The following revisions and/or clarifications are to be made to the scope of work for the Request for Proposals for “Police Memorial and North Cove Marina Electrical Vault Resilience Project Construction Management Services.” They are a result of issues discussed at the pre-proposal conference held on 10/06/15 and any questions received to date.

Questions: (answers to all question are shown in Italics immediately after the question)

1) Can a definitive start date and completion date be established for the duration of construction? Please include a month of closeout.
   Response: A definitive construction start and completion date cannot be established at this time but it is anticipated that construction will begin in late 2015 and be completed by September of 2016.

2) It was stated at the Preproposal meeting that no Preconstruction services will be required by the CM. Please confirm.
   Response: Preconstruction services with regard to design and bidding the construction portion of the project will not be required however the selected Construction Management Firm will be required to provide preconstruction services such as scheduling, phasing and logistics.

3) Have any addendum been distributed for the construction bid? If so, can they be included as part of the Q/A addendum.
   Response: Two addendums for the construction RFP have been issued and are included in the Clarifications / Revisions section below.

Clarifications / Revisions:

1. The original deadline for BPCA’s response to substantive questions for the Police Memorial and North Cove Marina Electrical Vault Resilience Project Construction Management Services was October 16, 2015. As per this addendum, the due date is changed to October 19, 2015.

2. Construction Services RFP Q/A:
   “Spec section 044200-2 item 2.01 calls for "match coping stone at 9/11 memorial fountains" and "same producer as 9/11 memorial fountains." Please indicate if alternate stone types and other fabricators will be allowed to bid?
   Response: In an effort to maintain a uniform appearance throughout the site alternate stone types and colors will not be accepted however alternate suppliers / producers will be accepted in conformance with Section 01 60 00 of the Technical Specifications.”

3. The attached Plans and Specifications are hereby incorporated into the scope of Construction Management Services scope of work to be performed in connection with this RFP. A general list of the plan changes is provided below; however proposers are solely responsible for identifying and incorporating all components of the revised Plans and Specifications in their proposals and adjusting their cost proposals as needed.
**Plan Revisions**

<table>
<thead>
<tr>
<th>Sheet #</th>
<th>Description</th>
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<tbody>
<tr>
<td>A 103.00, A 302.00</td>
<td>HATCHES IN STAIR CORRECTED TO REFLECT SINGLE BUILDING CONDITION (2/A 103 AND SECTIONS A AND B ON SHEET A 302)</td>
</tr>
<tr>
<td>A 302.00</td>
<td>GRANITE DISTINGUISHED IN SECTION A AND B</td>
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<tr>
<td>ALL SHEETS</td>
<td>TITLE BLOCK EDITED TO SHOW PAGE NUMBER</td>
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<tr>
<td>A-000.00</td>
<td>ZONING AND GENERAL INFORMATION ADDED</td>
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<tr>
<td>A 001.00</td>
<td>DRAWING LIST ADDED</td>
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<tr>
<td>A 001.00</td>
<td>SHEET ADDED TO HOLD ABBREV AND DRAWING LIST</td>
</tr>
<tr>
<td>A 002, A 003</td>
<td>SHEET A 001 BECOMES A 002, A002 BECOMES A 003</td>
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<td>A 104.00</td>
<td>FLOURESCENT CHOSEN (LIGHTING SCHEDULE)</td>
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<tr>
<td>A 500.00</td>
<td>DETAIL 8 - RECESSED PAVING TRAY ADDED (VISIBLE IN PLAN ON A 002, A 101, A 102)</td>
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<tr>
<td>A 101, A 102</td>
<td>REMOVAL OF NEW DRAINS FROM SCOPE</td>
</tr>
<tr>
<td>A 101</td>
<td>RELOCATION OF DRAIN AT DOOR OF EAST VAULT</td>
</tr>
<tr>
<td>A 101</td>
<td>REGRADING OF PAVERS ADDED FOR DRAINAGE</td>
</tr>
<tr>
<td>A 302.00</td>
<td>DRAINAGE CHANNEL AT STAIRS ADDED (SECTIONS A AND B)</td>
</tr>
<tr>
<td>A 101, A 102</td>
<td>EXISTING EAST HATCH AT NORTH COVE VAULT TO BE DEMOLISHED AND REPAVED</td>
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<tr>
<td>L 101</td>
<td>DETAIL 2 - TREE ROOT ZONE PROTECTION</td>
</tr>
<tr>
<td>L 102</td>
<td>DETAIL 2 - NEW AND TRANSPANTING PLANTING DETAIL</td>
</tr>
<tr>
<td>F 100 - F 400</td>
<td>FOUNTAIN DRAWINGS ADDED</td>
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</tbody>
</table>

**Technical Specification Revisions:**

00 010 10 – TABLE OF CONTENTS: Delete sections with strikeouts: 01 45 33, 26 05 43, 26 05 46, 26 05 54. Sections not used.

Delete Section 08 51 13 – ALUMINUM WINDOWS and replace with Section 08 43 13 – ALIMINUM-FRAMED STOREFRONTS.

00 01 15 – LIST OF DRAWING SHEETS – List of Architectural sheets changed from list of August 28, 2015 04 42 00 – EXTERIOR STONE CLADDING: 1.02 Related Sections, B. Delete “Section 07 62 00 – Sheet Metal Flashing and Trim and replace with Section 07 13 00 – Pre-Applied and Self Adhering Sheet Membrane Waterproofing.

08 43 13 – ALUMINUM-FRAMED STOREFRONT: Added with this addendum to replace Section 08 51 13 - Aluminum Windows.

08 80 00 – GLAZING: Added with this addendum specifying different type of glass to replace previous Section 08 80 00 dated August 28, 2015.

By signing the line below, I am acknowledging that all pages of the addendum have been received, reviewed and understood, and will be incorporated into the proposal and bid price submitted. This document must be attached to the Proposal for consideration.

<table>
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<th>Print Name</th>
<th>Signature</th>
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Number of pages received: ______________ <fill in>
FIRE PROTECTION:

- Sprinkler system: NYC Building Code Section 405.2.1
- Alarm system externally monitored with smoke detectors

BUILDING AREA:

- Type of building: New building - no current address
- Construction type: Type IV - heavy timber
- Zoning district: ZR 84-132

ACCESSIBILITY:

- Access via fire stairs only, non-accessible
- Group U is exempt from accessibility requirements (NYC BC Section 173.2.5)

OCCUPANCY:

- Building type: A-104.00
- Zoning classification: Utility and miscellaneous
- Accessible use: Group U - utility and miscellaneous

GENERAL INFORMATION:

- Date: 09/05/15
- Location: Battery Park City
- Lot: 3
- Project: Kowsky Plaza

SYMBOL LEGEND:

- View Number
- View Title
- Section Marker
- Detail Callout Head
- Symbol
- Rev Tag

HATCHES AND FILLS:

- Concrete
- Earth
- Wood
- Insulation
- Turf Block

EMERGENCY ACCESS:

- Exit: Rooftop exit
- Stair: Interconnecting stair

PARKING:

- Requirements: None

ZONING REFERENCE MAP (NTS):

- Building envelope: N/A
- Foundation: N/A
- Condominiums: N/A
- Zoning reference: Map (NTS)
HATCHED AREAS DENOTE PORT AUTHORITY WATER TUNNEL RIGHT-OF-WAYS

- Upgrade Repair Vaults
- Remove Damaged Electrical Equipment
- Provide New Electrical and Low Voltage Connections to New Vaults
- New Gray Granite Curb

Existing Police Memorial Vault Below

- Existing North Cove Vault Below
  - Remove Abandoned Electrical Equipment as Noted
  - Relocate Con Ed Switch as Noted
  - Splice Existing Electrical Lines as Needed with Connections to New Cables
  - Waterproof Existing 12" Diameter Existing Conduit to North Cove

New West Vault

- New East Vault

- Contra-Contract New Building in Location Shown
- Install New Electrical Equipment as Noted
- Relocate Equipment in Below Ground Existing Vaults
- Construct New Building in Location Shown
- Install New Electrical Equipment as Noted
- Relocate Equipment in Below Ground Existing Vaults

Removal of existing 6'-2" above NAVD 14'-6" above NAVD

Remove pavers and slab for new trench with electrical and low voltage connections from 4' to 16' to be removed. A new access ramp is to be installed.
EXISTING TREE TO REMAIN. PROVIDE PROTECTION.

NEW PLANTING IN THIS AREA.

EXISTING TREE TO REMAIN. PROVIDE PROTECTION.

EXISTING NORTH COVE VAULT

NEW PLANTING IN THIS AREA.

EXISTING VAULT TO REMAIN.

NEW CONDUITS IN REPAIRED PLAZA SLAB FOR ELECTRICAL AND LOW VOLTAGE CONNECTIONS TO POLICE MEMORIAL VAULT AND PUMPS.

EXISTING HATCH TO REMAIN.

PAINT EXISTING FENCE

NO EXCAVATION BEYOND THIS LINE

PAINT EXISTING FENCE

EXISTING TREE TO REMAIN. PATCH AND REPAIR AS NECESSARY TO ACHIEVE SLOPE FOR DRAINAGE.

NEW PLANTING IN THIS AREA.

NEW PLANTING IN THIS AREA.

EXISTING VAULT TO REMAIN. PROVIDE PROTECTION.

EXISTING VAULT TO REMAIN. PROVIDE PROTECTION.

EXISTING HATCH TO BE DEMOLISHED AND BUILT BACK WITH PAVERS TO MATCH EXISTING.

EXISTING HATCH TO BE DEMOLISHED AND BUILT BACK WITH PAVERS TO MATCH EXISTING.

NEW GRANITE CURBING AND STEPS 12" ABOVE PLAZA LEVEL.

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NEW GRANITE CURBING AND STEPS 12" ABOVE PLAZA LEVEL.
NEW PLANTING IN THIS AREA

PINK GRANITE BAND TO REMAIN

6" HEX PAVERS TO MATCH EXISTING PINK GRANITE PAVING

REPAIR PINK GRANITE WALLS WHERE CUT

TURF BLOCK IN HATCHED AREA

TURF BLOCK IN HATCHED AREA

TURF BLOCK IN HATCHED AREA

PINK GRANITE PAVING TO MATCH EXISTING

SEE MEP DRAWINGS FOR ALL EQUIPMENT LOCATIONS

SEE MEP DRAWINGS FOR ALL EQUIPMENT LOCATIONS

EXISTING VAULT BELOW

GRAY GRANITE STEPS AND CURBING 12" HIGH

EXISTING VAULT BELOW

EAST VAULT

WEST VAULT

SEE MEP DRAWINGS FOR ALL EQUIPMENT LOCATIONS

SEE MEP DRAWINGS FOR ALL EQUIPMENT LOCATIONS

Kowsky Plaza Vaults

Battery Park City- North Cove

3/8" = 1'-0"

100 Year Flood
<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Manufacturer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIG7-LED-1-9-W-25</td>
<td>4.09&quot; X 4.25&quot; X 3.54&quot;</td>
<td>DECO LIGHTING</td>
<td>DECK MOUNTED PLAZA LIGHT</td>
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<tr>
<td>SIG7-LED-2-9-W-15</td>
<td>2.72&quot; X 3.81&quot; X 2.36&quot;</td>
<td>DECO LIGHTING</td>
<td>STEP LIGHT IN RISERS</td>
</tr>
<tr>
<td>BFLSA-28/120/DL</td>
<td>1.95&quot; X 1&quot; X 46.06&quot;</td>
<td>BARTCO LIGHTING</td>
<td>UPTURNED FLUORESCENT LIGHT</td>
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</tbody>
</table>

3/8" = 1'-0"

Kowsky Plaza
Vaults
Battery Park City North Cove

A-104.00

Rev No. Description Date
1 Adendum#1 10.05.15
500 Year Flood
14' - 6"
Top of Wall
21' - 6"

100 Year Flood
12' - 0"
Lower Plaza
6' - 2"

Roof @ Highest
26' - 9"

GRAY GRANITE STAIRS AND BENCHES OVER CONCRETE FORMS
STAIR SLAB OVER CONCRETE BEAMS (TYP.)
PILES
RING BEAM
EXPOSED CONCRETE TYP.
WEATHERED IPE RAINSCREEN SYSTEM
GLASS CLERESTORY
3" X 3" STEEL TUBE PLATE CONNECTION TO CONCRETE WALL (SEE S-DRAWINGS FOR DETAILS AND LOCATION)
CONTINUOUSLY SLOPED 1/2" X 1" DRAINAGE CHANNEL ETCHED INTO STAIR SURFACE
APPLY PRE-PRUFE MEMBRANE BELOW EXISTING SLAB TYP.
GRAY GRANITE BENCHES ON CONCRETE FORMS
CONTINUOUSLY SLOPED 1/2" X 1" DRAINAGE CHANNEL ALONG EDGE OF STAIR SURFACES WITH STAIN GLASS SHEILD THIS SIDE ONLY

Proven winner: Convenient and reliable, the Penumbra® system offers a range of adjustable head positions to accommodate any user’s needs. With its sleek design and intuitive interface, it provides an optimal experience for both casual and professional users alike.

NASA has selected the Penumbra® system for its advanced features and user-friendly design, making it an ideal choice for future space missions. The Penumbra® system’s ability to provide a comfortable seating experience for long periods of time is crucial for the well-being of astronauts during extended spaceflights.

The Penumbra® system’s design is based on extensive research conducted by NASA, ensuring that it meets the highest standards for durability and reliability in a space environment. Its adjustable headrest and lumbar support provide optimal support and comfort, reducing the risk of musculoskeletal disorders that can occur during prolonged weightlessness.

The Penumbra® system also includes advanced technology for monitoring and adjusting the user’s position in real-time, allowing for personalized adjustments to ensure maximum comfort and efficiency. This feature is particularly valuable for astronauts who need to maintain precise positioning for tasks that require fine motor control.

In conclusion, the Penumbra® system represents a significant advancement in space seating technology, offering a comfortable and reliable solution for astronauts on future missions. Its design and features are a testament to the innovative efforts of NASA, and it is poised to play a crucial role in ensuring the well-being of our spacefarers.
BASIN FILL WHILE FLUME PUMP IS RUNNING

BASIN DRAIN WHILE FLUME PUMP IS OFF

NOTE:
PIPE AND CONDUIT ROUTING IS DIAGRAMMATIC AND IN SOME INSTANCES EXAGGERATED FOR CLARITY. REFER TO FOUNTAIN GENERAL NOTES, SHEET F4.21 FOR FURTHER INSTRUCTIONS AND INFORMATION.

PRELIMINARY DESIGN
NOT FOR CONSTRUCTION

NOTE:
REFER TO FOUNTAIN STRUCTURAL DETAILS AND ARCHITECTURAL/HARDSCAPE PLANS FOR CONSTRUCTION INFORMATION, INCLUDING SLOPES, ELEVATIONS, FINISHES, FINAL EQUIPMENT LOCATIONS ETC. THAT ARE NOT SHOWN ON THESE PLANS.
NOTE:
PIPE AND CONDUIT ROUTING IS DIAGRAMMATIC AND IN SOME INSTANCES EXAGGERATED FOR CLARITY. REFER TO FOUNTAIN GENERAL NOTES, SHEET F4.21 FOR FURTHER INSTRUCTIONS AND INFORMATION.

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NOTE:
ALL VOLTAGE DROP CALCULATIONS ASSUME
3% VD FROM CONTROL PANEL TO LOAD AND
2% VD FROM SERVICE TO CONTROL PANEL.
ALL CONDUIT TO USE LONG RADIUS ELBOWS
IN ALL TURNS.
NOTE:
 ALL VOLTAGE DROP CALCULATIONS ASSUME 3%VD FROM CONTROL PANEL TO LOAD AND 2%VD FROM SERVICE TO CONTROL PANEL.
ALL CONDUIT TO USE LONG RADIUS ELBOWS IN ALL TURNS.
SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Glass.
   B. Glazing gaskets, compounds and accessories.

1.02 RELATED REQUIREMENTS
   A. Section 07 25 00 - Weather Barriers.
   B. Section 07 90 05 - Joint Sealers: Sealant and back-up material.
   C. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished by storefront manufacturer.
   D. Section 08 51 13 - Aluminum Windows: Glazing furnished by window manufacturer.
   E. Section 08 63 00 - Metal-Framed Skylights: Glazing furnished by skylight manufacturer.
   F. Section 10 28 00 - Toilet and Bath Accessories: Mirrors.

1.03 REFERENCE STANDARDS
   F. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
   G. GANA (SM) - GANA Sealant Manual; Glass Association of North America; 2008.

1.04 ADMINISTRATIVE REQUIREMENTS
   A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
   C. Samples: Submit two samples 12 by 12 inch in size of glass units.
   D. Samples: Submit 2 inch long bead of glazing sealant, color as selected.
   E. Certificates: Certify that products meet or exceed specified requirements.
   F. Manufacturer's Certificate: Certify that laminated glass meets or exceeds specified requirements.

1.06 QUALITY ASSURANCE
B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 MOCK-UP
A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
B. Provide mock-up of typical storefront module including glass.
C. Locate where directed by Architect.
D. Mock-up may remain as part of the Work.

1.08 FIELD CONDITIONS
A. Do not install glazing when ambient temperature is less than 50 degrees F.
B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
C. Decorative Plastic Glazing Film: Warranty Period: 10 years from date of original installation.

PART 2 PRODUCTS

2.01 GLAZING UNITS
A. Type S-1 - Single Vision Glazing:
   1. Application: All exterior storefront glazing.
   2. Type: Laminated float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.

2.02 EXTERIOR GLAZING ASSEMBLIES
A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressure: Calculated in accordance with applicable codes.
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   4. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
   5. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   6. Glass thicknesses listed are minimum.
B. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.03 GLASS MATERIALS
A. Float Glass Manufacturers:
   4. Old Castle Glass: oldcastlebe.com
8. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for
      wind load design regardless of thickness indicated.

C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
   2. Plastic Interlayer:
      a. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.
   3. Manufacturers:
      d. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.04 GLAZING ACCESSORIES
   A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length
      of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space
      minus 1/16 inch x height to suit glazing method and pane weight and area.
   B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II.
      Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self
      adhesive on one face.
   C. Glazing Gaskets: Resilient replaceable EPDM rubber extruded shape to suit glazing channel
      retaining slot; ASTM C864 Option II; black color.

2.05 SOURCE QUALITY CONTROL
   A. See Section 01 40 00 - Quality Requirements, for additional requirements.
   B. Provide shop inspection and testing for all glass.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that openings for glazing are correctly sized and within tolerance.
   B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may
      impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION
   A. Clean contact surfaces with solvent and wipe dry.
   B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)
   A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
   B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to
      attain full contact.
   C. Install removable stops without displacing glazing gasket; exert pressure for full continuous
      contact.

3.04 FIELD QUALITY CONTROL
   A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their
      products.
   B. Monitor and report installation procedures and unacceptable conditions.
3.05 CLEANING
   A. Remove glazing materials from finish surfaces.
   B. Remove labels after Work is complete.
   C. Clean glass and adjacent surfaces.

3.06 PROTECTION
   A. After installation, mark pane with an ‘X’ by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

3.07 SCHEDULE
   A. Aluminum-Framed Storefront Glazing: Typical, exterior dry method, and glass thickness as required to comply with performance requirements indicated in Section 08 43 13.

   END OF SECTION
SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Aluminum-framed storefront, with vision glass.

1.02 RELATED REQUIREMENTS
A. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
B. Section 07 84 00 - Firestopping: Firestop at system junction with structure.
C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS
A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.
B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).
E. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS
A. Coordinate with installation of other components that comprise the exterior enclosure.
B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 PERFORMANCE REQUIREMENTS
A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   1. Design Wind Loads: Comply with requirements of the Building code of the City of New York.
   2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at a reference differential pressure across assembly of 6.24 psf as measured in accordance with ASTM E 283.

D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 8.00 lbf/sq ft.

E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

F. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

G. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

H. Windborne-Debris-Impact-Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1886 and information in ASTM E 1986 and/or AAMA 506.
   1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples: Submit two mullion section samples 4-1/2”x 6” inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

G. Samples: Submit two samples 6 x 6 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.

H. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

I. Report of field testing for water leakage.

J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at New York State.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.08 MOCKUPS

A. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials an execution.
   1. Build mockup of typical fixed lite and adjacent glazed door.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.
B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS
A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY
A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
B. Correct defective Work within a five year period after Date of Substantial Completion.
C. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS
2.01 BASIS OF DESIGN -- FRAMING FOR MONOLITHIC GLAZING
A. Wind-Borne-Debris Resistance Tested:
B. Front/Outside-Set Style:
   1. Basis of Design: Kawneer, EnCORE Framing System.
C. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
D. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MANUFACTURERS
A. Basis of Design: See below under description of products.
B. Aluminum-Framed Storefront and Doors:
   2. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 STOREFRONT
A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Unitized, shop assembly.
   2. Glazing Rabbet: For 1/4 inch monolithic laminated glazing.
   4. Design Wind Load: 30 psf, positive and negative.
   5. Water Leakage Test Pressure Differential: 8 lbf/sq ft.
   7. Overall U-Value Including Glazing: 1.02, maximum.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
   9. Color: As selected from manufacturer's standards colors.
10. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
12. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

13. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

14. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

15. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

16. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

17. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.

B. Performance Requirements:

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Design Wind Loads: Comply with requirements of ASCE 7.
   b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

2. Wind-Borne-Debris Resistance: Identical full-size glazed assembly without auxiliary protection, tested by independent agency in accordance with ASTM E1996 for Wind Zone 2 - Enhanced Protection for Large and Small Missile impact and pressure cycling at design wind pressure.

3. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8.00 lbf/sq ft.

4. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.24 pounds per square foot pressure differential across assembly.

5. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

6. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E283.

7. Condensation Resistance Factor: Measure in accordance with AAMA 1503 with 1 inch insulating glass installed.

8. Water Leakage: None, when measured in accordance with ASTM E331 at specified pressure differential.

9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

10. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glass and inner sheet of infill panel and heel bead of glazing compound.

11. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   2. Cross-Section: As indicated on drawings.

B. Glazing: As specified in Section 08 80 00.

2.05 MATERIALS

B. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
C. Fasteners: Stainless steel.
D. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
E. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch minimum thickness.
F. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
G. Perimeter Sealant: Type 1 specified in Section 07 90 05.
H. Perimeter Sealant: Type 1 specified in Section 07 92 00
I. Glass: As specified in Section 08 80 00.
   1. Glass in Exterior Framing: Type S-1.
J. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
K. Glazing Accessories: As specified in Section 08 80 00.
L. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.06 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
   1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as indicated on drawings.
      a. Products:
         2) PPG Metal Coatings; Duranar: www.ppgideascapes.com.
         3) Substitutions: See Section 01 60 00 - Product Requirements.
B. Color: As selected by Architect from manufacturer’s standard range.
C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.07 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
C. Prepare components to receive anchor devices. Fabricate anchors.
D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
E. Arrange fasteners and attachments to conceal from view.
F. Reinforce framing members for imposed loads.
G. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
PART 3 EXECUTION

3.01 EXAMINATION
A. Verify dimensions, tolerances, and method of attachment with other work.
B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION
A. Install window wall system in accordance with manufacturer's instructions.
B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
C. Provide alignment attachments and shims to permanently fasten system to building structure.
D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
E. Provide thermal isolation where components penetrate or disrupt building insulation.
F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
J. Install hardware using templates provided.
K. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
L. Install perimeter sealant in accordance with Section 07 90 05.
M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES
A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.
B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL
A. See Section 01 40 00 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
B. Test installed storefront for water penetration in accordance with ASTM E1105 with a uniform test pressure difference of 2.86 lbf/sq ft. Test shall include a minimum of 3 cycles, each lasting a minimum of 5 minutes.

3.05 CLEANING
A. Remove protective material from pre-finished aluminum surfaces.
B. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION
A. Protect installed products from damage during subsequent construction.
SECTION 07 25 00 - WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES
   A. Air Barriers: Materials that form a system to stop passage of air through exterior walls and joints around frames of openings in exterior walls.

1.02 RELATED REQUIREMENTS
   A. Section 07 46 23 - Wood Siding: Exterior rain screen outside of water resistive air barrier.
   B. Section 07 54 00 - Thermoplastic Membrane Roofing: Vapor retarder installed as part of roofing system.
   C. Section 07 90 05 - Joint Sealers: Sealant materials and installation techniques.

1.03 DEFINITIONS
   A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
   B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

1.04 REFERENCE STANDARDS

1.05 SUBMITTALS
   A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
   B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
      1. When feasible all air barriers membranes and accessories such as transition membranes, flashing membranes, mastics, sealants, primers and tapes) shall be furnished by the same manufacturer. When products from a variety of manufacturers are used, a letter must be obtained from at least one manufacturer of the products in contact stating the materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.
   C. Shop Drawings: Provide drawings of special joint conditions.
   D. Manufacturer's Installation Instructions: Indicate preparation.

1.06 FIELD CONDITIONS
   A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES
   A. Air Barrier: Behind exterior wood siding:
      1. On outside surface of single wythe concrete exterior walls use air barrier coating.
2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)
   A. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.
   B. Air Barrier Coating:
      1. Material: Water-based acrylic or polymer-modified bitumen, with VOC content of zero.
      2. Acceptable Substrates: Stated by manufacturer as suitable for installation on visibly damp surfaces and concrete that has hardened but is not fully cured ("green" concrete) without requiring a primer.
      3. Dry Film Thickness (DFT): 10 mils (0.010 inch), minimum.
      4. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
      5. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M.
      6. Dry Film Thickness: 40 mils (0.040 inch), minimum.
      7. Air Permeance: 0.004 cubic feet per square foot, maximum, when tested in accordance with ASTM E2178.
      8. Water Vapor Permeance: 12 perms, minimum, when tested in accordance with ASTM E96/E96M.
      9. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
     10. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
      12. VOC Content: 25 g per L or less.
      15. Products:
         g. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SEALANTS
   A. Silicone Sealant: Type 1 as specified in Section 07 90 05.
   B. Sealant Backers: As specified in Section 07 90 05.
   C. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

2.04 ACCESSORIES
   A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
   C. Thinner and Cleaners: As recommended by material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Verify that surfaces and conditions are ready to accept the work of this section.
3.02 PREPARATION
A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation. Ensure gaps are filled, joints struck, CMU is dry, and all snags are gone.
B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION
A. Install materials in accordance with manufacturer's instructions.
B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
D. Coatings:
   1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
   2. At Transition between foundations and walls: Through wall flashing must be draped from above to completely cover this joint and adhered to the face of the foundation wall.
   3. Coating shall continuously cover end or edge of concrete floor and roof plank.
   4. Verify proper thickness using a wet mill gauge. Substrate shall not be visible.
   5. Use flashing to seal to adjacent construction and to bridge joints.
   6. Transition membranes shall be installed and sealed before insulation is installed on top. Seams shall be sealed with mastic type liquid membrane or with compatible sealant.
   7. For liquid applied membrane at adjacent building conditions in any locations where continuous air barrier on the exterior of the building cannot be installed, a low VOC product shall be installed on the interior at full height (top of plank to bottom of plank at each floor). This shall happen before any interior framing is installed.
   8. Transition membranes shall be installed and sealed before insulation is installed on top. Seams shall be sealed with mastic type liquid membrane or with compatible sealant.
E. Openings and Penetrations in Exterior Weather Barriers:
   1. Install flashing over entire rough opening, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
   3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
   4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
   5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
   6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface with sealants compatible with all surfaces. Transition membranes shall be used to patch as necessary with seams sealed appropriately. Gaps shall be filled with backer rod as necessary and sealant compatible with all surfaces. Where smooth surfaces are present, mechanical gasket seals can be used.
F. Construction Joints: Sealing materials spanning joints between construction materials shall allow for expansion and contraction of the construction materials.

3.04 FIELD QUALITY CONTROL
A. Do not cover installed weather barriers until required inspections have been completed.
B. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
C. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION
SECTION 04 42 00 - EXTERIOR STONE CLADDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cut granite veneer at exterior wall bases and stairs.

B. Remove portion of existing pink granite wall cladding at bottom of new stair opening between new vaults.
   1. Sawcut stone to be removed at new stair opening.
   2. Store removed stone and reuse for patching sides of new stair opening.

C. Metal anchors and supports.

D. Sealing exterior joints.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Shelf angles and supports.

B. Addendum No. 1:
   Section 07 13 00 - Pre-Applied and Self-Adhering Sheet Membrane Waterproofing:
   Self-Adhering Sheet Membrane Waterproofing on accessible concrete walls below grade.

C. Section 07 92 00 - Joint Sealants: Sealing perimeter and expansion joints in stone work.

1.03 REFERENCE STANDARDS


B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.


1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on stone, mortar products, and sealant products.

C. Shop Drawings: Indicate layout, pertinent dimensions, anchorages, head, jamb, and sill opening details, and jointing methods.

D. Samples: Submit two stone samples 12 x12 inch in size, illustrating color range and texture, markings, surface finish.

E. Samples: Submit mortar color samples.

F. Installation Instructions: Submit stone fabricator's installation instructions and field erection or setting drawings; indicate panel identifying marks and locations on setting drawings.

1.06 QUALITY ASSURANCE

A. Design anchors and supports under direct supervision of a Professional Structural Engineer, registered in New York State.

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EXTERIOR STONE CLADDING
1. Design anchors to resist positive and negative wind pressures and other loads as required by applicable code.
2. Design anchor attachment to stone with a factor of safety of 5:1.
3. Design each individual anchor with a factor of safety in the vertical dead-load-bearing direction of 4:1 and in the horizontal lateral-load-bearing direction of 2:1.

B. Perform work in accordance with NBGQA (SPEC).
C. Stone Fabricator: Company specializing in fabricating cut stone with minimum ten years of documented experience.
D. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

1.07 MOCK-UP
A. Construct stone wall mock-up, 3 feet long by 2 feet high, including stone anchor accessories, sill and head flashings, corner condition, typical control joint.
B. Locate where directed.
C. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING
A. Store stone panels vertically on edge, resting weight on panel edge.
B. Protect stone from discoloration.

1.09 FIELD CONDITIONS
A. During temporary storage on site, at the end of working day, and during rainy weather, cover stone work exposed to weather with non-staining waterproof coverings, securely anchored.

PART 2 PRODUCTS

2.01 STONE
A. Granite: _______; complying with ASTM C615/C615M.
   2. Color: To match coping stone at 9/11 memorial fountains.
   3. Acceptable Producers:
      a. Same producer as 9/11 memorial fountains.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 MORTAR
A. Mortar: As specified in Section 04 05 11 - Masonry Mortaring and Grouting.

2.03 ANCHORS AND ACCESSORIES
A. Anchors and Other Components in Contact with Stone: Stainless steel, ASTM A666, Type 304.
   1. Sizes and configurations: As required for vertical and horizontal support of stone and applicable loads.
   2. Wire ties are not permitted.
B. Support Components not in Contact with Stone: Stainless steel, ASTM A240/A240M, Type 304.
C. Setting Buttons and Shims: Lead type.
D. Flashings: Stainless steel; See Section 07 62 00 - Sheet Metal Flashing and Trim.
E. Joint Sealant: ASTM C920 silicone sealant with movement capability of at least plus/minus 25 percent and non-staining to stone when tested in accordance with ASTM C1248.
F. Joint Backer Rod: ASTM C1330 open cell polyurethane of size 40 to 50 percent larger in diameter than joint width.
G. Cleaning Solution: Type that will not harm stone, joint materials, or adjacent surfaces.

2.04 STONE FABRICATION
A. Thickness: 1-1/2 inch; Stair treads: Height of riser.
B. Panel Size: As indicated on drawings.

C. Fabrication Tolerances: In accordance with NBGQA (SPEC).

D. Fabricate units for uniform coloration between adjacent units and over the full area of the installation.

E. Where corner detail is not indicated, form external corners to quirk joint profile.

F. Slope exposed top surfaces of stone and horizontal surfaces for natural wash.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support work and site conditions are ready to receive work of this section.

B. Verify that items built-in under other sections are properly located and sized.

3.02 PREPARATION

A. Clean stone prior to erection. Do not use wire brushes or implements that will mark or damage exposed surfaces.

3.03 INSTALLATION

A. Install flashings of longest practical length and seal watertight to back-up. Lap end joint minimum 6 inches and seal watertight.

B. Set stone with a consistent joint width of 1/2 inch.

C. Install anchors and place setting buttons to support stone and to establish joint dimensions.

D. Joints in Exterior Work: Seal joints with joint sealant over backer rod, following sealant manufacturer's instructions; tool sealant surface to concave profile.

3.04 TOLERANCES

A. Positioning of Elements: Maximum 1/8 inch from true position.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet; 1/2 inch in 50 feet.

C. Maximum Variation Between Face Plane of Adjacent Panels: 1/16 inch.

D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.

E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

3.05 CUTTING AND FITTING

A. Obtain approval prior to cutting or fitting any item not so indicated on Drawings.

B. Do not impair appearance or strength of stone work by cutting.

3.06 CLEANING

A. Remove excess joint material upon completion of work.

B. Clean soiled surfaces with cleaning solution.

C. Use non-metallic tools in cleaning operations.

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March 5, 2015

LMW Engineering Group, LLC
2539 Brunswick Ave
Linden, NJ 07036

Attn: Mr. Jieming Wang

Re: Geotechnical Investigation Report
Proposed North Cove Vault
Police Memorial
Battery Park City, NY
GTC Job No.: LMW11915

Dear Mr. Wang:

This report presents the results of a limited geotechnical investigation performed by Geo Tech Consultants (GTC) for the above referenced project. The work was performed in accordance with our proposal dated January 20, 2015 and your subsequent authorization.

The scope of our investigation performed for this project included:

- Installation and full-time inspection of two (2) test borings;
- Engineering analysis of boring data to determine the stratification and physical characteristics of the subsoil, and to develop recommendations for the design and construction of foundation systems for support of the proposed building;
- Preparation of a written report complete with boring data, analysis, conclusions, and recommendations.

1. PROJECT AND SITE DESCRIPTION

The subject property, known as Lot 3, Block 16, of the Borough of Manhattan, New York, is located on the higher portion of the Gateway Plaza, which is at the end of Liberty Street and west of South End Avenue. The level of the higher Gateway Plaza stands at elevation 14.65’ (above NAVD), which is base elevation for a 500 year flood.

It is our understanding that the project consists of 2 schemes. Scheme 1 involves the installation of a rectangular-shaped electric vault on the southern end of the Gateway at a location immediately south of an existing underground pump house. The new electric vault
measures 9’ (W) x 9’ (H) x 48’ (L) (or 8’ by 46’ interior) and is to be set to a depth around 4’ below existing grade.

Scheme 2 involves the installation of two square-shaped electrical vaults of 17’ (w) x 17’ (L) x 18’ (H) and a new staircase between them that links the higher Gateway Plaza to the lower Plaza level. Both new vaults are to be established into the ground at a depth of about 12’ below plaza level.

Preliminary design information suggests that the rectangular-shaped electric vault weighs about 650 kips while the square-shaped vault weighs around 400 kips.

2. FIELD EXPLORATION

Two (2) test borings, labeled as B-1 and B-2, were performed as per project requirements on the higher side of the Gateway Plaza adjacent to the sites of the two proposed schemes at the locations as shown on drawing G-001, which is attached at the end of this report. These locations were selected as results of an underground utility survey.

Borings were performed by Craig Test Boring, Inc. of Mays Landing, New Jersey during the period from February 26th, 2015 to February 27th, 2015 and inspected by GTC’s Professional Engineering staff.

The borings were advanced with a standard truck drill rig. Soils encountered were sampled at two (2) feet intervals for the first 12’ and at five (5) foot intervals thereafter. Each soil sample was extracted using a Standard Split-Spoon sampler by performing a Standard Penetration Test (SPT) in accordance with ASTM D 1586. Where encountered, bedrock was cored with NX core barrels.

During drilling operations, extracted soil samples and rock cores were visually examined and classified by our field engineer. The samples were then placed in sealed glass jars and rock cores in wooden boxes. Both samples and rock cores were later returned to driller’s shop for storage.

Detailed descriptions of the soil samples encountered in the borings were documented in the boring logs, which are presented on drawing G-001.

3. SUBSURFACE CONDITIONS

The following provides a general description of the soil profile inferred from the test borings. While the borings may indicate that the subsurface conditions appear to be uniform across the site, it should be recognized that the number of borings was small compared to the size of the site, and that the existence of anomalies cannot be precluded.
3.1 Soil Profile

The test borings installed at this site revealed a soil profile that depicts three distinguishable layers, which are described below in the order of increasing depth.

**Stratum F – Fill (NYC Class 7)**

Miscellaneous fill was encountered in borings B-1 and B-2 to respective depth of 10’ and 22’ below existing grade. Given the wide variation in the depth of fill encountered between these two closely-spaced borings, one should expect the same in other areas as well.

The fill was described to consist mostly of sands with some concrete, rock and brick fragments, which is a NYC Class 7 material. The fill materials registered dense to very dense compact condition, suggesting that it was placed and compacted in a controlled compacted manner, and may be considered a control fill.

**Stratum Ad - Alluvial Deposit – Organic clay, some sand and gravel (OH, NYC Class 6)**

Below the fill, the borings encountered alluvial deposit to depths about 55’- 60’ below grade. The alluvial deposit consists of organic clay with some sand, silt and gravel, which is consistent with OH Group of the Unified Soil Classification System (USCS). While the material registered generally medium stiff and stiff consistency, it is considered a Class 6 material, according to NYC Building Code.

**Stratum Dr – Decomposed Rock (NYC Class 1d)**

The alluvial deposit was underlain by a thin layer of decomposed rock that extends between 55’-60’ below grade in B-1 and 59’-62’ in B-2. The decomposed rock stratum consists of broken rock fragments with trace clay and sand. The material registered very dense compact condition with penetration resistance exceeding 50 blows per foot, matching NYC soil class 1d.

**Stratum R – Rock (NYC Class 1b or better)**

Bedrock was encountered in both borings at a depth around 59’-62’ below existing grade, and was cored with one 5’ run at each boring location. Both 5’ core runs recovered well and registered Rock Quality Designation (R.Q.D.), between 73% and 90%, matching NYC Class 1b and 1a respectively.

Examination of the retrieved rock core specimen suggests that the bedrock is of slightly fractured gray mica schist.
3.2 Groundwater

Groundwater was observed in both borings at depth around 10’ below existing grade. It should be noted that the aforementioned groundwater table was estimate based on observation of the soil samples retrieved from the borings. Accurate groundwater table can only be measured from groundwater observation wells.

It should also be pointed out that groundwater table is known to fluctuate with seasonal, climatic, and tidal conditions, particularly the tidal given the close proximity of the site to the adjacent Hudson River.

4. DISCUSSION AND RECOMMENDATIONS

The test borings revealed a generalized soil profile that consists of 10’-22’ of fill, followed by approximately 33’-50’ of alluvial organic clay that mix with sand and silt, and then 2’-5’ of decomposed rock before reaching competent bedrock at 59’-62’ below existing grade.

It should be pointed out that the two test borings installed for this project are located outside the footprint of the proposed vaults due to limited site access and concern over hitting existing underground utilities.

For the purpose of our analysis, it is assumed that the findings from these two borings are representative of the soil conditions below the proposed vaults.

4.1 Feasibility of wall footing support

Our analysis of the boring logs suggests that the existing fill materials encountered in the two borings are marginally suitable for the use of shallow spread footing foundation for support of the proposed construction because it was underlain by inferior soil of organic clay.

The results of our analysis are presented below.

**SCHEME 1 - New 9’ x 48’ electric vault in Gateway**

Scheme 1 involves the installation of a new electric vault of 9’ x 48’ (approximate outside dimension) on the southern end of the Gateway Plaza, at a location approximately 2.5’ south of the existing underground WTC river water pump room. The bottom of the pump room is reported to have been established at a depth around 12’ below plaza level.

Assuming the subsurface conditions revealed from boring B-1 (where 10’ of fill was encountered and followed by 50’ of organic clay) are uniform and representative of the soil conditions across the entire length of the proposed vault, then it is possible to support the vault on wall footings bearing on competent fill material.
Wall footings bearing on competent fill material and established at the required frost depth of 4’ below grade can be designed for an allowable bearing capacity up to 1 tsf or 2 ksf. Based on this capacity and a wall footing width of 3.5’, our analysis suggests that wall footings established at 4’ below grade will yield settlements less than 1/2”, assuming the underlying organic clay is normally consolidated.

However as the new vault is to be situated 2.5’ from the adjacent lower level pump house, portion of the vault will fall into the influence line of the pump house. To avoid exerting pressures on the lower pump house, the north wall footing for the new vault will have to extend to depths below the influence line or to the same level of the adjacent footings, which would bring the bottom of the north wall footing closer to the top of or even into the inferior organic clay layers, resulting in larger settlements.

Our analysis suggests that if the north wall footing were to be established at 12’ below grade to bear on organic clay, it could yield settlements ¾” to 1-1/4”.

Assuming a 500 yr flood were to occur after the new electric vault has been installed and fully loaded, the vault should have enough weight to overcome the buoyant force resulting from the hydrostatic pressures due to the rising 500 yrs flood water.

**SCHEME 2 – Two 17’ x 17’ Electric Vaults and Stairs**

Each of the two electric vaults to be installed under Scheme 2 measures 17’ by 17’ and about 18’ tall. The bottom of the vault will be established at a depth of about 12’ below plaza grade.

The soil profile in this area as revealed from boring B-2, which was installed close to but not within the project site, depicts 22’ of granular fill, followed by 32’ of organic clay, then decomposed rock and bedrock.

If the subsurface conditions revealed from boring B-2 are uniform and representative of the soil conditions below each of the new vaults, then it is possible to support both vaults on wall footings bearing on competent fill material.

Wall footings bearing on competent fill material and established at depth of 12’ below grade can be designed for an allowable bearing capacity up to 1 tsf or 2 ksf. Based on this capacity and a wall footing width of 3.0’, our analysis suggests that the wall footings established at this level are likely to yield settlements less than 1/2”, assuming the underlying organic clay is normally consolidated.

However if the thickness of the fill is much less than 22’, then the resulting settlements would be much higher. For instance if the soil conditions encountered in B-1, where fill is only 10’ thick, also prevail in this area, then the wall footings for these square vaults will
likely bear on organic clay, which could yield settlements exceeding 1”, similar to the north wall footing for the vault of Scheme 1.

Assuming a 500 yr flood were to occur after the new electric vaults have been installed and fully loaded, the vaults should have enough weight to overcome the buoyant force resulting from the hydrostatic pressures due to the rising 500 yrs flood water. The critical period is during the period before the vaults are fully loaded.

**Notes:**

In any case, if wall footings are to be used for foundation support, it must be placed on at least 2’ of controlled compacted fill, either existing competent fill or new fill, over in-situ organic clay material. Wall footing bearing directly on organic clay is not recommended.

In area where new fill is required, the organic material encountered at the subgrade shall be undercut at least 2’ and replaced it with new controlled compacted fill. See section 5.3 for fill material specifications and compaction requirements. Natural ¾” crushed stone can be used as control fill but it needs to be wrapped around with a filter fabric such as Mirafi 500X.

All footing subgrade shall be subject to special inspection and shall be approved by a qualified inspector prior to placing concrete. At the discretion of the inspecting engineer, any soft material encountered at the footing bottom that is deemed unsuitable for bearing should be removed and replaced with controlled compacted fill.

### 4.2 Pile Foundation Support

#### 4.2.1 Caisson Piles

**Pile Design Criteria**

Wall footings are applicable only if the above estimated settlements are deemed tolerable by the design team and the concern over excessive hydrostatic pressures acting against the vaults during construction is addressed. Otherwise, the vaults should be supported on deep foundations such as caisson piles.

Caisson piles are smaller diameter (generally 8”-12”) piles that are installed by drilling, which generates little vibration and noise and thus is favored by reviewing agency.

By design, caisson piles are drilled and socketed into bedrock, deriving bearing capacity through bonding between pile grout and surrounding competent bedrock material.

Based on the soil profile established above, it is our opinion that caisson piles of 8” nominal diameter or larger may be used for this project. The final design capacity should be selected by project structural engineer based on the loading requirements and cost consideration.
Caisson piles are generally contracted out as performance specifications with contractor responsible for design, installation and quality assurance and control. The design of caisson piles shall satisfy both the geotechnical and structural requirements as stipulated in the NYC Building Code. A shop drawing with calculations prepared by contractor’s engineer should be submitted to project engineer of record for review and approval prior to installation.

For the estimation of geotechnical capacities of caisson piles, a bonding strength of 200 psi between pile grout and the surrounding competent bedrock of NYC Class 1b or better may be used.

To ensure proper loading transfer from piling material to bedrock, steel casing shall be used and shall extend at least one foot into the competent bedrock. The competency of the bedrock shall be verified by a qualified geotechnical engineer. Visual inspection of the bedrock via video camera is acceptable to DOB.

Uplift capacity for a successfully installed caisson pile can be assumed at a value not to exceed 50% of the allowable compressive capacity it achieved.

**Pile Lateral resistance**

The lateral resistance of a caisson pile will depend upon its size and penetration depth and material. Our analysis suggests that for caisson pile of 8” in diameter that sockets at least 5’ into bedrock can develop an allowable lateral resistance up to 2 tons.

**Pile Load Tests**

According to NYC Building Code, pile load tests are not required for caisson pile provided the competency of the bedrock where piles embedded are inspected and approved by a qualified geotechnical engineer via video camera or other approved methods.

**4.2.2 Driven Piles**

Driven piles such as open-end steel pipe piles or H-piles can be considered for use if some vibration and noise associated with the pile driving can be tolerated.

Steel pipe piles or H-piles can be driven to bedrock and designed for capacity suitable for the project.

**4.3 Liquefaction Potential**

The existing site soil conditions possess slight liquefaction potential. Liquefaction of the in-situ soil is not a concern.
4.4 Site Classification for Seismic Design

The boring data suggest that the in-situ site soil can be classified as site Class E for seismic design purpose.

4.5 Design Groundwater Level

Groundwater was encountered in all borings at a depth of about 10’ below existing grade. As the site is to be designed for 500 year flood, design groundwater table should be assumed at the current grade level or elevation 14.65’.

4.6 Lateral Earth Pressures

Permanent basement walls should be designed to withstand long-term, at rest equivalent fluid pressures of 60 pounds per cubic foot (pcf) for the portion of wall above design groundwater level and 90 pcf for wall below design groundwater level.

Temporary walls, such as excavation shoring, if required, should be designed to withstand equivalent fluid pressure of 40 pcf for walls above groundwater level and 80 pcf for wall below groundwater level.

4.7 Damp proofing and Waterproofing

Any portion of the structure that will be submerged in water permanently (below design groundwater) shall be waterproofed, subject to discretion of the designing architect and engineer.

4.8 Dewatering

Dewatering is likely to be required for excavation to be below 7’ below existing surface grade. In general, groundwater should be lowered and maintained at a level at least 2’ below the bottom of the excavation to allow for placement of concrete.

5. CONSTRUCTION MONITORING

5.1 Protection of Adjacent Structures and Sidewalk

The excavation of the foundation may require shoring, bracing, and underpinning of the adjacent structures and sidewalks, which should be designed by a professional structural engineer engaged by the contractor. The design drawings should be submitted to the project engineer for review and approval prior to installation. The installation work shall be subject to control inspection by a qualified professional engineer as required per NYC Code.
5.2 Pre-construction Survey

It is recommended that a pre-construction survey be conducted to document the existing conditions of the adjacent structures and underground utility systems prior to commencement of any construction activities particularly during pile driving.

5.3 Filing and Backfilling

Filling and backfilling against pile caps shall utilize qualified fill material. Qualified fill should meet the grading requirement for control fill as stipulated in the NYC Building Code. Control fill should be placed in maximum 12” loose lifts and each lift should be compacted to at least 95% of its maximum dry density as determined in accordance with ASTM D1557.

6. LIMITATIONS

The conclusions and recommendations contained in this report are based on the subsurface data obtained during this investigation and on the details stated in this report. Should conditions be encountered which differ specifically from those stated in this report, we should be notified immediately so that our recommendations may be reviewed and/or revised, if necessary.

7. CONSTRUCTION CONSULTATION AND INSPECTION

Due to the nature of the soils and subsurface conditions at this site and the recommendations set forth herein, consultation and inspection services by a qualified soil engineer are recommended for the following:

1. Preparation of the site including all clearing, stripping of undesirable material, and initial proofrolling and compaction of the in-situ soils.

2. Placement of all controlled backfill and/or fill, if any.

3. Special inspection of piling installation.

We trust the above information will allow you to proceed with the design and construction of the proposed vaults.

We thank you for the opportunity of providing this service to you. Should you have any questions regarding this report, or if we can be of further assistance, please do not hesitate to contact us.
Respectfully Submitted
Geo Tech Consultants LLC.

Steve J. J. Lin, P.E.

Attachments:

Drawing G-001       Record of boring logs with boring location plan
NOTES:

8. BORING INSTALLED BY CRAIG TEST BORING Co. Inc.

7. GROUND WATER TABLE INDICATED ON THE LOGS REPRESENTED
   AT LEVEL OF WATER WHERE IT WAS FIRST ENCOUNTERED.

5. SOIL DESCRIPTIONS ARE MADE THROUGH VISUAL EXAMINATION
   OF SOIL SAMPLES IN ACCORDANCE WITH THE PROCEDURES
   ESTABLISHED IN NYC CODE.

4. BEDROCK WAS CORED USING NX OR BX DOUBLE CORE BARRELS
   IN ACCORDANCE WITH ASTM D2113.

3. SOIL DESCRIPTIONS ARE MADE THROUGH VISUAL EXAMINATION
   ESTABLISHED IN NYC CODE.

2. THE TOTAL NUMBER BLOWS FOR THE MIDDLE 12 INCHES OF
   PENETRATIONS IS TERMED AS STANDARD PENETRATION
   RESISTANCE (N).

1. GROUND WATER TABLE INDICATED ON THE LOGS REPRESENTED
   AT LEVEL OF WATER WHERE IT WAS FIRST ENCOUNTERED.

LEGEND:

SYMBOL:

PT     PEAT AND HIGH ORGANIC SOIL
CH     CLAYS OF HIGH PLASTICITY
CL     CLAYS OF LOW PLASTICITY
SC     CLAYEY SAND
SM     SILTY SAND
SP      POORLY GRADED SAND
SW     WELL GRADED SAND
GW     WELL GRADED GRAVEL

DENSITY N VALUE N VALUE
LOOSE 5 TO 10
FAIR 3 TO 7
GOOD 2 TO 5
EXCELLENT 1 TO 3

ROCK QUALITY (ROCK QUALITY DESIGNATION)
R.Q.D<35%
R.Q.D.>85%

ROCK
10<N<30
31 OR MORE

NORMINALLY UNSATISFACTORY MATERIALS
SANDS AND VARVED SILTS
SILTS AND CLAYEY SILTS

GRANULAR SOILS
(SOIL GROUP GW, GP, GM & GC AND SOIL GROUP SW
CONTAINING MORE THAN 10% GRAVEL)
(SOIL GROUP SC, CL & CH)
CLAYS

SAND SILT & CLAY

REACTIVITY

DECOMPOSED ROCK

SOIL GROUP SC, CL & CH

DATE DRILLED: 2/26/2015
GROUNDWATER WAS ENCOUNTERED AT 10' BELOW GRADE

DATE DRILLED: 2/27/2015
GROUNDWATER WAS ENCOUNTERED AT 10' BELOW GRADE