 22.0 | | | 6 6 | 11 | and roots. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | | | 23.5 -12. |
| _ | | | | | | | | | | - | 23.5 |
| 25 | | | | | | | | | | | |
| 23 _ | | S-10 | 25.0- | 24 | 13 | 13 14 | | S-10: Dense, brown/black, fine to medium SAND, some | 4 | | |
| - | | | 27.0 | | | 19 27 | 33 | Silt. (PID = 0.0) | | | |
| _ | | | | | | | | | | | LOWER SAND (3a/3b |
| | | | | | | | | | | | |
| - | 1 | | | | | | | | | | |
| - | 1 | | | | | | | | | | |
| 30 | | <u> </u> | | | <u> </u> | | | | <u> </u> | <u> </u> | , : |
| - | | | | | | organic co at approxir | | nds using a photo ionization detector (PID). Results reported | in pa | arts pe | r million (ppm). |
| SY | | | | | | | | for sample recovery. | | | |
| AR 1 | | | | | | at approxir | | | | | |
| REMARK | | | | | | | | | | | |
| See appropried | | | | | | | | | | | |
| | | | | | | | | | | | |
| See | Log K | ey fo | r explor | ation | of s | sample de | scription | on and identification procedures. Stratification lines repr | esen | t E | Exploration No.: |
| DOOL | n made | at the | times a | and u | nder | the condition | ons sta | oes. Actual transitions may be gradual. Water level readings ated. Fluctuations of groundwater may occur due to other fa | actor | s | GZ-41 |
| than | those p | resen | t at the t | times | the r | neasureme | nts we | ere made. | | | |

- 1 Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).
- 2 Color changed in drilling fluid at approximately 10.0 feet.
- 3 No recovery. 3-inch split spoon was advanced for sample recovery.
- 4 Color changed in drilling fluid at approximately 24.0 feet.

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-41 SHEET: 2 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Date Start: 5/10/2022 **Finish:** 5/10/2022

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan Stationing (ft.): Offset (ft.): Ground Surface Elevation (ft.): 11.27 Final Boring Depth (ft.): 40.5 H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225618.72 Easting: 1011839.18

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: NQ

Sampler Type: SS

| Date | Time | Water Depth | Stab. Time | See Report for Groundwater Readings |

| 10 | | | | | | | | | | |
|--|------|--------------------------------|------------|------------|-------------------------------|-------------|---|--|---------------|---|
| Depth Blows/ (ft) Core | No. | Depth | Pen. | Rec. | Blows | SPT | Sample Description and Identification (Modified Burmister Procedure) | Remark | Field Test | Stratum Stratum Stratum |
| Rate | S-11 | (ft.) 30.0- 32.0 | (in) 24 | (in) 12 | (per 6 in.) 12 13 16 26 | Value 29 | S-11: Medium dense, brown, fine to coarse SAND, some Silt, little Gravel. (PID = 0.0) | <u>x</u> | Data | |
| 35 _ 3:30 1:52 2:07 2:52 40 3:18 | | 35.0- 35.3 35.5- 40.5 | 3 60 | | 50/3" REC=100% RQD=67% | | S-12: Very dense, gray, medium to coarse SAND, some Gravel. (PID = 0.0) C-1: Medium to moderately hard, moderately weathered, dark gray, fine grained SCHIST with closely spaced, moderately to subhorizontaly dipping fractures. | 5 | - | 33.5 -22 WEATHERED ROCK (1d) -24 BEDROCK (1b) |
| 40 - 3.10 | | | | | | | | | | 40.5 -29 |
| 45 | | | | | | | | | | |
| 55 | | | | | | | | | | |
| 30 | | | | | | | | | | |

5 - Hard drilling; rig chattered at approximately 35.5 feet.

6 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-41

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-42 SHEET: 1 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc.

Foreman: P. Mullins

Date Start: 5/9/2022 **Finish:** 5/9/2022

Type of Rig: ATV Rig Model: CME 750X

Drilling Method:Mud Rotary

Boring Location: See Plan
Stationing (ft.): Offset (ft.):
Ground Surface Elevation (ft.): 10.64
Final Boring Depth (ft.): 45.1

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225749.24 Easting: 1011693.03

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size: N/A

Sampler Type: SS
Date Time Water Depth Stab. Time
See Report for Groundwater Readings

| | Casing | | | Samp | اما | | | | 노 | | |
|-------|--------|------|----------------|------|------|-------------|-------|--|--------|--------------|---------------------|
| Depth | Blows/ | | | | | Blows | SPT | Sample Description and Identification | Remark | Field | O Stratum . (:) |
| (ft) | Core | No. | Depth (ft.) | (in) | (in) | (per 6 in.) | | (NA adifical Diamaiatan Dua anduma) | en | Test Data | Description ## |
| | Rate | S-1 | 0.0- | 24 | 20 | 5 6 | value | S-1: Top 2": Asphalt | œ | Data | 0.3 ASPHALT 10.3 |
| _ | | 0-1 | 2.0 | 24 | 20 | 9 6 | 4.5 | Medium dense, black, medium to coarse SAND, trace | | · ' | 7.01.117.21 |
| | | | 2.0 | | | 9 0 | 15 | | 1 | | |
| _ | | S-2 | 2.0- | 24 | 20 | 5 3 | | Gravel, occasional cinders, coal and brick fragments. (PID | | | |
| _ | | | 4.0 | | | 3 2 | 6 | = 0.0 ppm) | | | |
| | | | 1.0 | | | 0 - | " | S-2: Loose, black, medium to coarse SAND, trace Gravel, | | | |
| _ | | S-3 | 4.0- | 24 | 2 | 1 0 | | occasional cinders, coal and brick fragments. (PID = 3.9) | | | |
| 5 _ | | | 6.0 | | | 1 0 | 1 | S-3: Very loose, black, medium to coarse SAND, | | | |
| | | | | | | | | occasional coal and brick fragments. (PID = 0.0) | | | FILL (7) |
| | | S-4 | 6.0- | 24 | 5 | 1 1 | | S-4: Very loose, black, medium to coarse SAND, | | | FILL (7) |
| - | | | 8.0 | | | 2 3 | 3 | occasional coal and brick fragments. (PID = 0.0) | | | |
| _ | | ۰. | 0.0 | | | 14/011 | | O. S. Maria Landa Sana da mandiana O.AND. Bulla | | | |
| | | S-5 | 8.0- | 24 | 6 | WOH | | S-5: Very loose, gray black, fine to medium SAND, little | | | |
| 10 | | | 10.0 | | | WOH | 1 | Silt, occasional wood chips and brick fragments. (PID = | | | |
| 10 _ | | S-6 | 10.0- | 24 | 9 | 1 5 | | 0.0) | | | |
| _ | | 5-0 | 12.0 | 24 | 9 | 1 1 | , | S-6: Very loose, gray, fine to medium SAND, little Silt, | | | |
| | | | 12.0 | | | 2 3 | 3 | occasional wood chips. (PID = 0.0) | | | 12 -1.4 |
| - | | S-7 | 12.0- | 24 | 0 | WOH 1 | | S-7: No recovery. | | | |
| - | | | 14.0 | | | WOH | 1 | , | | | |
| | | | | | | WOH | | | | | |
| 15 | | S-8 | 14.0- | 24 | 9 | WOH | | S-8: Very soft, gray CLAY, trace Gravel, occasional wood | 2 | | |
| 15 _ | | | 16.0 | | | WOH | 0 | chips. (PID = 0.0, PP = 0.3) | | | CLAY (6) |
| _ | | | | | | WOH | | | | | |
| | | | | | | WOH | | | | | |
| - | | | | | | VVOIT | | | | | |
| - | | | | | | | | | | | 187.4 |
| _ | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 20 _ | | S-9 | 20.0- | 24 | 24 | WOH 2 | | S-9: Loose, gray, fine to medium SAND, little Silt, trace | | | |
| _ | | | 22.0 | | | 2 1 | 4 | Gravel. (PID = 0.0) | | | |
| | | | 22.0 | | | | " | Graves: (1 12 0.0) | | | |
| _ | | | | | | | | | | | |
| - | | | | | | | | | | | UPPER SAND (6) |
| _ | | | | | | | | | | | 0.1.2.1.07.1.12 (0) |
| 25 | | | | | | | | | | | |
| | | S-10 | 25.0- | 24 | 4 | 1 WOH | | S-10: Very loose, gray, fine to medium SAND, little Silt, | | | |
| _ | | | 27.0 | | | 1 WOH | 1 | trace Gravel. (PID = 0.0) | | | |
| _ | | | - | | | | | ,, | | | |
| _ | | | | | | | | | | | |
| - | | | | | | | | | | | 28.517.9 |
| _ | | | | | | | | | | | LOWER SAND (3a) |
| 30 | | | | | | | | | | | LOWER SAND (3a) |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm).

2 - Pocket penetrometer reading in tons per square foot (tsf).

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-42

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental
of New York
Engineers and Scientists

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-42

SHEET: 2 of 2 PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Finish: 5/9/2022

rador
Geotechnical Testing, Inc.

White the state of the

Sampler Type: SS

Sampler O.D. (in.): 2.0

Rock Core Size: N/A

Sampler Length (in.): 24

Rig Model: CME 750X
Drilling Method:
Mud Rotary

Stationing (ft.): Offset (ft.): 10.64
Ground Surface Elevation (ft.): 10.64
Final Boring Depth (ft.): 45.1

Boring Location: See Plan

 Offset (ft.):
 V. Datum:
 NAVD 88

 In (ft.):
 10.64
 Northing:
 225749.24

 45.1
 Easting:
 1011693.03

H. Datum: NAD 83

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Date Start: 5/9/2022

Auger or Casing O.D./I.D Dia (in.): 4/3.5

| Date | Time | Water Depth | Stab. Time | | |
|--------------|--------------|-------------|------------|--|--|
| See Report f | ter Readings | | | | |

| | | | | | | | | | <u> </u> | | |
|----------------|--------------------------|------|----------------|----------------------|----|----------------------|--------------|--|-----------|-----------------------|-----------------|
| Depth (ft) | Casing Blows/ Core | No. | Depth (ft.) | Samp Pen. (in) | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Field Test Data | Description ⊕ ⊭ |
| - | Rate | S-11 | 30.0- | 24 | 16 | 10 11 50 100/3" | 61 | S-11: Very dense, brown, fine to coarse SAND, little Silt, trace Gravel. (PID = 0.0) | <u>rr</u> | Data | |
| 35 _ - | | S-12 | 35.0- 37.0 | 24 | 20 | 11 16 25 28 | 41 | S-12: Very dense, gray brown, fine to coarse SAND, little Silt. (PID = 0.0) | | | LOWER SAND (3a) |
| 40 <u> </u> | | S-13 | 40.0- 42.0 | 2 | 2 | 50/2" | R | S-13: Very dense, gray/black/white, fine to coarse SAND, little Silt, trace Decomposed Rock. (PID = 0.0) | | - | weathered rock |
| 45 _ - - | | S-14 | 45.0- 45.1 | 1 | 0 | 50/1" | R | S-14: No recovery. End of exploration at 45.1 feet. | 3 | | 45.1 -34. |
| 50 _ | | | | | | | | | | | |
| 55 | | | | | | | | | | | |
| - 60 | | | | | | | | | | | |

3 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with grout after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-42

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00.GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Finish: 5/24/2022

Kiewit Engineering Group, Inc. CHPE Astoria Convertor Station Queens, NY EXPLORATION NO.: GZ-43 SHEET: 1 of 2

PROJECT NO: 41.0163020.00 REVIEWED BY: D. Patel

Logged By: A. Amador

Prilling Co.: Craig Geotechnical Testi

Drilling Co.: Craig Geotechnical Testing, Inc. **Foreman:** P. Mullins

Type of Rig: ATV Rig Model: CME 750X Drilling Method:

Mud Rotary

Boring Location: See Plan
Stationing (ft.): Offset (ft.):
Ground Surface Elevation (ft.): 9.48
Final Boring Depth (ft.): 38

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225971.03 Easting: 1011471.47

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140

Date Start: 5/24/2022

Hammer Fall (in.): 30 Auger or Casing O.D./I.D Dia (in.): 4/3.5 Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

| | Casing | | | Samp | ole | | | 0 1 5 11 15 1 | ırk | Field | £ Stratum ; |
|---------------|----------------|------|----------------|--------------|------------|----------------------|--------------|--|----------|--------------|------------------------|
| Deptn (ft) | Blows/ Core | No. | Depth (ft.) | Pen. (in) | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | ີ ອີ ≓ Description 🤶 ⊭ |
| . , | Rate | S-1 | 0.0- | 24 | (in) 18 | 16 13 | value | S-1: Top 2": Gravel | <u>~</u> | Dala | 0.2 GRAVEL 9 |
| _ | | 0-1 | 2.0 | 24 | 10 | 12 27 | 25 | Medium dense, gray, fine to medium SAND, little Gravel, | | | 0.0 |
| | | | 2.0 | | | 12 21 | 25 | occasional brick, coal and cinder fragments. (PID = 0.0 | 1 | | |
| _ | | S-2 | 2.0- | 24 | 15 | 12 9 | | ppm) | | | |
| - | | | 4.0 | | | 8 7 | 17 | S-2: Medium dense, black, medium to coarse SAND, little | | | |
| _ | | | | | ١. | | | Gravel, occasional coal and brick fragments. (PID = 0.0) | | | |
| 5 | | S-3 | 4.0- | 24 | 4 | 1 2 | | S-3: Very loose, black, medium to coarse SAND, trace | | | Fu . (7) |
| | | | 6.0 | | | 1 1 | 3 | Gravel, occasional coal fragments. (PID = 0.0) | | | FILL (7) |
| - | | S-4 | 6.0- | 24 | 7 | 1 2 | | S-4: Very loose, black, medium to coarse SAND, trace | | | |
| _ | | | 8.0 | | | 2 5 | 4 | Gravel, occasional coal fragments. (PID = 0.0) | | | |
| _ | | | | | | | | | | | |
| | | S-5 | 8.0- | 24 | 6 | 1 1 | | S-5: Very loose, gray, fine to coarse SAND, little Silt, | | | |
| - | | | 10.0 | | | 1 1 | 2 | occasional roots and cinders. (PID = 0.0) | | | |
| 10 _ | | S-6 | 10.0- | 24 | 3 | WOR | | S-6: Very loose, gray, fine to coarse SAND, little Silt, | | - | 10 -0 |
| _ | | 3-0 | 12.0 | 24 | " | WOH | 0 | occasional roots and cinders. (PID = 0.0) | | | |
| | | | 12.0 | | | WOH | " | occasional roots and ciriders. (1 15 - 0.0) | | | |
| _ | | S-7 | 12.0- | 24 | 8 | WOH | | S-7: Very soft, gray CLAY, trace Sand, occasional roots | 2 | | |
| - | | | 14.0 | | | WOR | 0 | and shells. (PID = 0.0, PP = 0.3) | | | |
| _ | | | 440 | | 00 | WOR | | 0.00 Variation (0.00 Variation | | | CLAY (6) |
| 15 _ | | S-8 | 14.0- | 24 | 22 | WOH | | S-8: Very soft, gray CLAY, trace Sand, occasional roots | | | , , |
| | | | 16.0 | | | WOH | 0 | and shells. (PID = 0.0, PP = 0.4) | | | |
| - | | | | | | WOR | | | | | |
| - | | | | | | WOR | | | | | |
| _ | | | | | | WOH | | | | | 18 |
| | | | | | | WOH | | | | | |
| 20 | | | | | | | | | | | |
| 20 _ | | S-9 | 20.0- | 24 | 10 | 6 7 | | S-9: Medium dense, gray/brown, fine to medium SAND | | | |
| - | | | 22.0 | | | 4 5 | 11 | and SILT, little Gravel. (PID = 0.0) | | | |
| _ | | | | | | | ''' | | | | |
| | | | | | | | | | | | |
| - | | | | | | | | | | | |
| - | | | | | | | | | 3 | | LOWER SAND (3a/3b |
| 25 _ | | | | | | | | | " | | |
| | | S-10 | 25.0- | 24 | 10 | 9 15 | | S-10: Dense, black/brown, fine to medium SAND, little | | | |
| _ | | | 27.0 | | | 21 23 | 36 | Gravel, little Silt. (PID = 0.0) | | | |
| - | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| _ | | | | | | | | | | | |
| 30 | | | | | | | | | | | 30 -20 |

1 - Samples scanned for volatile organic compounds using a photo ionization detector (PID). Results reported in parts per million (ppm). 2 - Pocket penetrometer reading in tons per square foot (tsf).

3 - Color changes in drilling fluid at approximately 24.0 feet.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-43

32A TEMPLATE TEST BORING - GZA 2016_01_26.GDT - 6/10/22 13:29 - J:\GINT PROJECT DATABASES\41.0163000\41.0163020.00\GPJ

GZA GeoEnvironmental of New York Engineers and Scientists

Kiewit Engineering Group, Inc. **CHPE Astoria Convertor Station** Queens, NY

EXPLORATION NO.: SHEET: 2 of 2

PROJECT NO: 41.0163020.00 **REVIEWED BY: D. Patel**

Logged By: A. Amador

Drilling Co.: Craig Geotechnical Testing, Inc. Foreman:

P. Mullins **Date Start:** 5/24/2022 Finish: 5/24/2022

Type of Rig: ATV Boring Location: See Plan Rig Model: CME 750X Stationing (ft.): Offset (ft.): **Drilling Method:**

Ground Surface Elevation (ft.): 9.48 Final Boring Depth (ft.):

H. Datum: NAD 83 V. Datum: NAVD 88 Northing: 225971.03 Easting: 1011471.47

Hammer Type: Automatic Hammer Hammer Weight (lb.): 140 Hammer Fall (in.): 30

Auger or Casing O.D./I.D Dia (in.): 4/3.5

Sampler Type: SS Sampler O.D. (in.): 2.0 Sampler Length (in.): 24 Rock Core Size: N/A

Mud Rotary

Groundwater Depth (ft.) Date Time **Water Depth** Stab. Time See Report for Groundwater Readings

| | Casing Blows/ | | ; | Samp | ole | | | | Ĭ | Field | Stratum . ∴ |
|---------------|------------------------|------|----------------|------|-----|----------------------|--------------|--|--------|--------------|-------------------------------------|
| Jepth (ft) | Blows/ Core Rate | No. | Depth (ft.) | | | Blows (per 6 in.) | SPT Value | Sample Description and Identification (Modified Burmister Procedure) | Remark | Test Data | O Stratum (#) Description E (#) (#) |
| | Nate | S-11 | 30.0- | 24 | 4 | 4 100/4" | | S-11: Very dense, gray/black/brown, fine to medium | | | |
| - | | | 32.0 | | | | R | SAND, little Silt, trace mica fragments. (PID = 0.0) | 4 | | WEATHERED ROCK (1d) |
| - | 1:44 | C-1 | 33.0- | 60 | 60 | REC=100% | | C-1: Moderately hard to hard, moderately weathered, dark | | - | 33 |
| - 35 | 1:43 | | 38.0 | | | RQD=97% | | gray, fine grained SCHIST with closely spaced, horizontaly | | | |
| JJ _ | 2:15 | | | | | | | to subhorizontaly dipping fractures. | | | BEDROCK (1a) |
| | 1:50 | | | | | | | | | | |
| - | 1:42 | | | | | | | | | | 38 -28.5 |
| - | | | | | | | | End of exploration at 38 feet. | 5 | | |
| - 40 | | | | | | | | | | | |
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| 60 | | | | | | | | | | | |

4 - Hard drilling between 31.0 to 33.0 feet.

5 - Borehole was left open for a 24-hour period after drilling to obtain water level reading. Borehole was backfilled with bentonite after ground water measurement.

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-43

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| Client: | Champlain Hudson Power Express | Project No. |
|--------------------------------|--|---------------|
| Kiewit Engineering Group, Inc. | Astoria Converter Station | 41.0163020.00 |
| | 18-01 20 th Avenue, Astoria, NY | |



| Boring Depth GZ-41 (05/09/2022) 35.5-40.5 feet | | Run Summary | <u>Recovery</u> | <u>RQD</u> | |
|--|----------------|-----------------|------------------|------------------|--|
| | | C-1 – 60 inches | 60 inches (100%) | 40 inches (67%) | |
| GZ-40 (05/11/2022) | 35-40 feet | C-1 – 60 inches | 60 inches (100%) | 60 inches (100%) | |
| GZ-05 (05/12/2022) | 35.1-40.1 feet | C-1 – 60 inches | 57 inches (95%) | 43 inches (72%) | |
| GZ-03 (05/13/2022) | 40-45 feet | C-1 – 60 inches | 24 inches (40%) | 6 inches (10%) | |



Client: Champlain Hudson Power Express Project No.
Kiewit Engineering Group, Inc. Astoria Converter Station 41.0163020.00

18-01 20th Avenue, Astoria, NY



| Boring | <u>Depth</u> | Run Summary | <u>Recovery</u> | <u>RQD</u> |
|--------------------|----------------|-----------------|------------------|-----------------|
| GZ-03 (05/13/2022) | 45.2-50.2 feet | C-2 – 60 inches | 42 inches (70%) | 20 inches (33%) |
| GZ-03 (05/13/2022) | 50.2-55.2 feet | C-3 – 60 inches | 60 inches (100%) | 58 inches (97%) |



| Client: Kiewit Engineering Group, Inc. | Champlain Hudson Power Express Astoria Converter Station | Project No. 41.0163020.00 |
|---|--|----------------------------------|
| | 18-01 20th Avenue, Astoria, NY | |



| Boring | <u>Depth</u> | Run Summary | Recovery | RQD |
|-------------------------------|----------------|-----------------|------------------|-----------------|
| GZ-20 (05/19/2022) | 45-50 feet | C-1 – 60 inches | 34 inches (57%) | 13 inches (22%) |
| GZ-20 (05/19/2022) 50-55 feet | | C-2 – 60 inches | 60 inches (100%) | 56 inches (93%) |
| GZ-01 (05/16/2022) | 76.1-81.1 feet | C-1 – 60 inches | 58 inches (97%) | 58 inches (97%) |



| Client: Kiewit Engineering Group, Inc. | Champlain Hudson Power Express Astoria Converter Station | Project No. 41.0163020.00 |
|--|--|----------------------------------|
| | 18-01 20 th Avenue, Astoria, NY | |



| Boring | <u>Depth</u> | Run Summary | <u>Recovery</u> | RQD |
|--------------------|--------------|-----------------|-----------------|-----------------|
| GZ-37 (05/23/2022) | 35-40 feet | C-1 – 60 inches | 54 inches (90%) | 34 inches (57%) |
| GZ-35 (05/23/2022) | 34-39 feet | C-1 – 60 inches | 38 inches (63%) | 22 inches (37%) |



Client:Champlain Hudson Power ExpressProject No.Kiewit Engineering Group, Inc.Astoria Converter Station41.0163020.0018-01 20th Avenue, Astoria, NY



| Boring | <u>Depth</u> | Run Summary | <u>Recovery</u> | RQD | |
|--------------------|--------------|-----------------|------------------|-----------------|--|
| GZ-43 (05/24/2022) | 33-38 feet | C-1 – 60 inches | 60 inches (100%) | 58 inches (97%) | |

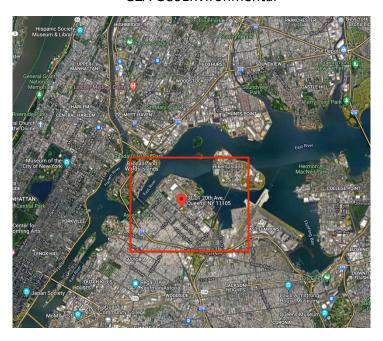


APPENDIX C – SEISMIC CONE PENETRATION TESTING REPORT

PRESENTATION OF SITE INVESTIGATION RESULTS

Astoria Yard - Queens NY

Prepared for:
GZA GeoEnvironmental



Prepared by:

Craig Geotechnical Drilling Co., Inc. PO Box 427 Mays Landing NJ 08330

> Tel: 609-625-4862 Fax: 609-625-4306

Email: Kcraig@craigtest.com www.craigtest.com



Introduction

The enclosed report presents the results of piezocone penetration testing (CPTu or CPT) program carried out at Astoria Yard, Queens NY. The site investigation was conducted by Craig Geotechnical Drilling Co., Inc. under contract to GZA GeoEnvironmental.

A total of 5 cone penetration tests were completed. The CPT program was performed to evaluate the subsurface soil conditions. CPT sounding locations were selected and numbered under the supervision of GZA personnel.

Project Information

| Project | |
|-------------|--------------------------|
| Client: | GZA GeoEnvironmental |
| Project: | Astoria Yard – Queens NY |
| Job Number: | 225081 |
| Date: | 7/12/22 |

| Rig Description | Deployment System | Test Type |
|-----------------|-------------------------------|------------|
| CPT Truck Rig | 20 Ton Truck (Twin Cylinders) | CPT & SCPT |

| Cone Penetration Test (CPT) | | | | |
|-----------------------------|--|--|--|--|
| Depth Reference | Ground Surface at the time of the investigation. | | | |
| Seismic Shear Wave Velocity | | | | |

Limitations

This report has been prepared for the exclusive use of GZA for the project titles "Astoria Yard". The report's contents may not be relied upon by any other party without the express written permission of Craig Geotechnical Drilling Co., Inc.. CGD has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

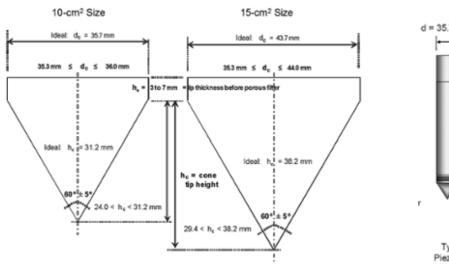
The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to Craig Geotechnical Drilling by the client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

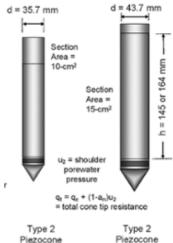


CPT Cones

Cone Penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Vertek of Randolph, VT 05060.

CPT cones are available in multiple sizes, but the 10 cm² cone and 15 cm² cone are the industry standard. Penetrometers are made of high strength steel and designed to resist abrasion by soil. The **15 cm² cone** was used on this project.





Minimum and Maximum Cone Measurements

| Cone Size (Cross-Sectional Area) | 10 cm ² | | | 15 cm ² | | |
|--|---------------------|---------------------|---------------------|--------------------------|---------------------|--------------------------|
| Measurement | Min | Ideal | Max | Min | Ideal | Max |
| Cone Diameter (d _c) | 35.3 mm | 35.7 mm | 36.0 mm | 35.3 mm | 43.7 mm | 44.0 mm |
| Cone Tip Height (hc) | 24.0 mm | 31.2 mm | 31.2 mm | 29.4 mm | 38.2 mm | 38.2 mm |
| Cone Tip Angle | 55° | 60° | 65° | 55° | 60° | 65° |
| Lip Thickness Before Porous Filter (h_e) | 3 mm | N/A | 7 mm | 3 mm | N/A | 7 mm |
| Friction Sleeve Diameter | 35.7 mm | 35.7 mm | 36.05 mm | 43.7 mm | 43.7 mm | 44.05 mm |
| Friction Sleeve Surface Area | 147 cm ² | 150 cm ² | 153 cm ² | 220.5 cm ² | 225 cm ² | 229.5 cm ² |



Cone Penetration Tests

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position. The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically, one-meter length rods with an outer diameter of 15cm are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Dissipation Tests

As a CPT cone is pushed into saturated subsurface soil, it creates a localized increase in pore pressure (denoted excess pore pressure, u_i) as groundwater is pushed out of the way of the cone. In a pore pressure dissipation test, the downward movement of the cone is paused and the time it takes for the pore pressure to stabilize is measured. This stable pore pressure is called equilibrium pore pressure, u_o . This information allows the user to identify important hydrogeologic features:

The water table (or phreatic surface) depth is defined as the distance below the soil surface at which pore pressure is equal to atmospheric pressure. This can be roughly visualized as the level below which subsurface materials are fully saturated with groundwater.

Especially in fine-grained soils, estimating the water table can be more complex than simply detecting moisture, since surface tension draws groundwater upwards, creating negative pore pressures. This is effect is called capillary rise.

Very low or negative pressures can be difficult to measure precisely with the piezocone, which is primarily designed to measure high pressures below the water table. In this case, the water table depth can be calculated by the following formula:

```
d_{water} = d_{cone} - h_w
```

d_{water} = water table depth
d_{cone} = depth of piezocone
h_w = water head

The water head, h_w , is the height of the water above the cone, which can be calculated based on the pore pressure and the unit weight of water:

```
h_w = u/\gamma_w + z
```

 h_w = water head

 $u_o = equilibrium pore pressure$

 \mathbf{Y}_{w} = unit weight of water

z = distance, if any, between pressure sensor location and depth reference point on the piezocone

