Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

INVITATION FOR BIDS

RESTORATION OF BOILERS AT BUILDING 62[1]
FEMA PW4388

Contact Information:

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Project Manager
Dmagdich@bnydc.org
718-907-5980

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[1] BNYDC underwent a wayfinding initiative in 2026 whereby the building numbers, street names, and the Navy Yard's address were updated. More information can be found here: https://www.brooklynnavyyard.org/wayfinding-faqs.

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A. PROJECT INFORMATION

The Brooklyn Navy Yard Development Corporation ("BNYDC") is issuing this Invitation for Bids ("IFB") to seek bids ("Bids" and each, a "Bid") from entities ("Bidders" and each, a "Bidder") interested in performing the Restoration of Boilers at Building 62 (now known as Building 103) (the "Project") at the Brooklyn Navy Yard (the "Yard").

1. PROJECT SITE(S):
   Building 62 (now known as Building 103)
   Brooklyn Navy Yard
   63 Flushing Avenue
   Brooklyn, NY 11205

2. DESCRIPTION OF PROJECT:
   Critical infrastructure damaged by super storm Sandy at the Brooklyn Navy Yard in Building 62 (now known as Building 103) included one low pressure boiler and its associated equipment and instrumentation. This boiler must be completely demolished and replaced at an elevated height to prevent future inundation by flood waters during storm events. The work will include the removal of one existing gas boiler, the construction of a masonry enclosure and the installation of ancillary water, steam and electrical equipment. A new gas boiler and any necessary equipment needed to support its operation are to be installed above dry flood elevation ("DFE") and within a new pile-supported steel and concrete structure

3. PROJECT SPECIFICATION DOCUMENTS AVAILABLE:
   The project specification documents are attached hereto as Exhibit M.

4. **M/WBE PARTICIPATION GOAL: 30%**

B. PERTINENT DATES AND CONDITIONS PRECEDENT FOR BNYDC TO CONSIDER A BID

1. MANDATORY PRE-BID MEETING. A **mandatory** pre-bid submission conference will be held at 1:00PM on Wednesday, August 26, 2026 at BNYDC's offices, 141 Flushing Avenue, Building 77, 8th Floor, Suite 801, Brooklyn, NY 11205. All prospective Respondents who plan to attend the pre-submission conference must pre-register using the following link:

   BNYDC Bid Meeting Restoration of Boilers at Building 62 – Fill out form

Contact David Magdich via email at dmagdich@bnydc.org with any questions regarding this meeting and site visit. The meeting will be immediately followed by a site walkthrough. All attendees must bring and wear their own hardhat.

2. INQUIRIES. Any explanation desired by Bidders regarding the meaning or interpretation of this IFB must be emailed and received by BNYDC no later than on Thursday, September 10, 2026. BNYDC will evaluate the need to respond to inquiries received. No verbal responses will be provided, and any information given to a prospective Bidder will be furnished to all prospective Bidders as an addendum to this IFB (an "Addendum"). Except as provided below, all questions must be directed only to David Magdich, Brooklyn Navy Yard Development Corporation, at Dmagdich@bnydc.org.

3. **BID SUBMISSION DEADLINE. Written sealed Bids must be received at BNYDC's office on or no later than 12:00PM on Tuesday, September 22, 2026 (the "Bid Submission Deadline"). If Bidder is submitting a request for a full or partial waiver of the M/WBE Participation Goal set forth in Section D hereof, they shall submit such waiver request no later than 12:00PM on Tuesday, September 15, 2026, which is seven (7) calendar days prior to the Bid Submission Deadline.**

4. BID SECURITY. Bidder must submit with the Bid either a bid deposit by certified check or a bid bond in the form attached hereto as Exhibit B in an amount of ten percent (10%) of the Bid. Note that Bid Security is not required for any Bid submitted for an amount under Two Hundred Fifty-Thousand Dollars ($250,000).

5. PASSPORT COMPLIANCE. Bidders are required to be registered and up-to-date in PASSPort prior to submitting a Bid to this IFB. Each Bidder must include its PASSPort identification number on the Confirmation of PASSPort Compliance form attached hereto as Exhibit E.

6. PROJECT SCHEDULE. Below are the following pertinent dates:

    a. Anticipated selection of Bid by and notification from BNYDC to winning Bidder on or around December 2026;

    b. Upon selection, the selected Bidder must execute a Contract substantially in the form attached hereto as Exhibit H. Please note that, if any Bidder desires any change(s) to the Contract form attached as Exhibit H, it must include any such proposed change(s) as part of its Bid. BNYDC does not agree to necessarily accept any such proposed Contract changes, but BNYDC will not consider any Contract changes that are not provided as part of a Bid. The contents of the selected Bid, together with this IFB and any formal questions and answers provided during the bid process may be incorporated into any final Contract at BNYDC's discretion;

    c. Commence work on Project immediately following the Notice to Proceed to be issued by BNYDC for this Project (the "NTP").

    d. Substantial completion of the Project (as defined in the Contract attached as Exhibit H hereto) no later than Section C.1 Time Of Completion (the "Substantial Completion Date").

C. CONTRACT PARTICULARS

1. TIME OF COMPLETION. 370 consecutive calendar days from the issuance of the NTP.
2. LIQUIDATED DAMAGES. $1,000 for each calendar day beyond Substantial Completion Date. Failure to comply with the M/WBE requirements described in this IFB may also result in liquidated damages, as described further in Exhibit N.
3. RETAINAGE. As provided in the Contract attached hereto as Exhibit H.
4. CONTRACT LENGTH. The anticipated Contract length is two (2) years.

D. MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PARTICIPATION

The specific requirements of minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs") participation for this Contract are detailed below. Additional provisions regarding this IFB's requirements relating to M/WBEs can be found in Exhibit N (Additional M/WBE Provisions) attached hereto.

Bidders must comply with all applicable MBE and WBE requirements for this Contract.

1. M/WBE PROGRAM. Section 6-129 of the Administrative Code of the City of New York ("Section 6-129") establishes the program for participation in City procurement ("M/WBE Program") by "MBEs and WBEs, certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6-129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. BNYDC endorses these goals and has adopted an M/WBE Program to further participation by MBEs and WBEs for its projects. All Bidders shall comply with all requirements of BNYDC's M/WBE Program applicable to this IFB.

2. M/WBE PARTICIPATION GOAL:
    a. The percentage goal for M/WBE participation (the "Participation Goal") for the Contract is thirty percent (30%) of the total dollar value of the Contract. The Participation Goal represents a percentage of the total dollar value of the Contract that may be achieved by awarding subcontracts to firms certified with DSBS or DMWBD (each as defined below) as MBEs or WBEs, and/or by crediting the participation of prime contractors and/or qualified joint ventures as provided in Section D.2.d and Section D.2.e below, unless the goals have been waived or modified by BNYDC in accordance with Exhibit N, Section A.
    b. M/WBE firms must be certified by either (i) the NYC Department of Small Business Services ("DSBS"), or (ii) Empire State Development's Division of Minority and Women's Business Development ("DMWBD") to credit such firms' participation toward attainment of the Participation Goal. Such certification must occur prior to the firms' commencement of work. A list of M/WBE firms may be obtained (i) from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6356, or by visiting or writing DSBS at 110

William Street, New York, New York, 10038, 7th Floor, and (ii) from the ESD website at www.ny.newnycontracts.com. Eligible firms that have not yet been certified may contact DSBS or DMWBD for additional information on how to get certified. No credit shall be given for participation by a graduate M/WBE, as defined in Section 6-129(c)(20).

c. The Participation Goal is a material term of the Contract and the selected Bidder shall be subject to the BNYDC approved Participation Goal, unless the goals have been waived or modified by BNYDC in accordance with Exhibit N, Section A.

d. An M/WBE Bidder shall be permitted to count its own participation toward fulfillment of the Participation Goal. The value of an M/WBE Bidder's participation shall be determined by subtracting from the total value of the Contract any amounts that the Bidder will pay to direct Subcontractors. A Bidder that is certified as both an MBE and a WBE may count its own participation either toward the goal for MBEs or the goal for WBEs, but not both. If a Bidder is not an M/WBE, it must meet the Participation Goal through the awarding of subcontracts to firms certified with DSBS or DMWBD as MBEs or WBEs.

e. A Bidder that is a Qualified Joint Venture (as defined in Section 6-129, and as discussed further in Section 5) shall be permitted to count a percentage of its own M/WBE participation toward fulfillment of the Participation Goal. The value of Bidder's participation shall be determined by subtracting from the total value of the Contract any amounts that Bidder pays to direct Subcontractors, and then multiplying the remainder by the percentage to be applied to total profit to determine the amount to which an MBE or WBE is entitled pursuant to the joint venture agreement, provided that where a participant in a joint venture is certified as both an MBE and a WBE, such amount shall be counted either toward the goal for MBEs or the goal for WBEs, but not both.

3. M/WBE PROPOSAL SUBMISSION FORMS.

a. Bidders shall be required to submit with its bid a completed M/WBE Utilization Plan in the form attached as Exhibit O indicating:

i. whether the Bidder is an MBE or WBE, or Qualified Joint Venture;

ii. the percentage of work it intends to award to direct Subcontractors;

iii. in cases where the Bidder intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and copies of DSBS or DMWBD certifications for each proposed MBE or WBE subcontractor listed in its M/WBE Utilization;

iv. the Bidder's required certification and affirmations, as attached as Exhibit O to this IFB. In the event that this M/WBE Utilization Plan indicates that the

bidder does not intend to meet the Participation Goal, the bid shall be deemed non-responsive, unless the goals have been waived or modified by BNYDC in accordance with Exhibit N, Section A.

b. **THE BIDDER MUST COMPLETE AN M/WBE UTILIZATION PLAN IN THE FORM ATTACHED HERETO AS EXHIBIT O. AN M/WBE UTILIZATION PLAN SUBMITTED BY THE BIDDER WHICH DOES NOT INCLUDE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS WILL BE DEEMED TO BE NON-RESPONSIVE, UNLESS A FULL WAIVER OF THE PARTICIPATION GOAL IS GRANTED IN ACCORDANCE WITH EXHIBIT N, SECTION A. IN THE EVENT THAT BNYDC DETERMINES THAT THE BIDDER HAS SUBMITTED AN M/WBE UTILIZATION PLAN WHERE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER ASPECTS OF THE M/WBE UTILIZATION PLAN ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE VENDOR CERTIFICATION AND AFFIRMATIONS, THE BIDDER WILL BE NOTIFIED BY BNYDC AND WILL BE GIVEN FOUR (4) CALENDAR DAYS FROM RECEIPT OF NOTIFICATION TO CURE THE SPECIFIED DEFICIENCIES AND RETURN A COMPLETED M/WBE UTILIZATION PLAN TO BNYDC. FAILURE TO DO SO WILL RESULT IN A DETERMINATION THAT THE BID IS NON- RESPONSIVE. RECEIPT OF NOTIFICATION IS DEFINED AS THE DATE NOTICE IS E-MAILED (IF THE BIDDER HAS PROVIDED AN E-MAIL ADDRESS), OR NO LATER THAN FIVE (5) CALENDAR DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.**

c. The successful Bidder (each Bidder who is awarded a Contract, a "Contractor") shall, within 30 days of issuance by BNYDC of a NTP, submit a list of proposed persons or entities to which it intends to award subcontracts within the subsequent 12 months. In the case of multi-year contracts, such list shall also be submitted every year thereafter. BNYDC may also require the Contractor to report periodically about the contracts awarded by its direct Subcontractors to indirect subcontractors (as defined in Section 6- 129(c)(22)). In the event that the Contractor's selection of a Subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.

4. <u>STATEMENTS SUBMITTED WITH REQUESTS FOR PAYMENT</u>.

a. The Contractor shall, with each voucher for payment, and/or periodically as BNYDC may require, submit statements, certified under penalty of perjury, which shall include, but not be limited, to:

i. the total amount the Contractor paid to its direct subcontractors, and, where applicable pursuant to Section 6-129(j), the total amount direct subcontractors paid to indirect subcontractors;

ii. the names, addresses and contact numbers of each MBE or WBE hired as a subcontractor by the Contractor, and, where applicable, hired by any of the Contractor's direct subcontractors; and

iii. the dates and amounts paid to each MBE or WBE.

b. The Contractor shall also submit, along with its voucher for final payment:
   i. the total amount it paid to subcontractors, and, where applicable pursuant to Section 6- 129(j), the total amount its direct subcontractors paid directly to their indirect subcontractors; and
   ii. a final list, certified under penalty of perjury, which shall include the name, address and contact information of each subcontractor that is an MBE or WBE, the work performed by, and the dates and amounts paid to each.

c. If payments made to, or work performed by, MBEs or WBEs are less than the amount specified in the Contractor's M/WBE Utilization Form, BNYDC shall take appropriate action, in accordance with the enforcement provisions described in the Contract and in Exhibit N, Section G, unless the goals have been waived or modified by BNYDC in accordance with Exhibit N, Section A.

5. MODIFICATIONS BASED ON CHANGE ORDERS. Where an M/WBE Utilization Plan has been submitted, and the Bidder requests a change order the value of which exceeds the greater of 10 percent of the Contract, as applicable, or $500,000, BNYDC shall review the scope of work for the Contract or Task Order, as applicable, and the scale and types of work involved in the change order, and determine whether the Participation Goals should be modified.

6. OTHER M/WBE REQUIREMENTS. The Contract and Exhibit N contain additional provisions related to the M/WBE requirements applicable to this IFB regarding, without limitation, waivers, modifications, substitutions, indefinite quantity contracts, progress reviews, evaluations and assessments, and enforcement. **PLEASE BE SURE THAT YOU REVIEW AND UNDERSTAND ALL OF THE REQUIREMENTS APPLICABLE TO THIS IFB AND THE CONTRACT PRIOR TO SUBMITTING YOUR PROPOSAL.**

E. SPECIAL REQUIREMENTS

1. MISCELLANEOUS CONDITIONS

   a. NON-BINDING ACCEPTANCE OF QUALIFICATIONS. This IFB does not commit BNYDC to award a contract for any work or services described herein.

   b. MODIFICATIONS. Bidders may be asked to make such revisions, additions or deletions to their Bids as may be required by BNYDC.

   c. RESERVED RIGHTS. All Bid material submitted becomes the property of BNYDC and BNYDC reserves the right at its sole discretion to:

      i. Reject any and all Bids received in response to this IFB at any time prior to signing of a contract with respect to the Project;

      ii. Award a contract to other than the lowest Bidder;

      iii. Waive, modify or correct any irregularities in Bids received, after notification to the Bidder;

iv. Change the structure of the proposed Bid, if such is in the interest of BNYDC;

v. Negotiate the final scope, staff participation, and Bid before entering into contract with successful Bidder;

vi. Revise the Bid as BNYDC may require subsequent to receipt of a competitively bid proposal for the Project;

vii. Extend the time for submission of all Bids after notification to all prospective Bidders;

viii. Terminate negotiations with a selected Bidder and select the next most responsive Bidder, or take such other action as deemed appropriate if negotiations fail to result in a signed contract within a reasonable amount of time from the commencement of negotiations;

ix. Terminate or modify the IFB process at any time and reissue the IFB;

x. Approve or reject any sub-contractor proposed by the Bidder; and

xi. Request a change of any sub-contractor at any time in the contract process.

2. CONTRACT REQUIREMENTS.

a. Any Bidder awarded a contract as a result of this IFB process will be required to sign a contract substantially in the form as attached hereto as Exhibit H (the "Contract"). If a Bidder desires any material or substantive change(s) to the Contract, it must include any such proposed change(s) in its response to this IFB. The contents of the selected Bid, together with this IFB and any formal questions and answers provided during the Bid processes, may be incorporated into any final Contract at BNYDC's discretion. The anticipated Contract length is two (2) years.

b. Any information which may have been released verbally or in writing prior to the issuance of the IFB shall be deemed preliminary in nature and bind neither BNYDC nor the Bidder.

c. Any Bidder awarded a contract as a result of this IFB will be required to obtain clearance through the City's Procurement and Sourcing Solutions Portal ("PASSPort"). PASSPort moves the VENDEX process online, eliminating paper submissions. Since PASSPort clearance is a pre-requisite to BNYDC's award of a contract, Bidders are required to be registered and up-to-date in PASSPort prior to submitting their response to this IFB and to include their PASSPort identification number with submission of their Bid. Non-compliance with these submission requirements shall result in the disqualification of the Bid and/or the Bidder and/or the cancellation of any contract after its award.

d. Notice to Bidders: Pursuant to Local Law 34 of 2007, amending the City's Campaign Finance Law, the City is required to establish a computerized database containing the names of any "person" that has "business dealings with the city" as such terms are defined in the Local Law. In order for the City to obtain necessary information to establish the required database, vendors responding to this solicitation are required

to complete the Doing Business Data Form attached as Exhibit F hereto and return it with the Bid. (If the responding vendor is a proposed joint venture, the entities that comprise the proposed joint venture must each complete a Data Form.) If the City determines that a vendor has failed to submit a Data Form or has submitted a Data Form that is not complete, the vendor will be notified by the agency and will be given four (4) calendar days from receipt of notification to cure the specified deficiencies and return a complete Data Form to the agency. Failure to do so will result in a determination that the Bid is non-responsive. Receipt of notification is defined as the day notice is e-mailed or faxed (if the vendor has provided an e-mail address or fax number), or no later than five (5) days from the date of mailing or upon delivery, if delivered.

e. Any Bidder awarded a contract as a result of this IFB will be required to register with the DOL and provide a copy of their Certificate of Registration. The same requirement applies to any subcontractors that Bidder may use. Since registration with the DOL is a pre-requisite to BNYDC's award of a contract, Bidders and their subcontractors (if applicable) are required to be registered with the DOL prior to submitting their response to this IFB and must include copies of their Certificates of Registration with submission of their Bid. Non-compliance with these submission requirements shall result in the disqualification of the Bid and/or the Bidder and/or the cancellation of any contract after its award.

F. BID SUBMISSION DOCUMENTS ("BSDs")

BNYDC requires that all BSDs listed below be completed and submitted as instructed in this IFB. Failure to submit the below forms, or submitting them improperly, may result in BNYDC's rejection of the Bid.

- ☐ Bid Form: Properly executed and sealed in the form attached as Exhibit A.
- ☐ Bid Security: If required per the IFB, completed form attached as Exhibit B.
- ☐ Experience Questionnaire: Completed form attached as Exhibit C.
- ☐ Declaration of Understanding: Completed and executed declaration attached as Exhibit D.
- ☐ Confirmation of PASSPort Compliance: Completed confirmation attached as Exhibit E.
- ☐ Doing Business Data Form: Completed form attached as Exhibit F.
- ☐ M/WBE Information Form: Completed form attached as Exhibit G.
- ☐ M/WBE Utilization Plan: Completed form attached as Exhibit O.
- ☐ Addenda: Acknowledged receipt of any Addendum to this IFB by attaching a signed copy of the Addendum to Bidder's Bid.

☐ Contract Revisions: If a Bidder desires any material or substantive change(s) to the Contract, Bidder must include any such proposed change(s) in its response to this IFB.

☐ Confirmation of DOL Contractor Registration Compliance Form: Completed confirmation attached as Exhibit H, along with copies of the Certificates of Registration for Bidder and Bidder's subcontractors.

☐ Environmental Certification Form: Completed form attached as Exhibit I: Completed form attached as Exhibit I certifying that they have reviewed the Site Management Plan Exhibit K and Excavation Work Plan Exhibit J and that all work will be completed in accordance with such documents.

BNYDC appreciates your interest in this IFB and looks forward to receiving your Bid.

EXHIBIT A

BID FORM

BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
BID FOR FURNISHING ALL LABOR AND MATERIAL FOR:
PROJECT: RESTORATION OF BOILERS AT BUILDING 62

CONTRACT #: _____

Name of Bidder: _____

Bidder is a(n): Individual ☐ Partnership ☐ Corporation ☐ LLC ☐
(Check one, whichever applies)

Business Address:_____

_____

Business Telephone Number:_____

Federal Tax Identification Number:_____

Home Address (If Individual):_____

If Bidder is a Partnership or an LLC, fill in the following blanks:

Name of Partners/Member	Home Address of Partner/Member
1. _____	_____
	_____
2. _____	_____
	_____
3. _____	_____

If Bidder is a Corporation, fill in the following blanks:

Organized under the laws of the State of:_____

Admitted to do business in New York on:_____

Name and Home Address of President: _____

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_____

Name and Home Address of Secretary: _____

_____

Name and Home Address of Treasurer: _____

_____

Other Interested Parties, Persons, or Companies (State None if None.)

Name: _____

Address: _____

Name: _____

Address: _____

Bidder certifies, under penalty of perjury (New York State Penal Law §210.45), that:

a) Bidder, if an individual or a partner in a partnership, is of lawful age and the only one interested in this bid; and no other person, firm partnership LLC or corporation other Bidder has any interest in this bid, or in the Contract if awarded; and

b) The prices in this Bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor; and

c) Unless otherwise required by law, the prices quoted in this bid have not been disclosed by the bidder and will not be disclosed by the bidder prior to bid opening, directly or indirectly, to any other bidder or to any competitor; and

d) No attempt has been made or will be made by the Bidder to induce any other person, partnership, LLC or corporation to submit or not to submit a bid for the purpose of restricting competition; and

e) No councilman or other officer, director or employee or person whose salary is payable in whole or in part from the Treasury of the City of New York or BNYDC is directly or indirectly interested in this bid, or in the supplies, materials, equipment, work or labor to which it relates, or in any of the profits thereof; and

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f) Bidder is not in arrears to the City of New York or BNYDC upon debt or contract or taxes, and is not a defaulter, as surety or otherwise, upon any obligation of the City of New York or BNYDC and has not been declared not responsible, or disqualified, by BNYDC or any agency of the City of New York or State of New York, nor is there any proceeding pending relating to the responsibility of qualification of the bidder to receive public contracts except _____ _____; and

g) Bidder has paid all applicable City income, excise and other taxes for all years it has conducted business activities in New York City; and

h) Bidder has complied with since its effective date and will continue to comply with the provisions of §6-108 of the Administrative Code of the City of New York; and

i) Bidder has complied with since its effective date and will continue to comply with the provisions of §220, §220a and §230 of the New York State Labor Law; and

j) Bidder has complied with since its effective date and will continue to comply with §6-109 of the Administrative Code of the City of New York; and

k) Bidder has complied with since its effective date and will continue to comply with § 24-216 of the Administrative Code of the City of New York; and

l) Bidder agrees to post notices setting forth the requirements of the aforesaid laws (items h, i, j and k above) in prominent and conspicuous places in each and every plant, factory, building and structure where employees engaged in the performance of the Contract can readily view it and will continue to keep such notices posted until the supplies, materials and equipment, or work labor and services required to be furnished or rendered by the Bidder have been finally accepted by BNYDC; and

m) Bidder has complied with since its effective date and will continue to comply with Executive Order No. 50, dated, April 25, 1980, on Equal Employment Compliance of the Contract. The required Employment Report must be submitted as part of the bid.

n) Bidder by submitting this bid certifies that it now has and will continue to have the financial capability to fully perform the Project required for the Contract. The award of the Contract will be made in reliance upon such certification. Therefore, upon request by BNYDC, Bidder will submit proof of financial capability, as BNYDC requires.

Bidder understands that any breach or violation of the foregoing may subject Bidder to damages, liquidated or otherwise, cancellation of the Contract, if awarded, and suspension of Bidder for a period of three years.

Please complete the attached form to provide your bid pricing.

BNYDC Project no:
H2M Contract No: BNYD1907
Restoration of Boiler at Building 62 - Brooklyn Navy Yard
63 Flushing Avenue - #300, Brooklyn NY

ITEM NO.		QUANTITY	MATERIAL UNIT PRICE	LABOR UNIT PRICE	MATERIAL LUMP SUM	LABOR LUMP SUM	SUB TOTAL
GENERAL REQUIREMENTS AND EXISTING CONDITIONS							
1	BOILER BUILDING DEMOLITION (WALLS, BOILER, SLAB, ELECTRICAL, ETC.)	LUMP SUM	N/A	N/A			
ENVIROMENTAL ***Quantity is used for bid balancing only. Actual payment on this item will be based on actual quantity**							
2	WASTE CHARACTERIZATION SAMPLING	LUMP SUM	N/A	N/A			
3	ENVIRONMENT SUBMITTALS: EXCAVATION WORK PLAN EXCAVATED MATERIALS WASTE CHARACTERIZATION PLAN DISPOSAL PAPERWORK	LUMP SUM	N/A	N/A			
4	*TRANSPORTATION AND DISPOSAL OF NON-HAZARDOUS SOIL	*1 TON	N/A				
5	*TRANSPORTATION AND DISPOSAL OF HAZARDOUS SOIL	*1 TON	N/A				
6	*TRANSPORTATION AND DISPOSAL OF PCB CONTAMINATED SOIL	*1 TON	N/A				
STRUCTURAL							
7	CASTE-IN-PLACE CONCRETE	LUMP SUM	N/A	N/A			
8	STEEL FRAMING	LUMP SUM	N/A	N/A			
9	METAL DECK	LUMP SUM	N/A	N/A			
10	METAL STAIR AND RAILINGS	LUMP SUM	N/A	N/A			
11	OTHER-S Please list items included in 'OTHER'.	LUMP SUM	N/A	N/A			
ARCHITECTURAL							
12	THERMAL & MOISTURE PROTECTION	LUMP SUM	N/A	N/A			
13	OPENINGS (DOORS, WINDOWS, FRAMES, AND HARDWARE)	LUMP SUM	N/A	N/A			
14	PAINT AND MISC. FINISHES	LUMP SUM	N/A	N/A			
15	OTHER-A Please list items included in 'OTHER'.	LUMP SUM	N/A	N/A			
MECHANICAL							
16	DEMOLITION OF EXISTING BOILER SYSTEM	LUMP SUM	N/A	N/A			

ITEM NO.		QUANTITY	MATERIAL UNIT PRICE	LABOR UNIT PRICE	MATERIAL LUMP SUM	LABOR LUMP SUM	SUB TOTAL
MECHANICAL (CONTINUED)							
17	CONSTRUCTION OF NEW BOILER SYSTEM	LUMP SUM	N/A	N/A			
18	TEMPORARY BOILER	LUMP SUM	N/A	N/A			
19	OTHER-M Please list items included in 'OTHER'.	LUMP SUM	N/A	N/A			
ELECTRICAL							
20	DEMOLITION OF EXISTING ELECTRICAL SYSTEM	LUMP SUM	N/A	N/A			
21	CONSTRUCTION OF NEW ELECTRICAL SYSTEM (PANELBOARD, LIGHTING, ETC.)	LUMP SUM	N/A	N/A			
22	CONDUIT	LUMP SUM	N/A	N/A			
23	LOW VOLTAGE CABLE	LUMP SUM	N/A	N/A			
24	OTHER-E Please list items included in 'OTHER'.	LUMP SUM	N/A	N/A			

Sub Total Amount (Bid Items No. 1 through No. 24)	$ -
Testing Allowance outlined in specification 012100	$ 20,000.00
**Additional Work Allowance outlined in specification 012100	$ 25,000.00
Removal/Repplacement of Window Allowance outlined in specification 012100	$ 15,000.00
General Conditions:	$ -
Permitting (DOB and EAB):	$ -
Payment and Performance Bonding:	$ -
Insurance:	$ -
Overhead & Profit:	$ -

** Allowance: Work for unforeseen existing conditions, including but not limited to unidentified conduits, cables, temporary feeders, etc.

BUILDING 62 TOTAL BID AMOUNT: $

BUILDING 62 TOTAL BID AMOUNT (MUST BE WRITTEN IN WORDS):

DOLLARS CENTS

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BrooklynNavyYard.org

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IN WITNESS WHEREOF, Bidder states that they have visited and examined the site of the Project. Bidder affirms that they have carefully examined the Contract form provided. Bidder agrees that it will execute the Contract unchanged in form and faithfully perform the Project required thereunder for the price set forth above, and have executed this Bid Form on the _____ day of _____ 20__

Bidder's Name: _____

By: _____
(Signature of Individual, Partner, Member or Corporate Officer)

Title: _____

Address: _____

_____

_____ (Corporate or LLC Seal)

Attest: Secretary of Corporate or LLC Bidder

[ACKNOWLEDGMENT, IF AN INDIVIDUAL

STATE OF NEW YORK)
ss.:
COUNTY OF _____)

On this _____ day of _____, 20___, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that he/ she resides at _____ and that he/she is the Individual described in and who executed the foregoing instrument and that the several matters therein stated are in all respects true.

_____]
Notary Public

[ACKNOWLEDGMENT, IF A PARTNERSHIP

STATE OF NEW YORK)
ss.:

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Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

COUNTY OF _____)

On this _____ day of _____, 20___, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that he/ she resides at _____ and that he/she is a member of, the firm described in and which executed the foregoing instrument and that the several matters therein stated are in all respects true.

_____
Notary Public]

[ACKNOWLEDGMENT, IF A LIMITED LIABILITY COMPANY

STATE OF NEW YORK)
: ss.:
COUNTY OF _____)

On the ____ day of _____ in the year 20__, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that that he/she is a member of _____ the limited liability company described in and which executed the foregoing instrument; and that he/she signed his/her name thereto by authority of the members of said limited liability company and that the several matters therein stated are in all respects true.

_____
Notary Public]

[ACKNOWLEDGMENT, IF A CORPORATION

STATE OF NEW YORK)
: ss.:
COUNTY OF _____)

On the ____ day of _____ in the year 20__, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that that he/she is the _____ of _____ the business described in and which executed the foregoing instrument; and that he/she signed his /her name thereto by authority of the Board of Directors of said corporation and that the several matters therein stated are in all respects true.

_____]
Notary Public

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EXHIBIT B

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, (hereinafter called " Principal) " and _____a corporation duly organized under the laws of the State of _____ as Surety, (hereinafter called " Surety ") are hereby held and firmly bound unto the Brooklyn Navy Yard Development Corporation, the City of New York, and the City of New York Department of Small Business Services or their successors and assigns collectively, as Obligee (hereinafter called ("Obligee") in the full and just sum of _____ Dollars ($_____) (hereinafter called “Penal Sum”), to the payment of which, well and truly to be made, the Principal and Surety hereby bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents:

Signed and sealed with our seals and dated this _____ day of _____, 20__.

WHEREAS, the Principal has submitted a bid to Obligee based on:

1. Obligee’s Request for Bids; and
2. Obligee’s Information for Bidders; and
3. Obligee’s Bid submission Documents; and
4. The Project Specification Documents issued by Obligee; and
5. Any addenda issued by Obligee in connection with the above documents.
6. Documents 1 through 5 above are incorporated herein by reference

For_____
_____
_____(Project)
Project number _____ (BID)

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WHEREAS, the Condition of the above obligation is such that the Principal has submitted to Obligee the id which requires Principal to enter into a written contract for the performance of the Project.

NOW, THEREFORE,

A. If the BID is rejected, or
B. If the BID is accepted and the Principal and Obligee have executed and delivered the required contract in the form set forth in the Information for Bidders, in accordance with the accepted BID (Contract); and
C. If the Principal furnishes Obligee with the required bond for Principal's faithful performance the Contract; and
D. If the Principal furnishes Obligee with the required bond for the payment of all persons performing labor or furnishing materials in connection with the Contract; and
E. If the Principal shall in all other respects perform the agreements created by Obligee's acceptance of the Bid
F. If the Principal shall pay to the Obligee an amount equaling the difference, not to exceed the Penal Sum hereof, between the amount specified in said BID and such larger amount for which the Obligee may in good faith contract with another party to undertake the Project covered by said Bid.

Then this obligation shall be null and void, otherwise to remain in full force and effect.

It is understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the Penal Sum as shown herein.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety under this Bond shall be in no way impaired or affected by any extension of the time within which the Obligee may accept the Bid; and said Surety does hereby waive notice of any such extension.

_____
(Principal) {SEAL}

By: _____
Title:
Address _____
_____

_____
(Surety) {SEAL}

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By: _____
(Attorney-In-Fact)
Address _____
_____

IMPORTANT

A. Surety companies executing this bond must be certified and appear on the United States Treasury Department's most recent Circular 570 as amended.
B. Surety companies can execute this bond only in the amount certified on the United States Treasury Department's most recent Circular 570 as amended.
Sureties executing this bond must be licensed as a surety by the State of New York.

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EXHIBIT C

EXPERIENCE QUESTIONNAIRE

As used in the questions below the words "YOU" or "YOUR" means, the bidding individual or bidding entity and each and every one of such bidding entity's officers, directors, partners, members or principals (any shareholder owning l0% or more of the company stock is deemed a principal).

Date: _____

Bidder's Name: _____

Bidder's Office Address: _____

Bidder's Telephone Number: _____

Bidder's Federal Taxpayer Identification Number: _____

Bidder is a(n): Individual ☐ Partnership ☐ Corporation ☐ LLC ☐
(Check one, whichever applies)

A. What type of construction work are YOU primarily engaged in? _____

_____

_____

B. You have been engaged in such construction work for a) as a Prime Contractor? ___years and/or b) as a Subcontractor ___ years

C. Have YOU or any organization YOU have been affiliated with in any capacity ever failed to complete a Contract awarded to YOU? Yes ☐ No ☐

If Yes, for whom, where, when and why? _____

_____

_____

D. Have YOU or any organization YOU have been affiliated with in any capacity ever been declared in default by any City, State or Federal Agency or on any Contract?

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Yes ☐ No ☐

If Yes where, when, by whom and why? _____

_____

_____

E. Have YOU or any organization YOU have been affiliated with in any capacity ever been investigated by any City, State or Federal Agency? Yes ☐ No ☐

If Yes where, when, by whom and why? _____

_____

_____

F. Have YOU or any organization YOU have been affiliated with in any capacity ever when called before a GRAND JURY to testify, refused to sign a WAIVER OF IMMUNITY or answer any relevant questions or have been indicted for any reason whatsoever? Yes ☐ No ☐

If Yes where, when and why? _____

_____

_____

G. List the names of all organization YOU have been affiliated with in any capacity that are <u>not</u> listed in paragraphs D. E. or F. above.

_____

_____

_____

_____

_____

H. Have YOU ever appeared before the Board of Responsibility of the City of New York? Yes ☐ No ☐

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If Yes when and why _____

_____

_____

I. In what other businesses do YOU have a financial interest? _____

_____

_____

_____

REFERENCES

List all corporations and individuals for whom YOU have performed significant work for and an official from whom BNYDC can obtain a reference. YOU must include a current address and telephone number for each reference.

_____

_____

_____

_____

_____

List all cities for which YOU have performed significant work for and an official from whom BNYDC can obtain a reference. YOU must include a current address and telephone number for each reference.

_____

_____

_____

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_____

_____

List all counties for whom YOU have performed significant work for and an official from which BNYDC can obtain a reference. YOU must include a current address and telephone number for each reference.

_____

_____

_____

_____

_____

List all States have YOU performed work and an official from whom BNYDC can obtain a reference. YOU must include a current address and telephone number for each reference.

_____

_____

_____

_____

_____

List all Federal construction projects YOU have performed work on and an official from whom BNYDC can obtain a reference. YOU must include a current address and telephone number for each reference.

_____

_____

_____

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_____

_____

Have YOU filed Performance Record reports with the Bureau of Contract Information, Inc., Washington, D.C.? Yes ☐ No ☐ if Yes list Date(s) _____

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PROJECT EXPERIENCE FORMS AND RESUMES

Individual Construction Experience

For each key individual in your organization please attach a resume providing at a minimum the following information:
Name
Education
Professional designations
Professional affiliations
Awards
Relevant experience including size of previous projects, cost of such project, location of such projects, a description of such projects and the key individuals position for each project

Special Experience Requirements: for each Special Requirement set forth in the Information For Bidders:

A. If bidder intends to perform the specific areas of work with its own forces, Bidder must provide Resumes for Key personnel and Project Experience Forms that demonstrates Bidders ability to fulfill the Special Requirements.
B. If bidder intends to subcontract the specific areas of work, the proposed subcontractor(s) must provide Resumes for Key personnel and Project Experience Forms that demonstrates subcontractor(s) ability to fulfill the Special Requirements.

I (We) have read and understood all the questions in the foregoing Experience Questionnaire and that I (We) have supplied true, full and complete information and answers I (We) understand that BNYDC will rely on the information contained herein.

Bidder

Name: _____

By: _____
(Signature of Individual, Partner, Member or Corporate Officer)

Title: _____

Address: _____

_____

_____ (Corporate or LLC Seal)
Attest: Secretary of Corporate or LLC Bidder

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ACKNOWLEDGMENT, IF AN INDIVIDUAL

STATE OF NEW YORK)
ss.:
COUNTY OF _____)

On this _____ day of _____, 20___, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that he/ she resides at _____ and that he/she is the Individual described in and who executed the foregoing instrument and that the several matters therein stated are in all respects true.

_____
Notary Public

ACKNOWLEDGMENT, IF A PARTNERSHIP

STATE OF NEW YORK)
ss.:
COUNTY OF _____)

On this _____ day of _____, 20___, before me personally came _____ to me known, who, being by me duly sworn, did depose and say that he/ she resides at _____ and that he/she is a member of, the firm described in and which executed the foregoing instrument and that the several matters therein stated are in all respects true.

_____
Notary Public

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Development Corporation
BrooklynNavyYard.org

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ACKNOWLEDGMENT, IF A LIMITED LIABILITY COMPANY

STATE OF NEW YORK)
: ss.:
COUNTY OF _____)

On the ____ day of _____ in the year 20__, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that that he/she is a member of _____ the limited liability company described in and which executed the foregoing instrument; and that he/she signed his/her name thereto by authority of the members of said limited liability company and that the several matters therein stated are in all respects true.

_____
Notary Public

ACKNOWLEDGMENT, IF A CORPORATION

STATE OF NEW YORK)
: ss.:
COUNTY OF _____)

On the ____ day of _____ in the year 20__, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that that he/she is the _____ of _____ the business described in and which executed the foregoing instrument; and that he/she signed his /her name thereto by authority of the Board of Directors of said corporation and that the several matters therein stated are in all respects true.

_____
Notary Public

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PROJECT EXPERIENCE FORM (To be completed for each of three projects)

Name of Project: _____

Location of Project: _____

Owner or Owner's representative familiar with the work performed:

Name: _____

Title: _____

Phone number: _____

Brief description of work completed: _____

_____

_____

Was the work was performed as a prime subcontractor, or joint venture: _____

_____

Dollar amount of Contract or subcontract: $_____

Date Started: _____

Original Scheduled Completion Date: _____

Actual Completion Date: _____

If Not Completed By Original Scheduled Date, Give Reasons Therefore:

_____

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PROJECT EXPERIENCE FORM (To be completed for each of three projects)

Name of Project: _____

Location of Project: _____

Owner or Owner's representative familiar with the work performed:

Name: _____

Title: _____

Phone number: _____

Brief description of work completed: _____

_____

_____

Was the work was performed as a prime subcontractor, or joint venture: _____

_____

Dollar amount of Contract or subcontract: $_____

Date Started: _____

Original Scheduled Completion Date: _____

Actual Completion Date: _____

If Not Completed By Original Scheduled Date, Give Reasons Therefore:

_____

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PROJECT EXPERIENCE FORM (To be completed for each of three projects)

Name of Project: _____

Location of Project: _____

Owner or Owner's representative familiar with the work performed:

Name: _____

Title: _____

Phone number: _____

Brief description of work completed: _____

_____

_____

Was the work was performed as a prime subcontractor, or joint venture: _____

_____

Dollar amount of Contract or subcontract: $_____

Date Started: _____

Original Scheduled Completion Date: _____

Actual Completion Date: _____

If Not Completed By Original Scheduled Date, Give Reasons Therefore: _____

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BrooklynNavyYard.org

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Brooklyn, NY 11205

EXHIBIT D

DECLARATION OF UNDERSTANDING

DECLARATION OF UNDERSTANDING

By signing in the space provided below, the undersigned certifies that the Bidder (i) has read and understands the scope and requirements of this Project, as described in the IFB and all attachments; (ii) has the capacity to execute this Project, (iii) agrees to accept payment in accordance with the requirements of this IFB and the standard Contract, attached hereto as Exhibit H, and (iv) will, if its Bid is accepted, enter into the attached Contract with the Brooklyn Navy Yard Development Corporation.

The undersigned further stipulates that the information in his/her Bid is, to the best of his/her knowledge, true and accurate.

_____ _____

Authorized Signature, Title Date

_____

Consultant Firm

_____

Business Address

_____

City State Zip

_____

Telephone Number Fax Number

_____

Federal Tax Identification Number

[ ] Corporation [ ] Partnership
[ ] Individual [ ] Other (State)

_____

(Seal, if a Corporation)

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT E

CONFIRMATION OF PASSPORT COMPLIANCE

CONFIRMATION OF PASSPORT COMPLIANCE

The Bidder shall submit this Confirmation of PASSPort Compliance, which replaces VENDEX and shall include its PASSPort identification number. All VENDEX processes are now completed in the PASSPort Portal, this replaces the paper forms. Please register and complete new questionnaires as soon as possible. PASSPort will not be importing any information from VENDEX. The main purpose of PASSPort is to be a completely paperless interactive system.

Please access to the NYC.gov PASSPort website thru the link below:
https://www.nyc.gov/site/mocs/passport/about-passport.page

[PASSPort Confirmation Form attached on following page]

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

CONFIRMATION OF PASSPORT COMPLIANCE

The Proposer shall submit this Confirmation of PASSPort Compliance

Name of Proposer: _____

Proposer's Federal Tax ID: _____

Proposer's Address: _____

Proposer's Telephone Number: _____

Proposer's Fax Number: _____

Date of Proposal Submission: _____

Project ID: _____

PASSPort Compliance: To demonstrate compliance with PASSPort requirements, the Proposer shall complete either Section (1) or Section (2) below, whichever applies.

Submission of Questionnaires: By signing in the space provided below, the Proposer certifies that as of the date specified below, the Proposer has submitted PASSPort Questionnaires to the PASSPort website thru the link below: https://www.nyc.gov/site/mocs/passport/about-passport.page

Date of Submission: _____

By:_____

(Signature of Partner or corporate officer)

Print Name: _____

(1) **Submission of Certification of No Change:** By signing in the space provided below, the Proposer certifies that they have read and follow the instructions on the PASSPort website.

By:_____

(Signature of Partner or corporate officer)

Print Name: _____

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EXHIBIT F

DOING BUSINESS DATA FORM

[attached on following page]

NYC Mayor's Office of Contract Services

Doing Business Data Form

Real Property Transactions

To be completed by the City agency prior to distribution Agency_____ Transaction ID_____

Check One

☐ Competative Solicitation (P) ☐ Application or Award (A)

Transaction Type (check one)

☐ Acquisition (ACQ) ☐ Disposition (DIS) ☐ Leasing to City (LES) ☐ Leasing From City (LOR)

Any entity participating in a transaction for the acquisition or disposition of real property with the City of New York must complete a Doing Business Data Form (see Q&A sheet for more information). Please either type responses directly into this fillable form or print answers by hand in black ink, and be sure to fill out the certification box on the last page. **Submission of a complete and accurate form is required for a proposal to be considered responsive or for any entity to receive an award or enter into an agreement.**

This Data Form requires information to be provided on principal officers, owners and senior managers. The name, employer and title of each person identified on the Data Form will be included in a public database of people who do business with the City of New York, as will the organizations that own 10% or more of the enitity. No other information reported on this form will be disclosed to the public. **This Data Form is not related to the City's PASSPort registration or VENDEX requirements.**

Please return the completed Data Form to the City office that supplied it. Please contact Doing Business Accountability at DoingBusiness@mocs.nyc.gov or 212-298-0600 with any questions regarding this Data Form. Thank you for your cooperation. Entity Information

If you are completing this form by hand, ***please print clearly.***

Entity EIN/TIN _____ Entity Name _____

Filing Status

NEW: *Data Forms submitted now must include the listing of* ***organizations,*** *as well as individuals, with 10% or more ownership of the entity. Until such certification of ownership is submitted through a change, new or update form, a no change form will not be accepted.*

(Select One)

☐ Entity has never completed a Doing Business Data Form. Fill out the entire form.

☐ Change from previous Data Form dated _____. *Fill out only those sections that have changed, and indicate the name of the persons who no longer hold positions with the entity.*

☐ No Change from previous Data Form dated _____. *Skip to the bottom of the last page.*

Entity is a Non-Profit ☐ Yes ☐ No

Entity Type ☐ Corporation (any type) ☐ Joint Venture ☐ LLC ☐ Partnership (any type) ☐ Sole Proprietor ☐ Other (specify) _____

Address _____

City _____ State _____ Zip _____

Phone _____ E-mail _____

Provide your e-mail address in order to receive notices regarding this form by e-mail.

Principal Officers

Please fill in the required identification information for each officer listed below. If the entity has no such officer or its equivalent, please check "This position does not exist." If the entity is filing a Change Form and the person listed is replacing someone who was previously disclosed, please check "This person replaced..." and fill in the name of the person being replaced so his/her name can be removed from the *Doing Business Database,* and indicate the date that the change became effective.

Chief Executive Officer (CEO) or equivalent officer ☐ This position does not exist

The highest ranking officer or manager, such as the President, Executive Director, Sole Proprietor or Chairperson of the Board.

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

☐ This person replaced former CEO _____ on date _____

Chief Financial Officer (CFO) or equivalent officer ☐ This position does not exist

The highest ranking financial officer, such as the Treasurer, Comptroller, Financial Director or VP for Finance.

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

☐ This person replaced former CFO _____ on date _____

Chief Operating Officer (COO) or equivalent officer ☐ This position does not exist

The highest ranking operational officer, such as the Chief Planning Officer, Director of Operations or VP for Operations.

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

☐ This person replaced former COO _____ on date _____

For information or assistance, please contact Doing Business Accountability at DoingBusiness@mocs.nyc.gov or 212-298-0600.

Principal Owners

Please fill in the required identification information for all individuals or organizations that, through stock shares, partnership agreements or other means, **own or control 10% or more of the entity.** If no individual or organization owners exist, please check the appropriate box to indicate why and skip to the **Senior Managers** section. If the entity is owned by other companies that control 10% or more of the entity, those companies must be listed. If an owner was identified on the previous page, fill in his/her name and write "See above." If the entity is filing a Change Form, list any individuals or organizations that are no longer owners at the bottom of this section. If more space is needed, attach additional pages labeled "Additional Owners."

There are no owners listed because (select one):

☐ The entity is not-for-profit ☐ The entity is an individual ☐ No individual or organization owns 10% or more of the entity

Other (explain) _____

Individual Owners (who own or control 10% or more of the entity)

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

Organization Owners (that own or control 10% or more of the entity)

Organization Name _____

Organization Name _____

Organization Name _____

Remove the following previously-reported Principal Owners

Name _____ Removal Date _____

Name _____ Removal Date _____

Name _____ Removal Date _____

Senior Managers

Please fill in the required identification information for all senior managers who oversee any of the entity's relevant transactions with the City (e.g., contract managers if this form is for a contract award/proposal, grant managers if for a grant, etc.). Senior managers include anyone who, either by title or duties, has substantial discretion and high-level oversight regarding the solicitation, letting or administration of any transaction with the City. At least one senior manager must be listed, or the Data Form will be considered incomplete. If a senior manager has been identified on a previous page, fill in his/her name and write "See above." If the entity is filing a Change Form, list individuals who are no longer senior managers at the bottom of this section. If more space is needed, attach additional pages labeled "Additional Senior Managers."

Senior Managers

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

First Name _____ MI ___ Last _____ Birth Date (mm/dd/yy) _____

Office Title _____ Employer (if not employed by entity) _____

Home Address _____

Remove the following previously-reported Senior Managers

Name _____ removal date _____

Name _____ removal date _____

Certification

I certify that the information submitted on these two pages and ____ additional pages is accurate and complete. I understand that willful or fraudulent submission of a materially false statement may result in the entity being found non-responsible and therefore denied future City awards.

Name _____ Title _____

Entity Name _____ Work Phone # _____

Signature _____ Date _____

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BrooklynNavyYard.org

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Brooklyn, NY 11205

EXHIBIT G

M/WBE INFORMATION FORM

[attached on following page]

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Avenue, Suite 801
Brooklyn, NY 11205

Dear Vendor:

The Brooklyn Navy Yard Development Corporation is compiling statistical data on companies that provide construction, professional services, standard services, and goods to our company so that we can comply with the New York City Local Law (LL 129). Please complete the attached information sheet and return it alongside your vendor information forms.

If you are a minority or woman-owned business enterprise (M/WBE) but are not yet certified by the City of New York we strongly urge you to do so. The city has an aggressive program to help certified M/WBEs and it is in your best interest to get certified. For more information on getting certified, we suggest that you call the New York City Department of Small Business Services' Certification Hotline at (212) 513-6311. Addition information can also be obtained through the City's website at: www.nyc.gov/getcertified.

We sincerely appreciate your cooperation.

Sincerely,

Brian Linett

Sr. Vice President & Controller

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Avenue, Suite 801
Brooklyn, NY 11205

Vendor Information Form

Name: Company Title:

Company Name:

Company Address:

Federal Tax ID / SSN:

Email: Telephone:

Business type: Select One

- ☐ Individual/Sole Proprietor
- ☐ Partnership
- ☐ Corporation
- ☐ Other

Business category: Select One

- ☐ Construction
- ☐ Construction Subcontract
- ☐ Professional Services
- ☐ Professional Services Subcontract
- ☐ Standard Services
- ☐ Goods
- ☐ Other

Business Demographics

A minority- and women- owned business enterprise (M/WBE) is a business owned (51% or greater) by an owner that identifies as Asian-Indian, Asian-Pacific, Black, Hispanic, Native American, and/or female.

Majority owner M/WBE? ☐ Yes ☐ No

Majority owner female? ☐ Yes ☐ No

Designated MBE Group (select one - if N/A, please leave blank):

- ☐ Asian - Indian
- ☐ Asian - Pacific
- ☐ Black
- ☐ Hispanic
- ☐ Native American

City or state certification (select all that apply):

- ☐ Minority and Women-owned Business Enterprise (M/WBE)
- ☐ Locally Based Enterprise (LBE)
- ☐ Emerging Business Enterprise (EBE)
- ☐ Service-Disabled Veteran-Owned Small Business (SDVOB)

Certification Number:

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT H

FORM OF CONTRACT

[attached on following page]

BNYDC CONSTRUCTION CONTRACT

CONSTRUCTION CONTRACT NUMBER [__] (hereinafter referred to as the "Contract") dated as of [_____], between **BROOKLYN NAVY YARD DEVELOPMENT CORPORATION**, having an office at Building 77, 141 Flushing Avenue, Suite 801, Brooklyn, New York 11205 (hereinafter referred to as "BNYDC"); and **[_____]**, having its principal place of business at [_____] (hereinafter referred to as the "Contractor") for [_____] (hereinafter referred to as "Project") at Building [___] (hereinafter referred to as "Project Site(s)") which Project Site(s) is located within the Brooklyn Navy Yard (the "Premises"). The Work as defined in Section 1.2 hereof shall commence upon BNYDC's issuance to Contractor of a Notice to Proceed, setting the Commencement Date. This Contract shall have a term of [___] consecutive calendar days, measured starting from the Commencement Date, unless extended in writing by both parties (hereinafter referred to as the "Term"). . Substantial Completion of the Work, as defined in Section 8.2 of this Contract, shall be completed by the date that is [___] calendar days from the Commencement Date (the "Substantial Completion Deadline") and Final Completion of the Work, as defined in Section 8.4 of this Contract, shall be completed by the date that is [___] calendar days from the Commencement Date (the "Final Completion Deadline"). Such Work shall be performed for the total amount of [_____] and [__]/100 Dollars ($[_____]) (hereinafter referred to as the "Contract Price"). A breakdown of the Contract Price is attached hereto as Exhibit "Q".

In consideration of the IFB, the BSD the RFB, Contract Price, and the mutual covenants contained herein and other valuable consideration, the parties agree as follows:

ARTICLE 1

GENERAL PROVISIONS AND DEFINITIONS

Section 1.1 Contract This Contract is composed of the following items:

A. Articles 1-17 of this Contract and all Exhibits annexed hereto;

B. All Change Orders as defined in Section 1.2.5 hereof and, all amendments and addenda to this Contract;

C. The Information For Bidders (hereinafter referred to as the "IFB"), Bid Submission Documents, (hereinafter referred to as the "BSD") and Request For Bids (hereinafter referred to as the "RFB") issued by BNYDC, together with all addenda to the IFB, BSD, or RFB.

D. All provisions of laws, rules, regulations and Executive Orders of the United States Government, the State of New York, the City of New York, or any agency or subdivision thereof, which are required to be a part of or apply to this Contract, whether or not any specific reference is made to the same in this Contract.

E. All required bid, payment and performance bonds.

Section 1.2 Definitions The following words shall, whenever they appear in this Contract, have the meanings set for them in this section, unless a different meaning is clear from the context:

A. "Architect/Engineer" shall mean the entity or entities retained by BNYDC to perform design services for the Project.

B. "BSD" shall mean the Bid Submission Documents as promulgated by BNYDC upon which Contractor presented its bid in response to the RFB and upon which the Contract Price is based.

C. "BNYDC's Contractors" shall mean other Contractors or construction managers engaged by BNYDC to perform work on the Project or at the Project Site(s).

D. "Change Orders" shall mean changed, deleted and/or additional Work to be performed by the Contractor pursuant to Article 6 hereof.

E. The "City" shall mean the City of New York.

F. The "City Contract" shall mean the management contract between the City of New York and the Brooklyn Navy Yard Development Corp.

G. "Construction Documents" shall mean the drawings identified on **Exhibit "C"** and the specifications annexed as **Exhibit "D"**.

H. "Contract Price" shall mean the total compensation for the Work as set forth on page 1 hereof.

I. "DSBS" shall mean the City of New York Department of Small Business Services.

J. "Extra Work" shall mean Work by Contactor performed at the request of BNYDC or Work performed by Contactor with BNYDC's. knowledge and approval for which there is no extra charge

K. "Federal" shall mean the Government of the United States of America.

L. "IFB" shall mean the Information For Bidders contained in the RFB promulgated by BNYDC upon which Contractor based its bid and upon which the Bid Submission Documents are based.

M. "Liquidated Damages" shall mean the liquidated damages rate set forth in the IFB multiplied by the number of calendar days that Substantial Completion (as defined in Section 8.2) of the Work is delayed from the Substantial Completion Deadline set forth in the Recitals to this Contract.

N. "Premises" shall mean the Brooklyn Navy Yard.

O. "President" shall mean the President of BNYDC, or the President's designee.

P. "Project" shall mean the services to be performed under this Contract, as defined on page 1 of this Agreement.

Q. "Protest Work" shall mean Work the Contractor believes is Change Order Work for which no Change Order has been issued.

R. "Project Site(s)" shall mean the location within the Brooklyn Navy Yard where the Work is to be performed as defined on page 1 hereof.

S. "RFB" shall mean the Request For Bids which contained the IFB promulgated by BNYDC upon which Contractor presented its bid on the BSD and upon which the Contract and the Contract Price are based.

T. "Project Engineer" shall mean a BNYDC's representative whose authority is set forth in Article 8.5 hereof.

U. "State" shall mean the State of New York.

V. "Subcontractor(s)" shall mean any entity the Contractor enters into a subcontract or material purchase order (hereinafter referred to as "Subcontract(s)") for purpose of performing the Work. All Subcontractor(s) and Subcontract(s) must be approved by BNYDC.

W. "Tenant", "Subtenant", "Licensee," "Invitee" "Person" or "Visitor" shall mean any person or entity that is on the Premises with or without the permission of BNYDC.

X. "Work" shall mean all labor, equipment, services, permits, approvals, inspections and material necessary for the complete and satisfactory completion of the Project as set forth in this Contract.

Section 1.3 Funding

A. Funds for the payment of Contractor under this Contract may be provided by or through the City, pursuant to the City Contract (hereinafter referred to as City Contract Funded). Therefore if the Project is City Contract Funded, Contractor shall take no action which constitutes a breach of the City Contract. Contractor acknowledges that it has carefully reviewed and completely understands the terms and conditions of the City Contract which was available for review during the bidding period. Contractor further understands and agrees that if the City Contract is terminated this Contract may be assigned by BNYDC to the City.

B. Funds for payment of Contractor under this Contract may also be provided by the United States Federal Emergency Management Agency's Public Assistance funds ("FEMA Funding"). The requirements in connection with FEMA Funding are set forth in Exhibit "O", which is attached hereto and made a part hereof. Failure by the contractor to comply with the requirements set forth in Exhibit "O" shall be a material default under this Contract.

Section 1.4 Applicable Laws, Rules and Regulations The Work shall be performed in strict compliance with all applicable federal, state and local laws, rules, regulations, codes and orders. Failure by the Contractor to comply with any such law, rule, regulation code or order shall be a material default under this Contract. Without limiting the generality of the foregoing, the Contractor agrees that it shall specifically comply with the following:

A. Equal Employment The requirements are set forth in **Exhibit "A"**, which is attached hereto and made a part hereof.

B. Federal Job Training Partnership Act (hereinafter referred to as the "FJTPA") The FJTPA, which specifies that when hiring for the Work, the Contractor shall give consideration to employing City residents who are economically disadvantaged or are eligible under FJTPA, and who have qualifications and skills commensurate with the requirements for the positions available. To the greatest extent feasible, the Contractor shall give opportunities for training and employment to lower income persons in the area of the Premises.

C. Minimum Wages; Payroll Reports The provisions of Sections 220 and 230 of the New York State Labor Law shall apply to all Work under this Contract. If no prevailing wage is applicable, then Contractor will pay workers the minimum hourly rate required by law, unless a higher amount is required pursuant to any other provision of this Contract. The Contractor shall furnish on demand by BNYDC or DSBS or such other agency or office as the President may direct, a verified copy of its payroll, and also any other information required by BNYDC to satisfy BNYDC that the provisions of this Section are being observed.

D. MacBride Principles The requirements are set forth in **Exhibit "B"**, which is attached hereto and made a part hereof.

E. Noise Control The provisions for noise control for the Work at the Project Site(s) and on the Premises are set forth in Section 24-216 of the City's Administrative Code as it may be amended from time to time.

F. ADA Requirements Title II of the Americans with Disabilities Act, the rules and regulations promulgated thereunder, and any state and local laws establishing construction requirements with respect to access for disabled persons.

G. Tropical Hardwoods The provisions for the use of Tropical Hardwoods used for the Work at the Project Site(s) and on the Premises are set forth in Section 167-b of the New York State Finance Law, which prohibits the use of tropical hardwoods, except as expressly permitted.

H. Intentionally Omitted.

I. Whistleblower Protection The requirements are set forth in **"Exhibit K"**, which is attached hereto and made a part hereof.

J. Paid Sick Leave The requirements are set forth in **"Exhibit L"**, which is attached hereto and made a part hereof.

K. OSHA The Contractor shall ensure that the Work is performed in a location and manner free from recognized hazards and shall comply with Occupational Safety and Health Administration ("OSHA") standards, rules and regulations. The Contractor shall regularly examine workplace conditions and use safe and well-maintained tools, equipment and Personal Protective Equipment to ensure conformance with applicable OSHA standards.

L. [Site Management Plan The Contractor shall perform all Work in compliance of the terms and provisions of that certain Site Management Plan ("SMP") referenced in the Environmental Easement (the "Environmental Easement") between the City, BNYDC and the People of the State of New York dated as of June 26, 2018 and recorded on July 3, 2018, C.R.F.N. 2018000219215. Contractor specifically acknowledges and agrees that any ground disturbance activities at the Project Site (including all digging for construction, utility installations, or otherwise) must be performed in strict accordance with the notice and other provisions the SMP, including but not limited to the Excavation Work Plan attached as **Exhibit "M"** to this Contract and the Health and Safety Plan attached as **Exhibit "N"** to this Contract, which Plans are attached as appendices to the SMP; (ii) Contractor's failure to strictly comply with the Environmental Easement and the SMP shall be a material default under this Contract and (iii) in addition to all of BNYDC's remedies under this Contract, Contractor shall be responsible for payment of any fines or other consequences related to Contractor's failure to strictly comply with the Environmental Easement and the SMP.]

Contractor agrees to incorporate, each of the provisions contained in Article 1.4 and each of the exhibits referenced therein into each Subcontract so as to bind each Subcontractor to the provision of Article 1.4.

Section 1.5 Intent of Contract The intent of this contract is to complete the Project; therefore matters not expressly included in this Contract but which are reasonably inferable therefrom as being necessary to produce the intended results shall be deemed included as a part of the Work. The Contract parts are

complementary and cumulative and what is called for by one part shall be as binding as if called for by all.

Section 1.6 The Construction Documents The drawings identified in **Exhibit "C"** which is attached hereto and made a part hereof and the Specifications identified in **Exhibit "D"** are complementary. Anything shown in any of the drawings and not mentioned in the specifications, or mentioned in any of the specifications and not shown in the drawings, shall have the same effect as if shown or mentioned in both. In the event of a conflict between the drawings and the specifications, Contractor shall do the more complete installation, unless directed, in BNYDC's sole discretion, otherwise in writing.

Section 1.7 Contract Modifications The Contract is to be construed as one coherent overall document. If part of the Contract is Modified for the purpose of varying, modifying, rescinding or adding to the Contract then such modified portions of the Contract must be read together with the unmodified portions of the Contract to which they relate so as to give effect to the provisions of the Contract Documents that remain in full force and effect. Notwithstanding the above, and to the extent BNYDC or Contractor becomes aware of any conflict within any of the Contract, then BNYDC and Contractor shall promptly inform each other of such conflict and BNYDC shall resolve the conflict. BNYDC's decision is final and binding upon Contractor. Contractor shall proceed with the Work in accordance with BNYDC's determination. If Contractor performs Work before the conflict is resolved such Work is be done at Contractor's sole risk, cost and expense.

ARTICLE 2

THE PROJECT SITE (S) AND CONTRACTOR'S RESPONSIBILITIES

Section 2.1 Project Site(s) The Premises are the former New York Naval Shipyard, which has been in continuous use for over 200 years. As such, there are buried foundations of demolished buildings, railroad and crane tracks set in massive concrete foundations and concrete decks set on various types of piles; therefore, BNYDC makes no representations whatsoever as to any subsurface condition of the Project Site(s). The Contractor assumes all responsibility and liability for all subsurface conditions at the Project Site(s) that could have been discovered by subsurface examination. The Contract Price contemplates whatever subsurface conditions exist. No Change Order will be issued for subsurface conditions at the Project Site(s) materially differing from any assumptions made by Contractor

unless the Contractor having notice of the history of the Premises could not have anticipated such subsurface conditions.
If access to the Project Site(s) or Premises shall be denied to the Contractor at any time by BNYDC or any person(s) not associated with BNYDC or by court action, and such access denial reasonably interferes with Contractor's ability to perform the Work, then the Term set forth on page 1 hereof shall be extended for a period equal to any such period of access denial. Notwithstanding the foregoing, the Contractor shall not be entitled to an extension of time for any access denial attributable to the actions of the Contractor. In no event shall any denial of access to the Project Site(s) be a breach of this Contract and no damages or increased costs shall be recoverable on account of such denial of access.

Section 2.2 Contractor's Responsibilities

A. Adherence to Contract Documents The Contractor shall perform the Work in strict accordance with the Contract.

B. Supervision The Contractor shall use its best skills to properly administer, coordinate, supervise and superintend the Work. The Contractor shall furnish a competent on-site representative to receive notices, orders and instructions. The Contractor shall at BNYDC's request, report at a meeting between BNYDC and the Contractor on the general progress of the Work at the Project Site(s). The Contractor shall attend in person or have a competent and responsible representative attend such progress meetings.

C. Labor The Contractor shall furnish and maintain an adequate staff and work force of skilled, competent, experienced, reliable and honest workers at the Project Site(s) to carry out the Work in an efficient and timely manner until completion of the Work and shall enforce discipline and order among Contractor's and Subcontractor's employees and shall not employ on the Work any unfit person or anyone not properly skilled or trained in the task to which they are assigned.

D. Labor Disputes The Work may not be interrupted by labor disputes. The Contractor shall use such materials, have deliveries made to the Project Site(s), and employ only such Labor as will perform their services in harmony with all other trades performing Work at the Project Site(s), all other BNYDC's Contactors on the Premises, or otherwise.
If a labor dispute does occur then the Contractor is responsible for taking all necessary actions to settle such labor dispute. If questions of union

jurisdiction do arise, then the Contractor shall immediately take all necessary action to settle such jurisdictional disputes and shall use such labor as will settle such dispute at no additional cost to BNYDC. The Contractor shall be responsible for any time lost due to such dispute. If Contractor cannot settle the Labor disputes expeditiously, BNYDC shall after three (3) days written notice to Contractor have the right to terminate the Contractor pursuant to Article 9.2 of this Contract. BNYDC shall then have the right to enter upon the Project Site(s) and take possession thereof for the purpose of completing the Work.

E. Layout of Work All layout shall be performed by the Contractor, who shall be solely responsible for establishing and maintaining the layout, line and grade tolerances required for its the Work. The Contractor shall verify all established baselines prior to use and shall notify BNYDC of any discrepancies.

F. Cleaning and Rubbish Removal Contractor shall clear all debris and rubbish created by its operations on a daily basis. The debris and rubbish shall be collected and deposited in containers provided by Contractor. If the Contractor fails to clear and collect the debris and rubbish then, BNYDC may do so for the account of the Contractor. Such debris and rubbish removal costs shall be deducted from the Contract Price unless sooner paid by Contractor to BNYDC.

Section 2.3 Safety The Contractor shall be solely responsible for:

A. Construction means, methods and techniques; and
B. Employing methods of construction, materials, scaffolding, tools, structures and equipment which meet or exceed federal, state and local safety and health related rules and regulations, laws and codes; and
C. Complying with the requirements of all insurance carriers providing insurance coverage for the work.

The Contractor shall coordinate with BNYDC and all BNYDC's Contactors on the Project Site(s) to ensure that the Project Site(s) complies with all safety regulations promulgated by any governmental agency having jurisdiction over the Project Site(s) or the Work. The Contractor shall cooperate fully with BNYDC and other persons, to prevent loss and accidents with respect to the Work on or at the Project Site(s).

ARTICLE 3

TIME OF PERFORMANCE

Section 3.1 Commencement and Coordination of Work Contractor shall commence the Work at the Project Site(s) on the date specified on page 1 of this Contract. Contractor is completely responsible for the coordination of the Work. BNYDC Contractors or third-party Contractors may from time to time work at, on or about the Project Site(s). Contractor agrees to coordinate the Work scheduling to accommodate the needs of such BNYDC Contractors or third-party Contractors.

Section 3.2 BNYDC's Contractors

A. BNYDC reserves the right to have BNYDC's Contractors or third-party Contractors perform work on the Project or at the Project Site(s). Such BNYDC's Contractors or third-party Contractors may provide additional work beyond the Work covered by this Contract including, but not limited to, tenant improvements. Contractor shall, without further compensation, coordinate the Work with the work of BNYDC's Contractors or third-party Contractors. Contractor shall provide BNYDC's Contractors or third-party Contractors access to the Project Site(s) as often and for as long as BNYDC's Contractors or third-party Contractors may request. Contractor shall furnish to BNYDC Contractors or third-party Contractors any services that Contractor utilizes or furnishes to its Subcontractors including, but not limited to, use of hoisting facilities and temporary utilities.

B. Contractor shall integrate the schedule of BNYDC's Contractors or third-party Contractors into the Progress Schedule, as defined in Article 3.3.

C. Contractor shall permit BNYDC, BNYDC Contractors and third-party Contractors to install equipment of furnishings in the Project, provided that such installation shall not materially interfere with Contractor's performance of its obligations hereunder.

D. If Contractor causes damage to the property of BNYDC, BNYDC's Contractors or third-party Contractors or to any other work or property on the Project Site(s) or Premises, then Contractor shall promptly pay for such damage. Such payment for damages shall be deducted from the Contract Price unless sooner paid by Contractor to BNYDC.

E. BNYDC's Contractors and third-party Contractors may be required to do work before, or simultaneously with the Work. Contractor agrees that, when

requested by BNYDC's Contractor shall stop or suspend the Work to allow BNYDC's Contractors and third-party Contractors to complete their work. When BNYDC makes a request for Contractor to stop, interrupt or suspend Work to the extent that there are delays in the performance of the Work, the period of time during which the Work shall have ceased shall be recognized as a Contemplated Delay.

Section 3.3 Schedules Ten days after the issuance of this Contract, Contractor shall submit to BNYDC in writing, on a form provided by or otherwise acceptable to BNYDC, a schedule of all items of Work to be performed showing the relative dollar value of each item, the date when each item of Work is to be commenced, the duration of each item of Work and the date when each item of Work is to be completed (hereinafter referred to as "Progress Schedule"). As required by section 3.2 b) above, the Progress Schedule shall show the interrelationship of each construction activity of the Contractor under this Contract and all other contracts affecting the Work. BNYDC must approve the Progress Schedule before Work commences. BNYDC will promptly review the submitted Progress Schedule and notify the Contractor to change those items that BNYDC deems incomplete, inaccurate or untimely. Upon receipt of such notification by BNYDC Contractor will incorporate the required changes and submit a revised Progress Schedule. Upon final approval by BNYDC of the Progress Schedule, Contractor shall strictly adhere to the approved Progress Schedule.
It is a condition precedent that an approved Progress Schedule is on file with BNYDC before payment of any kind will be made to the Contractor.

Section 3.4 Time for Completion Time is of the essence in this Contract. All Work must be completed within the number of calendar days set forth on page 1 hereof, from the date specified on page 1 hereof, subject to the provisions of Article 3.7 below.

Section 3.5 Contemplated Delays BNYDC and Contractor acknowledge that they are aware that delays are common to construction projects (hereinafter referred to as "Contemplated Delays").
The Following circumstances shall be deemed Contemplated Delays:

A. Errors in the Construction Documents, or discrepancies in the Construction Documents, or Changes to the Construction Documents, or incomplete Construction Documents that necessitate the issuance of corrective Change Orders.

B. Slow processing of shop drawings.

C. Interference from BNYDC Contractors or third-party Contractors or visitors to the Project Site(s) as contemplated by this Article 3.

D. Adverse weather conditions

E. Delays, disruptions, hindrances, interferences, or acceleration caused by:

i. Acts, failures to act, errors or omissions of BNYDC, the Architect/Engineer or other BNYDC consultants (hereinafter referred to as "Consultants") in the performance of their respective obligations on the Project, or their failure to give approvals and/or consents within the time periods set forth in the Progress Schedule that result in delays.
ii. Economic, industry-wide strikes; fire; acts of God.
iii. Acts of the public enemy.
iv. Unavailability of, or inability to obtain, labor or materials by reason of the acts of any governmental body which affect the supply or availability of labor or materials.
v. Floods.
vi. Rebellions, riots, insurrections or sabotage.
vii. Suspension, resequencing, stoppage or interruption of the Work ordered by BNYDC under this Agreement.
viii. Interruption or failure of utilities, including without limitation, electric, gas, heat, steam and water.

Section 3.6 Assumption of the Risk for Delays

Notwithstanding any other provisions of this Contract, and for the benefit of BNYDC, Architect/Engineer and the Consultants, Contractor agrees to make no claim against BNYDC, the Architect/Engineer, or the Consultants due to any Contemplated Delays or other delays even if Contractor complies with the provisions of Article 3.7, and Contractor is granted an extension of the Term. Contractor agrees to assume the risk of any and all loss and expense for such other delays in the performance of the Work or any other obligation of Contractor under this Contract.

The intent of this Article 3.6 is to avoid protracted costly litigation as to whether delays, should they occur, were anticipated or unanticipated, foreseeable or

unforeseeable, reasonable or unreasonable or as to whether or not they were the fault of BNYDC, Architect/Engineer, Consultants or their representatives. Contractor agrees that all delays, regardless of duration the Contractor assumes any and all loss and expense for such delays in the performance of the Work or any other obligation of Contractor under this Contract.

Contractor certifies that it has considered, as an experienced Contractor, the risk of encountering such delays and its assumption of any and all loss and expense for such delays in the performance of the Work in reaching the Contract Price contained in this Contract.

Section 3.7 Extension of Time for Performance. If performance by the Contractor is a Contemplated Delay, Contractor may be allowed a reasonable extension of the Term to complete the Work. Only the President, upon written application by the Contractor, may grant an extension of time.

Section 3.8 Grounds for Extension If the Contractor has otherwise strictly complied with all of the requirements of this Contract and if Contractor applies, in accordance with Section 3.9 hereof, for an extension of time to complete the Work due to a Contemplated Delay, then Contractor shall be entitled to an extension of the Term to complete the Work. The President shall determine how many days of extension time to grant, but in no event more than the number of days missed due to the contemplated delay.

The Contractor shall not receive separate extensions of time for each of several causes of delay operating concurrently. If one of several causes of delay operating concurrently results from any act, fault or omission of the Contractor or of its Subcontractors or material suppliers, and would of itself (irrespective of the concurrent causes) have delayed the Work, no extension of time will be allowed for the period of delay resulting from such act, fault or omission.

Section 3.9 Applications for Extension of Time to Complete Work. Contractor must within five (5) days after commencement of the Contemplated Delay, submit a written application to the President containing the following:

A. Contract identification

B. The nature of each alleged cause of delay in completing the Work

C. The number of days attributable to each such cause

D. The date that each such alleged cause of delay began

E. The anticipated end date of each alleged cause of delay

F. Original bid amount contained in the BSD

G. Contract start date

H. Original completion date

I. All previous time extensions granted

J. The extension of time currently requested.

As part of the application for Extension of Time, Contractor must include the following statement: "Contractor understands and agrees that if a time extension is granted it is only for purposes of permitting continuation of Work and that, unless otherwise agreed by BNDYC in its sole discretion, Liquidated Damages will continue to accrue for each day Substantial Completion is delayed past the applicable Substantial Completion Deadline."

Section 3.10 Analyses and Approval of Time Extensions The President shall analyze Contractor's application for extension of time to complete Work and issue a written acceptance or rejection of said application. If the President accepts the application to extend the time for the performance of the Contract then the Term shall be extended the number of days the President specifies.

Section 3.11 Waiver of Claims The Contractor waives all claims for damages, including all costs and increased costs for labor and material, incurred on account of any delay, hindrance or cause whatsoever, and the Contractor agrees that its sole right and remedy for any delay, hindrance or cause shall be that the Contractor shall be entitled to such extension of the Term as the President may grant. Contractor further agrees that such extension of the Term is full and adequate consideration for all delays, hindrances, or causes.

Section 3.12 Liquidated Damages If the Contractor fails to complete the Work by the Substantial Completion Deadline set forth in the Recitals to this Contract, Contractor shall immediately become liable to BNYDC for the specified Liquidated Damages. The Liquidated Damages shall be deducted from the Contract Price unless sooner paid by Contractor to BNYDC.
BNYDC and Contractor agreed to the assessment of liquidated damages because each recognizes and acknowledges that the actual damages suffered by BNYDC

by reason of any delay in the completion of the Work will be of such a nature that they will be unreasonably difficult to determine.
BNYDC reserves the right, in accordance with Article 9 hereof, to terminate this Contract and have the Work completed by others at the expense of the Contractor and, in addition, to collect Liquidated Damages.

ARTICLE 4

WORK HOURS

The Contractor shall perform Work only between the hours of 7:30 a.m. and 4:30 p.m., Monday through Friday, except as otherwise specified in the RFB. In an emergency or if the Contractor is required to complete the Work in accordance with the Progress Schedule, Work, with the approval of BNYDC, may be performed at other hours. No extra compensation for any overtime charges or additional expenses resulting from such work shall be paid to Contractor.

ARTICLE 5

PAYMENT; METHOD OF PAYMENT; PAYMENT RECORDS

Section 5.1 Payment BNYDC agrees, upon Final Completion of the Work, to pay the Contractor in full satisfaction for the performance of the Work, and the Contractor agrees to accept, the Contract Price.

Section 5.2 Partial Payment From time to time as the Work progresses, and provided that the Contractor is not in default of this Contract, but not more than once a month, the Contractor shall submit to BNYDC the following required documents (hereinafter referred to as "Required Documents"):

A. Fully executed and notarized Contractor's Requisition for Progress Payment in the form annexed hereto as **Exhibit "F"**; and

B. Contractor shall submit for all Work for which Contractor is requesting payment a fully executed and notarized partial release and partial lien waiver, in the form annexed hereto as **Exhibit "I"**; and

C. Contractor shall submit for each Subcontractor that did Work for which Contractor is requesting payment a fully

executed and notarized partial release and partial lien waiver, in the form annexed hereto as **Exhibit "I"**.

BNYDC will review the Required Documents and when satisfied that the documents are accurate and complete, promptly pay the Contractor the amount requested, less retainage as follows: until the Work is substantially complete, 5% of the amount requested.

If BNYDC is not satisfied with the accuracy or completeness of the Required Documents, BNYDC will return the Required Documents to Contractor together with a statement setting forth the items of inaccuracy or incompleteness.
The statement from BNYDC shall be conclusive and binding upon the Contractor as to all the items included therein.
No further progress payments shall be paid to Contractor until Contractor submits and BNYDC accepts the Required Documents.

Section 5.3 Final Requisition On the day that Final Completion of the Work is achieved, Contractor shall submit to BNYDC the following documents (hereinafter referred to as "Final Documents"):

A. Fully executed and notarized Contractor's Final Requisition for Payment in the form annexed hereto as **Exhibit "F"**; and

B. Contractor shall submit for all Work for which Contractor is requesting final payment a fully executed and notarized final release and final lien waiver, in the form annexed hereto as **Exhibit "J"**; and

C. Contractor shall submit for each Subcontractor that did Work on the Project a fully executed and notarized final release and final lien waiver, in the form annexed hereto as **Exhibit "J"**.

BNYDC will review the Final Documents and when satisfied that the Final Documents are accurate and complete, promptly pay the Contractor the final payment less 1% of the final Contract Price as retainage for guaranty or warranty to be held by BNYDC for one (1) year, and return to Contractor excess retainage, if any.
If BNYDC is not satisfied with the accuracy or completeness of the Final Documents, BNYDC will return the Final Documents to Contractor together with a statement setting forth the items of inaccuracy or incompleteness.
The statement from BNYDC shall be conclusive and binding upon the Contractor as to all the items included therein.

Final payment shall not be made to Contractor until Contractor submits and BNYDC accepts the Final Documents.

Section 5.4 Withholding of Payment

Anything contained in this Agreement to the contrary notwithstanding, BNYDC, reserves the right to withhold from any payment due Contractor any amount that BNYDC deems sufficient to reimburse BNYDC for its actual expenditures made for the account of Contractor.
The right to withhold money from Contractor includes without limitation, all amount payable hereunder. If in BNYDC's opinion there is an actual or potential breach of this Contract, or an actual or potential default under this Contract by Contractor and the remaining balance payable to Contractor under this Contract would be insufficient to complete the Work. In connection therewith, BNYDC may nullify, in whole or in part, any previously approved but unpaid Partial Payments.

Section 5.5 Stored Materials BNYDC will allow materials or equipment that are not incorporated in the Work but will be installed in the Project and are delivered (hereinafter referred to as "Material") and suitably stored at the Project Site(s) to be included as an item in the Contractor's Requisition for Progress Payment. If approved in advance by BNYDC, BNYDC will allow eighty percent (80%) of the cost of the Material suitably stored at a location other than at the Project Site(s) to be included as an item in the Contractor's Requisition for Progress Payment so long as Contractor submits paid invoices, bills of sale or such other document satisfactory to BNYDC that establish BNYDC's title to such materials or equipment. Contractor must also protect BNYDC's interest in the Material by providing BNYDC acceptable proof that BNYDC's interest in the material is properly insured. Since off site storage of Material is for the convenience of Contractor transportation to the Project Site(s) of the Material shall not be included as an item in the Contractor's Requisition for Progress Payment.

Section 5.6 Progress Payment Any payment to Contractor pursuant to a Contractor's Requisition for Progress Payment shall only be for completed work in accordance with Section 5.2 hereof or stored materials pursuant to Section 5.5 hereof. In no event shall BNYDC make a Progress Payment for a downpayment or deposit for materials or equipment.

Section 5.7 Miscellaneous Payment Provisions Nothing contained in this Article 5 shall relieve the Contractor of its obligation to give notice of claims pursuant to any other provision of this Contract. The acceptance of the final payment by the

Contractor is a specific waiver and release of any claim the Contractor may have against BNYDC on account of or arising out of the Work. The making of the final payment by BNYDC shall not act as an estoppel against BNYDC or prevent BNYDC from enforcing any right under this Contract or any rights that may accrue or have already accrued at law or in equity.

Section 5.7 Joint Payment All payments by BNYDC shall be in the form of one or more separate checks which together total the amount due, made payable, at the option of BNYDC, either: (1) to the Contractor, (2) to the Contractor and one or more of its suppliers or Subcontractors, or (3) directly to its suppliers or Subcontractors. This provision is strictly for the benefit of BNYDC in order that satisfactory morale and relations with Subcontractors or suppliers is maintained and shall not under any circumstances confer any right upon a third party. In the event BNYDC makes a joint payment to the Contractor and one or more of its suppliers or Subcontractors or pays Contractor's suppliers or Subcontractors directly, then the Contractor shall be notified of such payment and such payment shall be reflected in Contractor's next Requisition and applied to the Contract Price.

Section 5.8 Payment Records Contractor agrees that its records pertaining to this Contract, the Project Site(s), the Project, all payments made hereunder, all purchases, and expenses charged hereunder or otherwise expended (hereinafter referred to as "Records") shall be subject to examination, audit and post audit at any time by BNYDC, the Comptroller of the City, the Director of Administrative Services of the City, DSBS, or such other designated official, and/or agent of the City, the State of New York, or the United States Government (hereinafter referred to as "Audit"). The Contractor shall maintain the Records at its business premises for a period of at least six years from the date of final payment. The Contractor shall maintain all Records and additional documents and records required by BNYDC (hereinafter referred to as "Additional Records"). Contract agrees that the maintenance of the Records and Additional Records are a material part of this Contract. Contractor agrees to promptly prepare and furnish to BNYDC such statements, Records, Additional Records, reports, data or information as requested by BNYDC. The Contractor acknowledges that its Subcontractors are subject to the provisions of this Section and will include such terms in all Subcontracts. Contractor undertakes to provide BNYDC such statements, Records, Additional Records, reports, data or information from Subcontractors as requested by BNYDC

If an Audit discloses any discrepancy, then BNYDC and the Contractor and shall immediately address and clear such discrepancies. If determined by

said audit that BNYDC has overpaid Contractor then Contractor shall immediately return such overpayment to BNYDC. Said return of funds shall be in addition to any claim for damages BNYDC may have as against Contractor. If determined by said audit that Contractor has been underpaid by BNYDC then upon a receipt and approval of a fully executed and notarized requisition for payment, BNYDC will pay Contractor the requested amount.

ARTICLE 6

CHANGE ORDERS; PROTEST WORK

Section 6.1 Extra Work BNYDC reserves the right to interpret the Construction Documents and/or to order minor changes in the Work, if those changes do not involve any adjustment in the Contract Price. The Contractor will promptly comply with any such interpretation or order.

Section 6.2 Field Orders In order to resolve conflicts in the Construction Documents, to order minor changes to avoid conflicts between different trades, or for Extra Work Architect/Engineer and BNYDC's Project Engineer shall have the authority to issue written field orders (hereinafter referred to as "Field Orders"). A Field Order is not a Change Order, only the President under Section 6.3 below has the authority to issue a Change Order.

Section 6.3 Change Orders. BNYDC reserves the right to, from time to time during the course of the Work, change, delete or add Work to the Contract, Such deleted or additional work shall hereinafter be referred to as a "Change Order". The President and the Contractor must sign all Change Orders. An oral directive or a writing not signed by the President and the Contractor shall be void ab initio and of no effect. Contractor upon receipt of a valid Change Order shall promptly perform required Work thereunder. The price for the Work required by the Change Order shall be determined as follows:

A. If Contractor and BNYDC agree upon a lump sum amount that the Contract Price will be amended by such lump sum amount; and/or

B. If this Contract the RFB, IFB, or the BSD contains unit prices (hereinafter referred to as "Unit Prices"), which are applicable to the type of work involved in the Change Order, then said Unit Prices will be used to set the amount that the Contract Price will be amended.

C. If BNYDC and the Contractor cannot agree upon a Change Order price prior to the performance of the Change Order, and if Unit Prices are not applicable to the Change Order, then the Contractor shall be paid for such Change Order Work an amount equal to either

1. With respect to Change Order Work performed by the Contractor the sum of:

a. Contractor's actual, documented to BNYDC's satisfaction, incurred costs defined as:

i) Base wages paid to laborers, including all insurance, welfare and other fringe benefits, and payments to labor organizations; and

ii) Cost of materials purchased, plus transportation costs, less all Contractor's discounts; and

iii) The actual cost of additional insurance necessitated by the Change Order Work; and

iv) The cost of installation, maintenance, operation and rental (or rental value of Contractor owned plant and equipment, but not tools) necessitated by the Change Order; and

v) The cost of necessary installation and dismantling of such plant and equipment (including transportation to and from the Project Site) (hereinafter referred to as "Actual Costs"); plus

b. 10% of such Actual Costs as compensation for all other costs, including overhead and small tools (hereinafter referred to as "Additional Costs"); plus

c. An additional 10% of such Actual Costs as compensation for profit (hereinafter referred to as "Profit"); or

2. With respect to Change Order Work performed by a Subcontractor, the sum of:

a. The Subcontractor's Actual Costs; and

b. 10% of Actual Costs as compensation for Subcontractor's Additional Costs,

c. Not more than 5% of Actual Costs for Subcontractor's profit; and

d. Not more than 5% of Subcontractor's Actual Costs for the Contractor's Additional Costs and profit;

e. The total of the markups described in (2) (b), (2) (c) and (2) (d) above shall not exceed 20% of the Subcontractor's Actual Costs.

D. If the Change Order deletes Work, then the Contract Price shall be reduced by an amount equal to the sum of (a) the Actual Costs, plus (6) all unearned Profit and Additional Costs.

E. If BNYDC and the Contractor cannot agree on a price for the Change Order Work under paragraphs a), b) or c) above, then the Contractor agrees that Contractor shall nevertheless immediately perform or delete the Change Order Work. The price to be paid or the credit to be taken for said Change Order Work shall be determined by BNYDC based upon the current market value for said work (hereinafter referred to as "Actual Market Value"), but in no event shall such Actual Market Value exceed the Actual Costs of performing said Change Order Work. The determination of Actual Market Value shall be made by the President and shall be binding upon the Contractor.

Section 6.4 Payment for Change Orders Request for payment of a Change Orders may be included with the Contractor's next Partial Requisition. Such request shall constitute Contractor's agreement that the Change Order relieves BNYDC from any liability for Contractor's loss due to delay, disruption, cost, or expense occasioned by reason of such Change Order and further Contractor releases BNYDC from any further liability therefore.

Section 6.5 Protest Work Contractor must, at least 7 days prior to commencing Protest Work, give BNYDC a formal written notice of the Protest Work together with a detailed explanation of why the contested work is not already covered by the Contract and an itemization of the cost to perform such disputed work. Notwithstanding any such claim of Protest Work, the Contractor shall proceed to diligently perform the Work in question, unless BNYDC shall by written notice direct that such work shall not be performed.

Section 6.6 Protest Work Records Contractor shall, while performing Protest Work, furnish BNYDC daily a written report showing:

A. The name and social security number of each worker performing Protest Work (hereinafter referred to as a "Protest Worker"); and

B. The number of hours worked by each Protest Worker; and

C. The type of work each Protest Worker performed; and

D. The cost, nature and quantity of all materials accompanied by paid receipts from the vendor from whom such materials were purchased showing date purchased and cost; and

E. The cost, nature and quantity of all equipment furnished or used in connection with the Protest Work accompanied by certified records showing daily usage costs, paid receipts from the vendor from whom such equipment was purchased or rented showing date purchased or rented and cost.

Failure to comply with the requirements of this Section 6.6 shall be deemed a waiver of any claim for payment on account of Protest Work.

ARTICLE 7

SUBCONTRACTS

Section 7.1 Subcontracts The Contractor is not an agent of BNYDC, the City or DSBS. All Subcontracts are between Contractor and Subcontractor. BNYDC, the City and DSBS have no responsibility for and assume no liability under any Subcontract.

Contractor shall include in each Subcontract a representation and warranty that Subcontractor presently has no interest, and Subcontractor shall not acquire any interest, which would directly or indirectly conflict, in any manner or degree, with the performance of Work on the Project and that no person with any such conflicting interest shall be employed in the performance of the Subcontract; any such interest on the part of the Subcontractor, its employees, agents or assigns must be fully disclosed to BNYDC.

The Contractor shall include and enforce all applicable terms and conditions set forth in this Contract in every Subcontract.

Section 7.2 Investigation Forms for Subcontractors. The Contractor shall cause each Subcontractor to submit to the City, Mayor's Office of Contract Services (hereinafter referred to as MOCS), a Procurement and Sourcing Solutions Portal (hereinafter referred to as "PASSport") profile. The Subcontractor shall not commence Work until BNYDC receives clearance from the MOCS.

Section 7.3 Indemnification of Subcontractor's Lien. To the fullest extent permitted by law, Contractor indemnifies and holds BNYDC, the City, DSBS and the directors, officers, agents and employees of each harmless against any and all Subcontractors' liens which may be filed. If the Contractor fails to promptly discharge all Subcontractors' liens, BNYDC shall make no further payment to the Contractor under this Contract. BNYDC, the City and DSBS shall have the right to discharge any liens which may be filed by any Subcontractor of any tier, and may recover the costs of securing such discharge from the Contractor by withholding such amount from the next payment due or otherwise.

ARTICLE 8

INSPECTION AND COMPLETION OF THE WORK

Section 8.1 Inspection All Work, materials and methods of construction shall at all times be subject to the inspection by BNYDC or its designee, or any City, New York State or Federal agency or department with jurisdiction over the Premises. If any Work, material or method of construction does not meet the approval of BNYDC or its designee, or any City, New York State or Federal agency or department with jurisdiction over the Premises such Work, material or method of construction shall be immediately changed, corrected, replaced and made good, at the Contractor's expense. BNYDC shall be the final judge of the quality and suitability of the Work, materials, and the methods of construction. Acceptance of any Work, material or method of construction shall not relieve the Contractor from any of its obligations under this Contract. BNYDC and its agents shall have no liability or obligation as a result of the inspection and the Contractor shall not be relieved of any Contract obligations by the making of an inspection or any acceptance resulting therefrom.

Section 8.2 Substantial Completion of the Work. When Contractor believes that the Work is complete Contractor shall request in writing that BNYDC inspect the Project. The Project shall be deemed substantially completed (hereinafter referred to as "Substantial Completion") on the date when all of the following shall have occurred:

A. BNYDC may use and occupy the Project; and

B. Only minor incomplete or unsatisfactory Work (hereinafter referred to as "Punch Lists"), if any, remains incomplete provided it does not interfere with BNYDC's use and occupancy; and

C. A Temporary Certificate of Completion or Certificate of Occupancy and/or such other required approval (i.e., a Notice of Completion or a New York City agency sign-off, as may be applicable) shall have been issued by the appropriate local governmental authority for all or a portion of the Project.

Section 8.3 Punch List When BNYDC or its designee prepares a Punch List, Contractor shall promptly complete and/or correct said work on the Punch List. The Contractor shall remain fully responsible to perform all Work whether or not there is a Punch List. BNYDC shall be entitled to withhold from any payment, in addition to any other sums properly withheld hereunder, the sum of two times the value of the Punch List, but in no event less than $1,000.

Section 8.4 Final Completion of the Work. The Project shall be deemed finally completed (hereinafter referred to as "Final Completion") on the date when the Work shall have been finally completed and BNYDC shall have received:

A. Evidence that all Work including Punch List items, have been fully and satisfactorily completed in a good and workmanlike manner, in conformance with this Contract; and

B. The Project has received, in full compliance with all applicable laws, rules, requirements and regulations of all government Authorities having jurisdiction over the Project the required signoffs and Certificates of Completion and/or Occupancy; and

C. Contractor has delivered all final certificates of approval relating to the Work and the contemplated uses of the Project, including, without limitation, all necessary certificates of the Board of Fire Underwriters or any successor thereof, Inspection and approval by the Bureau of Electrical Control, the City Fire Department, the City Department of Environmental Protection, all warranties and all guarantees for the Work and the Certificate of Completion and/or Occupancy, shall have been delivered to BNYDC; and

D. All required receipts, releases, releases of liens, affidavits, waivers, as-built drawings and any other documents required under this Contract shall have been delivered to BNYDC.

Section 8.5 Project Engineer BNYDC may employ a Project Engineer as BNYDC's representative at the Project Site(s). The Project Engineer shall, subject to review by BNYDC, have the authority, in the first instance, to inspect, supervise and control the performance of the Work.

NOTE – The Project Engineer, or any other person, does not have the power to issue a Change Order. Only the President, in compliance with section 6.3, has the power to issue a Change Order.

Section 8.6 Occupation or Use Prior to Completion BNYDC shall have the right before the Final Completion, to take over, occupy, operate or otherwise use any part of the Project. Contractor shall not interfere with or object to such take over, occupancy, operation or use any part of the Project. BNYDC shall notify Contractor in writing of such take over, occupancy, operation or use part of the Project specifying the date of such take over, occupancy, operation or use of part of the Project. Contractor's guarantee on the part of the Project taken over, occupied, operated or used by BNYDC shall begin on the date of such take over, occupancy, operation or use by BNYDC. If BNYDC shall take over, occupy, operate or use any part of the Project, BNYDC shall first inspect the parts of the Project to be so taken over, occupied, operated or used by BNYDC. Contractor will then be furnished in writing with a statement of Substantial Completion, and a Punch List for such part so taken over, occupied, operated or used by BNYDC.

ARTICLE 9

SUSPENSION OF WORK; TERMINATION

Section 9.1 Suspension BNYDC may, at any time, with or without cause, suspend the Work or any portion thereof for a period of not more than 90 days by giving Contractor written notice of such suspension (hereinafter referred to as "Suspension Notice"). Contractor shall immediately stop the Work covered by BNYDC's Suspension Notice and cause all Subcontractors to stop the Work covered by BNYDC's Suspension Notice. Contractor and Subcontractors shall resume the Work on the date set by BNYDC. Contractor and Subcontractors shall not be entitled to any additional compensation for costs attributable to any suspension, but the time for completion of the Work shall be extended by the period of suspension. The Contractor shall secure and make safe the Project Site(s) to BNYDC's satisfaction during any suspension.

Section 9.2 Defaults and Terminations for Cause In addition to any other rights that BNYDC may have, BNYDC shall have the right to declare the Contractor in default and terminate, for cause, this Contract, in whole or in part, if any of the following occur:

A. The Contractor shall become insolvent; or

B. The Contractor shall fail to perform the Work in the method and manner required by BNYDC; or

C. The Contractor shall fail to complete the Work within the Term; or

D. The Contractor shall fail to assign workers, order materials or enter into Subcontracts in a manner deemed sufficient by BNYDC to permit completion of the Work in accordance with the approved work schedule; or

E. The Contractor's interest in this Contract or its right to receive funds shall be assigned, transferred, conveyed or otherwise disposed of voluntarily or by operation of law without the prior written consent of BNYDC; or

F. The Contractor shall not comply with or violate any provision of this Contract; or

G. The Contractor shall fail to comply with any of the applicable laws, rules, regulations or orders that may be applicable to this Contract, or the Contractor shall be defaulted or debarred by the City, the State of New York or the United States Government; or

H. Any statement or representation of the Contractor in the Contract or in any document submitted by the Contractor with respect to the Work, the Project, or the Contract (or for purposes of securing the Contract) was untrue or incorrect when made.

Section 9.3 Termination for Convenience BNYDC reserves the right to terminate Contract at any time for its own convenience, without fault, and for such reasons as BNYDC deems appropriate (hereinafter referred to as "Convenience Termination"). A Convenience Termination shall take effect immediately upon Contractor receipt of BNYDC's written Convenience Termination notice. Contractor shall be entitled to full payment of sums due hereunder for Work

performed prior to such Convenience Termination. Contractor shall not be entitled to profit or overhead on the unperformed portion of the Work.

Section 9.4 Effects of a Default or a Termination Upon termination of this Contract, Contractor and all Subcontractors will immediately cease work and take all necessary steps to remove all hazards so as to make the Project Site(s) safe. After securing the Project Site(s), Contractor shall promptly present BNYDC a statement of costs actually incurred to the date of termination. The Contractor shall not recover as part of its costs any unearned or anticipated overhead or profit for itself or for its Subcontractors as a result of any termination.

Section 9.5 Payment Due when Termination not for Cause BNYDC will promptly review the statement of costs submitted by the Contractor by verifying and auditing all canceled checks, Subcontracts, paid receipts, bills from Subcontractors and any other document deemed necessary. BNYDC will notify the Contractor in writing when BNYDC is satisfied that the statement of costs is accurate (hereinafter referred to as "Approved Statement of Costs"). Contractor may then submit a Final Requisition for the balance of the Approved Statement of Costs, Contractors Final Release and Final Lien Waivers, all Subcontractors Final Release and Final Lien Waivers. Receipt of payment from BNYDC of the amount of the Final Requisition shall be full and final payment to the Contractor.

Section 9.6 Payment Due when Termination is for Cause In addition to any other rights BNYDC may have in law, in equity, or under this Contract if termination is for cause, BNYDC may, at its sole discretion, have the Work completed by another Contractor of its choice, or elect not to complete the Work.

BNYDC shall deduct from all monies then due Contractor the sum of:

A. All expenses incurred in completing the Work; or
B. The value of the Work not completed (as determined by BNYDC, in its sole discretion; and
C. all incidental expenses incurred as a result of the termination for cause, including all actual legal fees and accounting fees.

If, after making the above computation, there remains a balance due Contractor BNYDC shall pay such amount to the Contractor upon Contractor submitting a Final Requisition for such balance, Contractors Final Release and Final Lien Waivers, all Subcontractors Final Release and Final Lien Waivers. Receipt of payment from BNYDC of the amount of the Final Requisition shall be full and final payment to the Contractor.

If there is a balance due from the Contractor to BNYDC, then the Contractor shall immediately pay that amount to BNYDC.

No monies shall be due or payable to Contractor, if Contract is terminated for cause, until the Project is completed or BNYDC abandons the Project.

BNYDC need not wait until the completion of the Project to seek the enforcement of its rights hereunder.

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY; INDEMNIFICATION

Section 10.1Protection of Persons and Property The Contractor is responsible for providing safety and protection for all persons at the Project Site(s). The Contractor is responsible for all property damage, loss, injury, theft or vandalism at the Project Site(s) resulting from the Contractor's acts or omissions or those acts or omissions of any Subcontractors or any act or omission by anyone for whose acts Contractor may be liable.

Section 10.2 Indemnification To the fullest extent permitted by law, Contractor agrees to indemnify, keep indemnified, and hold harmless BNYDC and the City and their respective affiliates, officers, directors, members, partners, trustees, beneficiaries, agents and employees (hereinafter referred to as "Indemnities") from and against any and all liability, civil money penalties, fines, claims, losses, suits, damages, demands, judgments, actions, causes of action, settlements, expenses including but not limited to attorney's fees and disbursements, costs and charges of every nature and kind, both legal and otherwise, whether direct or indirect, arising out of (i) the acts or omissions of the Contractor, its Subcontractors, agents, employees or material suppliers, and any and all Persons on the Project Site(s) or in connected to the Work or (ii) any negligence, fault or default of the Contractor, its Subcontractors, agents, employees or material suppliers.

Contractor specifically agrees and acknowledges that there shall be no personal liability on the part of any officer, director, employee or agent of the Indemnities in connection with this Contract or otherwise.

This section 10.2 shall survive any termination of this Contract and remain in full force and effect.

Section 10.3 BNYDC, the City and DSBS not liable BNYDC, the City and DSBS shall not be liable for any damage, injury or liability that may be sustained by Contractor, Subcontractor or any other person whatsoever, or to their goods and chattels from any cause whatsoever arising from or out of the Work at the Project Site(s). Contractor hereby releases and discharges BNYDC, the City and DSBS from any and all demands, claims, actions and causes of action arising from the aforesaid.
Contractor shall look solely and exclusively to the funding for this Project for the satisfaction of any claim or cause of action Contractor may have against BNYDC, the City or DSBS in connection with this Contract or the failure of BNYDC to perform any of its obligations hereunder.

Section 10.4 Contractor Not an Agent of BNYDC, the City, or DSBS Contractor, Contractor's employees, Subcontractors or Subcontractor's employees are not agents, servants or employees of the Indemnities by virtue of this Contract or by virtue of any approval, permit, license, grant, right or authorization given by BNYDC, the City, DSBS or any of their officers, directors, employees or agents. Contractor, Contractor's employees, Subcontractors, or Subcontractor's employees shall not in any way directly or indirectly represent that they are agents, servants or employees of the Indemnities. The Contractor is solely responsible for the work, direction, compensation and personal conduct of its officers, employees, agents, Subcontractors, Subcontractor's officers, employees, and agents.

ARTICLE 11
INSURANCE AND BONDS

Section 11.1 Insurance, Performance Bond and Payment Bond Contractor and each Subcontractor shall provide:

A. Proof of Insurance as set forth in **Exhibit "G"** which is attached hereto and made a part hereof; and
B. A Performance Bond in the exact form set forth in **Exhibit "H"** which is attached hereto and made a part hereof in the Penal Sum set forth in Attachment 1 of the IFB; and
C. A Payment Bond in the exact form set forth in **Exhibit "H"** which is attached hereto and made a part hereof in the Penal Sum set forth in Attachment 1 of the IFB.

Section 11.2 Bid Security The bid bond or bid deposit as required by the RFB, the IFB and the BSD shall be retained by BNYDC as security for the Contractor entering into this Contract and commencing Work on the Project. A bid bond will be only be returned to the Contractor in compliance with its own terms. A bid deposit will only be returned to Contractor after the BNYDC receives this Contract duly executed by Contractor, the required Performance Bond and the required Payment Bond.

ARTICLE 12

LABOR AND MATERIALS; GUARANTEES

Section 12.1 Materials and Equipment All materials and equipment permanently installed in or on the Project shall be new, except as approved by BNYDC or as specified in the Construction Documents. Notwithstanding the foregoing, BNYDC encourages the use of recycled products where practicable. The Contractor shall notify BNYDC if it intends to use recycled products with respect to any materials to be permanently installed on the Project.
All labor performed on the Project shall be performed by skilled workers in their respective trades and shall be of first class quality in accordance with the standards of the construction industry and the particular trade. The Contractor shall obtain in the name of BNYDC all manufacturers' warranties and guarantees on all equipment and materials required by this Contract and installed in or on the Project and shall deliver such warranties and guarantees to BNYDC.

Section 12.2 Guarantee of Work Unless otherwise specifically set forth in the Construction Documents or elsewhere in this Contract, Contractor fully warrants and guarantees the materials, equipment, and Work against any and all defects whether latent or patent for a period of one year from the date Final Completion is achieved (hereinafter referred to as the "Warranty Period"). During the warranty period Contractor shall promptly repair, replace, rebuild or restore (as BNYDC may direct) all defective Work and materials and shall pay all costs for labor and materials necessary to correct such defective Work. Should Contractor fail to promptly repair, replace, rebuild or restore such defective Work, BNYDC shall repair, replace, rebuild or restore such defective Work and Contractor shall promptly pay to BNYDC all costs incurred by BNYDC in connection therewith. BNYDC's certificate setting forth the costs incurred in repairing, replacing, rebuilding or restoring any damaged or defective Work shall be binding and conclusive as to the amount thereof upon the Contractor.

Section 12.3 Security for Materials and Guarantees As security for the Contractor's faithful performance of its obligations under this Article 12, BNYDC will deduct from the Final Completion payment an amount equal to one percent (1%) of the Contract Price or such greater amount fixed in the RFB, the IFB and the BSD (hereinafter referred to as "Retainage"). In BNYDC's sole discretion, BNYDC may require Contractor to post in addition to the Retainage security in such amount, as BNYDC deems necessary to guarantee Contractors performance under this Article 12.
If Contractor faithfully performs all its obligations hereunder, BNYDC will as soon as practicable after the expiration of the Warranty Period return to Contractor the Retainage and additional security, if any, without interest. Notice by BNYDC to repair, replace, rebuild and/or restore any defective or damaged Work shall be timely if given up to 10 days after the expiration of the Warranty Period.

Section 12.4 Rights not Exclusive BNYDC's rights under this Article 12 are in addition to all other rights BNYDC may have under this Contract, at law or in equity.

ARTICLE 13

TITLE TO THE WORK, MATERIALS AND EQUIPMENT

Section 13.1 Tax Exempt Status Pursuant to Section 1115(a)(15) and (16) of the New York State Tax Law, purchases of tangible personal property by the Contractor or its Subcontractors arising out of this Contract are exempt from the sales and use tax imposed by Article 28 of the New York State Tax Law, to the extent that such property is used to alter, maintain or improve, and becomes an integral component part of City-owned or leased real property which is improved under this Contract. This exemption does not apply to tools, machinery, equipment or other property purchased or leased by the Contractor or its Subcontractors, or to supplies, materials or other property which are consumed in the course of construction or for any other reason not incorporated into the real property which is improved under this Contract.

Section 13.2 Exclusion of Tax From Contract Price Contractor represents and warrants that to the extent applicable state and local sales taxes have been excluded from the Contract Price. Contractor and its Subcontractors shall be responsible for and shall pay any and all applicable taxes, including sales and use taxes imposed upon purchased or leased tools, machinery, equipment, and upon all such unincorporated supplies and materials and other property as

provided by law. The Contract Price shall be deemed to include full payment and consideration for the sale of all supplies and materials necessary for the performance of the Contract.

Section 13.3 Evidence of Title At the request of BNYDC, Contractor shall furnish BNYDC such paid bills, bills of sale and/or other instrument properly executed, acknowledged and delivered as BNYDC may require, proving title for all supplies, materials and equipment permanently installed in or on the Project has passed to the City, free of liens or encumbrances. Contractor shall clearly mark or otherwise identify all such materials as the property of the City.

Section 13.4 Title to Materials Title to all materials used on the Project immediately vests in BNYDC upon the earlier of (1) delivery of such materials to the Premises or (2) payment by BNYDC for such materials.
Notwithstanding such transfer of title to the materials until such time as such materials are installed in accordance with the provisions of this Contract and up to Final Completion of the Work, Contractor shall:

A. Protect the materials against loss or damage, and maintain the materials in proper condition and repair; and

B. Replace or make good any loss, theft, disappearance, or damage to the materials, and furnish additional materials in place of any that may be lost, stolen or rendered unusable all without cost to BNYDC.

Such transfer of title shall in no way affect any of the Contractor's obligations hereunder.
BNYDC reserves the right, in its sole discretion, to reject any defective or otherwise unsatisfactory materials. Title to any rejected, defective or otherwise unsatisfactory materials shall be deemed to revert to Contractor.

Section 13.5 Subcontracts to Separate Materials from Labor All Subcontracts shall be in a form similar to this Contract with respect to the separation of the sale of materials from the work and labor, services, consumable supplies and any other items to be provided. The Subcontracts shall provide separate prices for (1) materials and (2) all other services and items. Such separation shall actually be followed in practice, including the separation of payments for materials from the payments for other work and labor and other things to be provided.

Section 13.6 Tax Exempt Certificates Contractor and Subcontractors shall obtain, Contractor Exempt Purchase Certificates (Form ST-120.1) and shall furnish to all persons, firms or corporations from which they purchase materials for the performance of the Work such Contractor Exempt Purchase Certificates.

ARTICLE 14

REPRESENTATIONS AND WARRANTIES

Contractor represents and warrants the following:

Section 14.1 Illegal Consideration
Contractor has not been asked to pay, and has neither offered to pay, nor paid, any illegal consideration, whether monetary or otherwise, in connection with the procurement of this Contract.

Section 14.2 Solicitation Contractor has not employed any person to solicit or procure this Contract, and has not made and shall not make, except to full time employees of the Contractor, any payment or any agreement for the payment of any commission, percentage, brokerage, contingent fee or any other compensation in connection with the procurement of this Contract.

Section 14.3 Conflict of Interest Contractor has not acquired nor will it acquire any interest of any nature, direct or indirect (including without limitation, any interest in land in an area related to the Work or any interest in any corporation, partnership, etc. with any such interest), which would conflict in any manner or degree with the performance of the Work and no person having any such conflicting interest shall be employed by the Contractor in the performance of this Contract.

Section 14.4 Investigation Forms All questionnaires and disclosure forms delivered by the Contractor to BNYDC to date are, to the best of the Contractor's knowledge, true and correct in all material respects; no material change has occurred in the circumstances of the Contractor, its principals, or affiliated persons or entities since the respective dates upon which such disclosure forms were executed which would otherwise require disclosure on such forms; and no material disclosed in such disclosure forms contains, to the best of the Contractor's knowledge, any untrue statement of a material fact or omits to state a material fact necessary in order to make any statement contained in such form not misleading.

Section 14.5 Anti-Boycott Provisions Contractor shall comply in all respects with the provisions of §6-114 of the Administrative Code of the City and the rules and regulations issued by the Comptroller of the City thereunder.
Contractor certifies it is not now participating in, nor shall it participate in, during the term of this Contract, an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder.
Upon the final determination by the United States Department of Commerce or any other agency of the Government of the United States that Contractor has participated in an international boycott in violation of the provisions of the Export Administration Act of 1979, as amended, or the regulations promulgated thereunder, BNYDC may, at its sole option, render this Contract forfeit and void.

ARTICLE 15

WOMEN OWNED AND MINORITY OWNED BUSINESSES PARTICIPATION

Section 15.1 M/WBE Program. Section 6-129 of the Administrative Code of the City of New York ("Section 6-129") establishes the program for participation in City procurement ("M/WBE Program") by "MBEs and WBEs, certified in accordance with Section 1304 of the New York City Charter. As stated in Section 6-129, the intent of the program is to address the impact of discrimination on the City's procurement process, and to promote the public interest in avoiding fraud and favoritism in the procurement process, increasing competition for City business, and lowering contract costs. BNYDC endorses these goals and has adopted an M/WBE Program to further participation by MBEs and WBEs for its projects. The Contractor shall comply with all requirements of BNYDC's M/WBE Program described in this Contract.

Section 15.2 M/WBE Participation Goal.

A. The percentage goal for M/WBE participation (the "Participation Goal") for the Contract is [__]% of the total dollar value of the Contract. The Participation Goal represents a percentage of the total dollar value of the Contract that may be achieved by awarding subcontracts to firms certified with DSBS or DMWBD (each as defined below) as MBEs or WBEs, and/or by crediting the participation of prime contractors and/or qualified joint ventures as provided in Section 15.2(D) and Section 15.2(E) below.

B. M/WBE firms must be certified by either (i) DSBS, or (ii) Empire State Development's Division of Minority and Women's Business Development ("DMWBD") to credit such firms' participation toward attainment of the Participation Goal. Such certification must occur prior to the firms' commencement of work. A list of M/WBE firms may be obtained (i) from the DSBS website at www.nyc.gov/buycertified, by emailing DSBS at buyer@sbs.nyc.gov, by calling (212) 513-6356, or by visiting or writing DSBS at 110 William Street, New York, New York, 10038, 7th Floor, and (ii) from the ESD website at www.ny.newnycontracts.com. Eligible firms that have not yet been certified may contact DSBS or DMWBD for additional information on how to get certified. No credit shall be given for participation by a graduate M/WBE, as defined in Section 6-129(c)(20).

C. The Participation Goal is a material term of this Contract and the Contractor shall be subject to the BNYDC approved Participation Goal.

D. An M/WBE Contractor shall be permitted to count its own participation toward fulfillment of the Participation Goal. The value of an M/WBE Contractor's participation shall be determined by subtracting from the total value of the Contract any amounts that the Contractor will pay to direct Subcontractors. A Contractor that is certified as both an MBE and a WBE may count its own participation either toward the goal for MBEs or the goal for WBEs, but not both. If a Contractor is not an M/WBE, it must meet the Participation Goal through the awarding of subcontracts to firms certified with DSBS or DMWBD as MBEs or WBEs.

E. A Contractor that is a Qualified Joint Venture (as defined in Section 6-129, and as discussed further in Section 5) shall be permitted to count a percentage of its own M/WBE participation toward fulfillment of the Participation Goal. The value of Contractor's participation shall be determined by subtracting from the total value of the Contract any amounts that Contractor pays to direct Subcontractors, and then multiplying the remainder by the percentage to be applied to total profit to determine the amount to which an MBE or WBE is entitled pursuant to the joint venture agreement, provided that where a participant in a joint venture is certified as both an MBE and a WBE, such amount shall be counted either toward the goal for MBEs or the goal for WBEs, but not both.

Section 15.3 M/WBE Proposal Submission Forms.

A. The Contractor has submitted with its bid a completed M/WBE Utilization Plan, which is attached as Exhibit "P", indicating:

i. whether the Contractor is an MBE or WBE, or Qualified Joint Venture;
ii. the percentage of work it intends to award to direct Subcontractors;
iii. in cases where the Contractor intends to award direct subcontracts, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs, and the time frames in which such work is scheduled to begin and end; as well as the name, addresses, and telephone numbers of the M/WBE subcontractors if required by the solicitation; and copies of DSBS or DMWBD certifications for each proposed MBE or WBE subcontractor listed in its M/WBE Utilization;
iv. the Contractor's required certification and affirmations, as attached as Exhibit "P" to this IFB.

B. **THE CONTRACTOR HAS COMPLETED AN M/WBE UTILIZATION PLAN, AS ATTACHED HERETO AS EXHIBIT "P". IN THE EVENT THAT BNYDC DETERMINES THAT THE CONTRACTOR HAS SUBMITTED AN M/WBE UTILIZATION PLAN WHERE THE VENDOR CERTIFICATION AND REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER ASPECTS OF THE M/WBE UTILIZATION PLAN ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE VENDOR CERTIFICATION AND AFFIRMATIONS, THE CONTRACTOR WILL BE NOTIFIED BY BNYDC AND WILL BE GIVEN FOUR (4) CALENDAR DAYS FROM RECEIPT OF NOTIFICATION TO CURE THE SPECIFIED DEFICIENCIES AND RETURN A COMPLETED M/WBE UTILIZATION PLAN TO BNYDC. RECEIPT OF NOTIFICATION IS DEFINED AS THE DATE NOTICE IS E-MAILED OR FAXED (IF THE CONTRACTOR HAS PROVIDED AN E-MAIL ADDRESS OR FAX NUMBER), OR NO LATER THAN FIVE (5) CALENDAR DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.**

C. Every twelve (12) months within the Term, the Contractor shall submit a list of proposed persons or entities to which it intends to award subcontracts within the subsequent 12 months. BNYDC may also require the Contractor to report periodically about the contracts awarded by its direct Subcontractors to indirect subcontractors (as defined in Section 6-129(c)(22)). In the event that the Contractor's selection of a Subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.

Section 15.4 Statements Submitted with Requests for Payment.

A. The Contractor shall, with each voucher for payment, and/or periodically as BNYDC may require, submit statements, certified under penalty of perjury, which shall include, but not be limited, to:
   i. the total amount the Contractor paid to its direct subcontractors, and, where applicable pursuant to Section 6-129(j), the total amount direct subcontractors paid to indirect subcontractors;
   ii. the names, addresses and contact numbers of each MBE or WBE hired as a subcontractor by the Contractor, and, where applicable, hired by any of the Contractor's direct subcontractors; and
   iii. the dates and amounts paid to each MBE or WBE.

B. The Contractor shall also submit, along with its voucher for final payment:
   i. the total amount it paid to subcontractors, and, where applicable pursuant to Section 6- 129(j), the total amount its direct subcontractors paid directly to their indirect subcontractors; and
   ii. a final list, certified under penalty of perjury, which shall include the name, address and contact information of each subcontractor that is an MBE or WBE, the work performed by, and the dates and amounts paid to each.

C. If payments made to, or work performed by, MBEs or WBEs are less than the amount specified in the Contractor's M/WBE Utilization Form, BNYDC shall take appropriate action, in accordance with the enforcement provisions described in the Contract and in Section 15.13.

Section 15.5 Modifications Based on Change Orders. Where the Contractor requests a change order the value of which exceeds the greater of 10 percent of the Contract, as applicable, or $500,000, BNYDC shall review the scope of work for the Contract or Task Order, as applicable, and the scale and types of work involved in the change order, and determine whether the Participation Goal should be modified.

Section 15.6 Other M/WBE Requirements. The IFB contains additional provisions related to the M/WBE requirements applicable to this Contract.

Section 15.7 Intentionally Omitted

Section 15.8 Modification of M/WBE Utilization Plan.

A. A Contractor may request a modification of its M/WBE Utilization Plan (a "Modification") during the Term of this Contract. BNYDC may grant a request for Modification of a Contractor's M/WBE Utilization Plan if it

determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts to meet the Participation Goal. In making such determination, BNYDC shall consider evidence of the following efforts, as applicable, along with any other relevant factors:

i. The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;

ii. The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;

iii. The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;

iv. The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;

v. The Contractor held meetings with MBEs and/or WBEs prior to the date their bids were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids were solicited;

vi. The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;

vii. Timely written requests for assistance made by the Contractor to BNYDC's M/WBE liaison officer at mwbe@bnydc.org and to DSBS and DMWBD;

viii. Description of how recommendations made by DSBS, DMWBD and BNYDC were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

BNYDC's M/WBE liaison officer shall provide written notice to the Contractor of the determination.

B. BNYDC may modify the Participation Goal when the scope of the work has been changed by BNYDC in a manner that affects the scale and types

of work that the Contractor indicated in its M/WBE Utilization Plan would be awarded to subcontractors.

Section 15.9 Substitutions. Substitutions to the MBEs and/or WBEs that Contractor identified as firms they intended to use in connection with the performance of the Contract may only be made with the approval of BNYDC, which shall only be given when the Contractor has proposed to use a firm that would satisfy the Participation Goal to the same extent as the firm previously identified, unless BNYDC determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts. In making such determination, BNYDC shall require evidence of the efforts listed in Section B(1) above, as applicable, along with any other relevant factors.

Section 15.10 Indefinite Quantity Contracts. If this Contract is for an indefinite quantity of construction or is a requirements type contract, the Contractor will not be deemed in violation of the M/WBE Program requirements for this Contract with regard to any work which was intended to be subcontracted to an MBE and/or WBE to the extent that BNYDC has determined that such work is not needed.

Section 15.11 Progress Review, Evaluation and Assessment. At least once annually during the term of the Contract, BNYDC shall review the Contractor's progress toward attainment of its M/WBE Utilization Plan, including but not limited to, by reviewing the percentage of work the Contractor has actually awarded to MBE and/or WBE subcontractors and the payments the Contractor made to such subcontractors.

BNYDC shall evaluate and assess the Contractor's performance in meeting those goals, and such evaluation and assessment shall become part of the Contractor's overall contract performance evaluation.

Section 15.12 Miscellaneous Provisions.

A. The Contractor shall take notice that this Contract may be audited. Furthermore, such this Contract may also be examined by the City's Comptroller to assess compliance with its M/WBE Utilization Plan.
B. DSBS and DMWBD are available to assist contractors and potential contractors in determining the availability of MBEs and/or WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and/or WBEs in contracts.

C. The Contractor hereby acknowledges its understanding of the M/WBE Program requirements set forth herein and the Contractor hereby agrees to comply with the M/WBE Program requirements of this Contract, all of which shall be deemed to be material terms of this Contract. The Contractor hereby agrees to make all reasonable, good faith efforts to solicit and obtain the participation of MBEs and/or WBEs to meet the required Participation Goal.

Section 15.13 Enforcement.

A. Whenever BNYDC believes that the Contractor or a subcontractor is not in compliance with the M/WBE Program or its M/WBE Utilization Plan, BNYDC shall send a written notice to the Contractor describing the alleged noncompliance and offering the Contractor an opportunity to be heard. BNYDC shall then conduct an investigation to determine whether such Contractor or subcontractor is in compliance.

B. In the event that the Contractor has been found to have violated the M/WBE Program or its M/WBE Utilization Plan, BNYDC may determine that one of the following actions should be taken:
   i. entering into an agreement with the Contractor allowing the Contractor to cure the violation;
   ii. revoking the Contractor's pre-qualification to bid for future contracts;
   iii. making a finding that the Contractor is in default of the Contract;
   iv. terminating the Contract;
   v. declaring the Contractor to be in breach of Contract;
   vi. withholding payment or reimbursement;
   vii. determining not to renew the Contract;
   viii. assessing actual and consequential damages;
   ix. assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;
   x. exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or
   xi. taking any other appropriate remedy.

C. If the Contractor has been found to have failed to fulfill its Participation Goal contained in its M/WBE Utilization Plan or the Participation Goal as modified by BNYDC pursuant to Section 15.8, BNYDC may assess liquidated damages in the amount of ten percent (10%) of the difference between the dollar amount of work required to be awarded to MBE and/or WBE firms to meet the Participation Goal and the dollar amount the Contractor actually awarded and paid, and/or credited, to MBE and/or WBE firms. In view of the difficulty of accurately ascertaining the loss which BNYDC will suffer by reason of Contractor's failure to meet the Participation Goal, the foregoing amount is hereby fixed and agreed as the liquidated damages that BNYDC will suffer by reason of such failure, and not as a penalty. BNYDC may deduct and retain out of any monies which may become due under this Contract the amount of any such liquidated damages; and in case the amount which may become due under this Contract shall be less than the amount of liquidated damages suffered by BNYDC, the Contractor shall be liable to pay the difference.

D. Whenever BNYDC has reason to believe that an MBE and/or WBE is not qualified for certification, or is participating in a contract in a manner that does not serve a commercially useful function (as defined in Section 6-129(c)(8)), BNYDC shall notify the Commissioner of DSBS or DMWBD, as applicable, who shall determine whether the certification of such business enterprise should be revoked.

E. Statements made in any instrument submitted to BNYDC pursuant to the M/WBE Program shall be submitted under penalty of perjury and any false or misleading statement or omission shall be grounds for the application of any applicable criminal and/or civil penalties for perjury. The making of a false or fraudulent statement by an MBE and/or WBE in any instrument submitted pursuant the M/WBE Program shall, in addition, be grounds for revocation of its certification.

F. The Contractor's record in implementing its M/WBE Utilization Plan shall be a factor in the evaluation of its performance. Whenever BNYDC determines that a Contractor's compliance with an M/WBE Utilization Plan has been unsatisfactory, BNYDC shall, after consultation with the BNYDC M/WBE liaison officer, file an advice of caution form for inclusion in PASSPort as caution data.

ARTICLE 16

INVESTIGATION

Section 16.1 Cooperation with Investigation The parties to this Contract agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by BNYDC. The parties to this Contract agree to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a State or City governmental agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or the Inspector General of a governmental agency that is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit or license that is the subject of the investigation, audit or inquiry. If any person who has been advised that his/her statement, and any information from such statement, will not be used against him/her in any subsequent criminal proceeding refuses to testify before a grand jury or other governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or the Inspector General of the governmental agency that is a party in interest, and is seeking testimony, concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with BNYDC, The City, the State, or any political subdivision or public authority thereof, or the Port Authority of New York and New Jersey, or any local development corporation within the City, or any public benefit corporation organized under the Laws of the State of New York, or, if any person refuses to testify for a reason other than the assertion of his/her privilege against self incrimination in any such investigation, then BNYDC and/or the Commissioner whose agency is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license shall convene a hearing, upon not less than five days written notice to the parties involved, to determine if any penalties should attach for the failure of a person to testify.

If any non-governmental party to the hearing requests an adjournment, BNYDC or the Commissioner who convened the hearing may, upon granting the adjournment, suspend any contract, lease, permit or license, pending the final determination, without the City or BNYDC incurring any penalty or damages for delay or otherwise.

Section 16.2 Penalties The penalties that may attach after a final determination by BNYDC or the Commissioner may include but shall not exceed:

A. The disqualification, for a period not to exceed five years from the date of an adverse determination for any person or any

entity of which such person was a member at the time the testimony was sought, from submitting bids for, or transacting business with, or entering into or obtaining any contract, lease, permit or license with or from BNYDC and/or the City; and/or

B. The cancellation or termination of any and all such existing BNYDC and/or City contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this Contract, nor the proceeds of which pledged, to an unaffiliated and unrelated institutional lender for fair value prior to the issuance of the notice scheduling the hearing, without the City or BNYDC incurring any penalty or damages on account of such cancellation or termination; monies lawfully due for goods delivered, work done, rentals or fees accrued prior to the cancellation or termination shall be paid by the BNYDC or the City.

Section 16.3 Factors in Assessing Penalties BNYDC and/or The Commissioner shall consider and address in reaching his/her determination and in assessing an appropriate penalty the factors in subparagraphs (a) and (b) below. BNYDC and/or The Commissioner may also consider, if relevant and appropriate, the criteria established in subparagraphs (c) and (d) below, in addition to any other information, which may be relevant and appropriate:

A. The party's good faith endeavors or lack thereof to cooperate fully and faithfully with any governmental investigation or audit, including but not limited to the discipline, discharge or disassociation of any person failing to testify, the production of accurate and complete books and records, and the forthcoming testimony of all other members, agents, assignees or fiduciaries whose testimony is sought.

B. The relationship of the person who refused to testify to any entity that is a party to the hearing, including but not limited to, whether the person whose testimony is sought has an ownership interest in the entity and/or the degree of authority and responsibility the person has within the entity.

C. The nexus of the testimony sought to the subject entity and its contracts, leases, permits or licenses with BNYDC and the City.

D. The effect a penalty may have on an unaffiliated and unrelated party or entity that has a significant interest in an entity subject to penalties as described above, provided that the party or entity has given actual notice to BNYDC and/or the Commissioner upon the acquisition of the interest, or at the hearing called for gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity shall present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

1. The term "license" or "permit" as used in this Article 16 shall be defined as a license, permit, franchise or concession not granted as a matter of right.

2. The term "person" as used in this Article 16 shall be defined as any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

3. The term "entity" as used in this Article 16 shall be defined as any firm, partnership, corporation, association, joint venture, limited liability company or person that receives monies, benefits, licenses, leases or permits from or through the City or otherwise transacts business with the City.

4. The term "member" as used in this Article 16 shall be defined as any person associated with another person or entity as a partner, member of a limited liability company, director, officer, principal or employee.

Section 16.4 Termination In addition to and notwithstanding any other provision of this Contract, the President and/or the Commissioner may in his/her sole discretion terminate this Contract upon not less than three days written notice in the event the Contractor fails to promptly report in writing to BNYDC and the Commissioner of the Department of Investigations of the City any solicitation of money, goods, requests for future employment or other benefit or thing of value, by or on behalf of any employee of the City or other person, firm, corporation or entity for any purpose which may be related to the procurement or obtaining of this Contract by the Contractor, or affecting the performance of this Contract.

ARTICLE 17

MISCELLANEOUS PROVISIONS

Section 17.1 Notices All notices, demands and requests required or permitted to be given under this Contract shall be in writing and shall not be effective unless personally delivered, sent by United States registered or certified mail, postage paid, return receipt optional, or sent by an overnight courier service of recognized reputation, addressed as hereinafter provided. All such notices, demands and requests mailed to BNYDC shall be addressed to BNYDC as follows:

Brooklyn Navy Yard Development Corporation
Building 77
141 Flushing Avenue, Suite 801
Brooklyn, New York 11205
Attention: Counsel

Or at such other address as BNYDC may from time to time designate by written notice to Contractor. All such notices, demands and requests mailed to Contractor shall be addressed to Contractor at Contractor's address as stated on page 1 hereof. Or at such other address as Contractor may from time to time designate by written notice to BNYDC.

Notices, demands and requests which shall be served in the manner aforesaid shall be deemed given for all purposes hereunder at the time such notice, demand, or request is deposited in any post office or branch post office or official depository regularly maintained by the United States Postal Service.

Section 17.2 Severability If any provision of this Agreement shall contravene or be invalid under the laws of the United States or the State, it is agreed that such provision shall not invalidate the whole Contract but the Contract shall be construed as if not containing the particular provision or provisions held to be invalid.

Section 17.3 Claims and Actions Against BNYDC Contractor shall look solely to the funds available to and appropriated by BNYDC under the City Contract for this particular project for the satisfaction of any claim or cause of action the Contractor may have against BNYDC in connection with this Contract. No director, officer, employee, agent or other person authorized to act on behalf of BNYDC shall have any personal liability in connection with this Contract or any failure of BNYDC to perform its obligations hereunder. The Contractor agrees that it shall have no claim against BNYDC for damages, or in any action or proceeding at law or in equity, unless the Contractor shall give notice of the

existence of such claims to BNYDC within sixty (60) days after the cause of action arose, or the damages first became ascertainable, whichever shall occur first. The notice of claim must strictly comply as to form with all of the provisions required by law regarding claims against the City as provided for in §7-201 of the New York City Administrative Code (except for the time to file such claim which shall be sixty (60) days) with service of the same to be made by personal delivery upon an officer or agent of BNYDC.

Serving the notice of claim in strict accordance with this Article shall be a necessary and non-waivable jurisdictional element of any claim by the Contractor. Any action or proceeding by the Contractor against BNYDC must be commenced within sixty (60) days after the service of said notice of claim, but not before thirty (30) days after the service of the notice of claim.

Contractor acknowledges that it will be adequately compensated by money damages alone for any act or omission of BNYDC and, therefore, specifically waives all rights that it may have for equitable relief, including injunctive relief. The filing of a Notice of Appeal by BNYDC in any judicial proceeding shall stay the enforcement of any judgment against BNYDC, pending a resolution and final determination of that appeal, without BNYDC posting any security and without any court order being obtained.

In addition to any other contractual statute of limitations set forth herein, the Contractor agrees that no action against BNYDC shall lie or be maintained if BNYDC is barred by any statute or time limitation whatsoever at the time the Contractor institutes its suit or for twenty (20) days thereafter, from maintaining, prosecuting or instituting any claim against the City, the State of New York, the United States Government, any insurance company which may be liable, or any of them, based upon the same facts alleged by the Contractor, either as a third-party plaintiff or in a plenary action.

Section 17.4 Governing Law & Venue. This Contract is deemed executed in the City of New York, State of New York and shall be governed by and construed in accordance with the laws of the State of New York. The parties agree that any and all claims asserted by or against BNYDC, the City or DSBS arising under this Contract or related hereto shall be heard and determined either in the courts of the United States ("Federal Courts") located in New York City or in the courts of the State of New York ("New York State Courts") located in the City and County of New York.

Section 17.5 Service of Process If BNYDC, the City or DSBS initiates any action against the Contractor in Federal Court or in New York State Courts, personal service of process may be made on the Contractor either in person, wherever the Contractor may be found, or by registered mail addressed to the Contractor at its address as set forth on page 1 of this Contract, or to such other address as the Contractor may have provided to BNYDC, the City or DSBS, as the case may be.

Section 17.6 Waiver by the Contractor With respect to any action between BNYDC, the City or DSBS and the Contractor in New York State Court, the Contractor expressly waives and relinquishes any rights it might otherwise have (1) to move to dismiss on grounds of forum non conveniens, (2) to remove to Federal Court, and (3) to move for a change of venue to a New York State Court outside New York County. With respect to any action between BNYDC, the City or DSBS and the Contractor in Federal Court located in New York City, the Contractor expressly waives and relinquishes any rights it might otherwise have to move to transfer the action to a Federal Court outside New York City.

Section 17.7 Change of Venue If the Contractor commences any action against the City or DSBS in a court located other than in the City and State of New York, upon request of BNYDC, the City or DSBS, as the case may be, the Contractor shall either consent to a transfer of the action to a court of competent jurisdiction located in the City and State of New York or, if the court where the action is initially brought will not or cannot transfer the action, the Contractor shall consent to dismiss such action without prejudice and may thereafter reinstitute the action in a court of competent jurisdiction in New York City.

Section 17.8 Assignment Contractor can neither assign this Contract, nor the right to receive the funds to be paid under this Contract, without the express written consent of BNYDC. BNYDC can either assign this Contract or the rights hereunder to the City without the consent of the Contractor.

Section 17.9 Contract Interpretations In the event any interpretation of this Contract is required after execution, or if any actual or apparent conflict between any two or more provisions of the Contract is discovered, then the Contract or such conflict shall be interpreted by the President and that interpretation shall be conclusive and binding on the parties hereto. In the event of any dispute between BNYDC and the Contractor as to whether or not the Work is completed, the inspection report of BNYDC or its agent shall be considered binding, final and conclusive.

Section 17.10 Titles The titles to any article or any subdivision of this Contract are for organizational purposes only.

Section 17.11 Merger This Contract may not be modified orally. This Contract may be supplemented, amended or revised only in writing by the mutual agreement of the BNYDC and Contractor. This Contract supersedes all previous agreements and/or Contracts whether oral or written between the BNYDC and Contractor.

Section 17.12 Non-Waiver Forbearance, neglect or failure by BNYDC to enforce any and all of the provisions of this Contract or to insist upon strict compliance by Contractor shall not be construed as a waiver of any rights or privileges of BNYDC. A waiver by BNYDC of a past act or circumstance shall not constitute or be a course of conduct or waiver of any subsequent act or circumstance.

Section 17.13 Contractor's Performance Evaluation Provisions Contractor's performance of the Work may be evaluated by BNYDC (i) upon the vouchering of 50% of the Contract Price and/or (ii) upon Substantial Completion of the Work. BNYDC will send a copy of the evaluation to the Contractor after such evaluation and the Contractor may respond in writing to such evaluation. The response will be filed with the evaluation. The evaluation may be filed with the City.

By executing this Contract Contractor verifies that Contractor has carefully and completely reviewed and understands the terms and conditions this Contract.

IN WITNESS WHEREOF, the parties have hereunto set their hands and seal the day and year first above written.

BROOKLYN NAVY YARD
DEVELOPMENT CORPORATION

By: _____

Name: _____

Title: _____

[_____]

By: _____

Name: _____

Title: _____

[ACKNOWLEDGMENT, IF A PARTNERSHIP

STATE OF_____)

ss.:

COUNTY OF _____)

On this day of_____, 20_, before me personally came _____, _____to me known and known to me to be one of the partners of the firm of_____ _____described in and which executed the foregoing instrument and __he acknowledged to me that __he executed the same as and for the act and deed of said firm.

_____

Notary Public

ACKNOWLEDGMENT, IF AN INDIVIDUAL

STATE OF_____)

ss.:

COUNTY OF _____)

On this day of_____, 20_, before me personally came _____, _____, _____to me known to be the individual described in and who executed the foregoing instrument and __he acknowledged to me that __he executed foregoing instrument.

_____

Notary Public

ACKNOWLEDGMENT, IF A CORPORATION

STATE OF _____)

ss:

COUNTY OF _____)

On the ____ day of _____ in the year 20__, before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he is the _____ of _____, the corporation described in and which executed the above instrument; and that he signed his name thereto by authority of the Board of Directors of said corporation.

_____]

Notary Public

EXHIBIT A
E.O. 50 CONSTRUCTION RIDER

A. EQUAL EMPLOYMENT OPPORTUNITY

This contract is subject to the requirements of Executive Order No. 50 (April 25, 1980) as amended ("E.O. 50") and the Rules and Regulations promulgated thereunder. No contract will be awarded unless and until these requirements have been complied with in their entirety. By signing this contract, the Contractor agrees that:

(1) It will not engage in any unlawful discrimination against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, marital status or sexual orientation with respect to all employment decisions including, but not limited to, recruitment, hiring, upgrading, demotion, downgrading, transfer, training, rates of pay or other forms of compensation, layoff, termination, and all other terms and conditions of employment;

(2) When it subcontracts it will not engage in any unlawful discrimination in the selection of Subcontractors on the basis of the race, creed, color, national origin, sex, age, disability, marital status or sexual orientation of the owner, manager or any other officer, director, agent or employee of such Subcontractors;

(3) It will state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that all qualified applicants will receive consideration for employment without regard to race, creed, color, national origin, sex, age, disability, marital status or sexual orientation, or that it is an equal employment opportunity employer;

(4) It will send to each labor organization or representative of workers with which it has a collective bargaining agreement or other contract or memorandum of understanding, written notification of its equal employment opportunity commitments under E.O. 50 and the rules and regulations promulgated thereunder; and

(5) It will furnish all information and reports (which are required by E. O. 50, the rules and regulations promulgated thereunder, and orders of the Director of the New York City Department of Small Business Services, Division of Labor Services ("DLS"), including an Employment Report if the Contract Price is $1,000,000 or more), before the award of the Contract and will permit access to its

books, records and accounts by DLS for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

The Contractor understands that in the event of its noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this Contract and noncompliance with E.O. 50 and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of DLS, the Director of DLS may direct the imposition upon the Contractor found to be in noncompliance of any or all of the following sanctions:

(i) Disapproval of the Contractor;
(ii) Suspension or termination of this Contract;
(iii) Declaring the Contractor in default; or
(iv) In lieu of any of the foregoing sanctions, the Director of DLS may impose an employment program.

The Director of DLS may recommend to BNYDC that a hearing be convened for purposes of declaring a Contractor who has repeatedly failed to comply with E. O. 50 and the rules and regulations promulgated thereunder to be non-responsible.

If the Contract Price is $1,000,000 or more, the Contractor further agrees as follows:

(i) It shall employ trainees for training level jobs and it shall participate in on-the-job training programs, other than apprenticeship programs, that are approved by DLS and, where required by law, the U.S. Department of Labor, Bureau of Apprenticeship Training or the New York State Department of Labor;

(ii) It shall make a good faith effort to achieve the ratio of one "trainee" (which means an economically disadvantaged person who qualifies for and receives training in one of the construction trades pursuant to a program, other than an apprenticeship program, approved by DLS and, where required by law, the New York State Department of Labor and the United States Department of Labor, Bureau of Apprenticeship and Training) to four journey-level employees of each job group on each construction project. The Contractor shall be considered to employ four journey-level employees in a particular job group when he or she employs any number of journey-level employees in that craft whose aggregate work hours equal the number of hours four full time journey-level employees would have worked in a work week as defined by the prevailing practice in the industry for the particular craft, i.e., 40 hours, 37 hours, 35 hours,

etc. For example, in a craft where there is a 40 hour work week, the employment of four journey-level employees results in 160 hours of employment (4 x 40). Hence, any number of journey-level employees which results in 160 hours of work is considered for purposes of the training program to equal four journey-level employees, i.e., three journey-level employees who work 53 hours (3 x 53 = 160). The training requirement shall not apply to any trade in which the employment of four or more journey-level employees and the trainee shall be for less than four weeks; provided, that four weeks shall mean four weeks of full time work as defined by the prevailing practice in the industry for the particular craft, i.e., 160 hours (4 weeks x 40 hours), 150 hours (4 weeks x 37 hours), 140 hours (4 weeks x 35 hours), etc.;

(iii) It shall attempt to provide continuous employment for trainees after the completion of this Contract to enable them to complete their course of training;

(iv) It shall, to the extent it is a party to any collective bargaining agreement, refer, recommend and sponsor for union membership any of its trainees who can perform the duties of a qualified journey-level employee or who have successfully completed the training program. Such former trainees shall be paid full journey-level wages and fringe benefits, whether or not union membership is granted after such referral, recommendation or sponsorship, and the Contractor shall make good faith efforts to continue the employment of such persons; and

(v) If the Contractor fails to provide training to the required number of trainees for the required number of weeks, the Contractor's compensation shall be decreased by an amount (the "Credit") equal to the difference between the wages and fringe benefits paid by the Contractor to the trainees and the wages and fringe benefits which would have been paid to the trainees had the number and duration of the positions been as required unless the Contractor can demonstrate that it made a good faith effort to provide training and was unsuccessful. The wages and fringes deducted will be whatever a first term trainee would receive under the prevailing wage schedule in effect at the time the trainees should have been employed. For purposes hereof, a good faith effort includes but is not limited to:

(a) Documented efforts to secure trainees from approved training programs,
(b) Documented outreach efforts to community and civil rights groups to identify candidates for training positions and sponsorship of those

persons by the Contractor for entrance into an approved training program, and

(c) Written notification to DLS that the Contractor has been unable to secure trainees pursuant to subsections (a) and (b) above and requesting DLS's assistance in securing trainees; provided, that neither the provisions of any collective bargaining agreement nor the refusal by a union with which the Contractor has a collective bargaining agreement to recognize the validity of the training program shall excuse the Contractor's obligation to provide training pursuant to E.O. 50 and these regulations.

If the Contract Price is $1,000,000 or more, the Contractor shall include the provisions of the foregoing paragraph in every subcontract in the amount of $750,000 or more to which it becomes a party unless exempted by E.O. 50 and the rules and regulations promulgated thereunder, so that such provisions will be binding upon each subcontractor. If the Contract Price is less than $1,000,000, the Contractor shall include the provisions of this rider (other than the provisions of the immediately preceding paragraph) in every subcontract or purchase order in excess of $50,000 to which it becomes a party unless exempted by E.O. 50 and the rules and regulations promulgated thereunder, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Director of DLS as a means of enforcing such provisions including sanctions for noncompliance and/or the taking of a Credit.

The Contractor further agrees that it will refrain from entering into any contract or contract modification subject to E.O. 50 and the rules and regulations promulgated thereunder with a subcontractor who is not in compliance with the requirements of E.O. 50 and the rules and regulations promulgated thereunder.

B. CONSTRUCTION EMPLOYMENT REPORT SUBMISSION REQUIREMENTS

Pursuant to Executive Order No. 50 (April 25, 1980) as amended and the implementing rules and regulations, all Contractors with contracts of $1,000,000 or more, and all subcontractors with contracts of $1,000,000 or more, must complete and submit an Employment Report (ER) and EEO-1 report. If you submit an ER you must comply with the training requirements set forth above.

If you are a Contractor with a contract of less than $1,000,000 you must complete the attached certification of less than $1,000,000 contract.

DEPARTMENT OF SMALL BUSINESS SERVICES
DIVISION OF LABOR SERVICES
LESS THAN $1,000,000 CONTRACT CERTIFICATE

CONTRACTOR _____

ADDRESS _____

_____

TELEPHONE # (_____) _____

NAME & TITLE OF SIGNATORY _____

CONTRACTING ENTITY *BROOKLYN NAVY YARD DEVELOPMENT CORPORATION*

CONTRACT AMOUNT _____

PROJECT NUMBER _____

DESCRIPTION AND ADDRESS OF PROPOSED CONTRACT

_____
_____
_____

I, (fill in name of person signing) _____hereby affirm that I am authorized by the above named Contractor to certify that said Contractor's proposed contract with the above named entity or City agency is less than $1,000,000.

_____ _____

DATE SIGNATURE

WILLFUL OR FRAUDULENT FALSIFICATION OF ANY DATA OR INFORMATION SUBMITTED HEREWITH MAY RESULT IN THE TERMINATION OF ANY CONTRACT BETWEEN THE CITY AND THE BIDDER OR CONTRACTOR AND BAR THE BIDDER OR CONTRACTOR FROM PARTICIPATION IN ANY CITY CONTRACT FOR A PERIOD OF UP TO THREE YEARS. FURTHER, SUCH FALSIFICATION MAY RESULT IN CRIMINAL PROSECUTION.

EXHIBIT B

MACBRIDE PRINCIPLES RIDER

For purposes of this rider, the "Contractor" means the Contractor, as defined in the Contract to which this rider is attached, and the "contracting entity" means Brooklyn Navy Yard Development Corporation.

ARTICLE I. MACBRIDE PRINCIPLES

PART A

The Contractor stipulates that such Contractor and any individual or legal entity in which the Contractor holds a ten percent or greater ownership interest and any individual or legal entity that holds a ten percent or greater ownership interest in the Contractor either (a) have no business operations in Northern Ireland, or (b) shall take lawful steps in good faith to conduct any business operations they have in Northern Ireland in accordance with the MacBride Principles, and shall permit independent monitoring of their compliance with such principles.

PART B

For purposes hereof, "MacBride Principles" shall mean those principles relating to nondiscrimination in employment and freedom of work place opportunity which require employers doing business in Northern Ireland to:

(1) Increase the representation of individuals from underrepresented religious groups in the work force, including managerial, supervisory, administrative, clerical and technical jobs;
(2) Take steps to promote adequate security for the protection of employees from underrepresented religious groups both at the workplace and while traveling to and from work;
(3) Ban provocative religious or political emblems from the workplace;
(4) Publicly advertise all job openings and make special recruitment efforts to attract applicants from underrepresented religious groups;
(5) Establish layoff, recall and termination procedures which do not in practice favor a particular religious group;
(6) Abolish all job reservations, apprenticeship restrictions and different employment criteria which discriminate on the basis of religion;
(7) Develop training programs that will prepare substantial numbers of current employees from underrepresented religious groups for skilled jobs, including the expansion of existing programs and the creation of new

programs to train, upgrade and improve the skills of workers from underrepresented religious groups;

(8) Establish procedures to assess, identify and actively recruit employees from underrepresented religious groups with potential for further advancement; and

(9) Appoint a senior management staff member to oversee affirmative action efforts and develop a timetable to ensure their full implementation.

ARTICLE II. ENFORCEMENT OF ARTICLE I

The Contractor agrees that the covenants and representations in Article I above are material conditions to this contract. In the event the contracting entity receives information that the Contractor who made the stipulation required by this rider is in violation thereof, the contracting entity shall review such information and give the Contractor an opportunity to respond. If the contracting entity finds that a violation has occurred, the contracting entity shall have the right to declare the Contractor in default and/or terminate this contract for cause and procure the supplies, services or work from another source in any manner the contracting entity deems proper. In the event of such termination, the Contractor shall pay to the contracting entity, or the contracting entity in its sole discretion may withhold from any amounts otherwise payable to the Contractor, the difference between the contract price for the uncompleted portion of this contract and the cost to the contracting entity of completing performance of this contract either itself or by engaging another Contractor or Contractors. In the case of a requirements contract, the Contractor shall be liable for such difference in price for the entire amount of supplies required by the contracting entity for the uncompleted term of its contract. In the case of a construction contract, the contracting entity shall also have the right to hold the Contractor in partial or total default in accordance with the default provisions of this contract, and/or may seek debarment or suspension of the Contractor. The rights and remedies of the contracting entity hereunder shall be in addition to, and not in lieu of, any rights and remedies the contracting entity has pursuant to this contract or by operation of law.

EXHIBIT C

LIST OF CONTRACT DRAWINGS

EXHIBIT D

SPECIFICATIONS

The specifications governing the scope of work under this contract are as follows:

[Populate or reference name and date of separate specification(s) documents.]

Specification sections issued in addenda, shall supersede the previous specifications.

EXHIBIT E

INTENTIONALLY OMITTED

EXHIBIT F
CONTRACTORS REQUISITION FOR PROGRESS PAYMENTS

ESTIMATE FOR PARTIAL PAYMENT NO. _____

a. Value of Work Completed To Date $_____

b. Retainage $_____

c. Net Amount Earned (a - b) $_____

d. Amount Due for Stored Material $_____

e. Total Amount Due This Estimate (c + d) $_____

f. Total Previously Approved $_____

g. Net Amount Due This Payment (e - f) $_____

h. Less Amount Withheld by BNYDC* $_____
*Reason:

_____

_____

i. Payment Due This Estimate (g - h) $_____

j. Total of All Requisitions Approved to Date
by BNYDC (f + i) $_____

CONTRACTOR'S CERTIFICATE

I/We certify that:

a. All items, units, quantities and prices for work and material shown on this estimate are true and correct; and
b. All work has been performed and material supplied in full compliance with the terms and conditions of the Contract to which this Certificate applies; and
c. All contract provisions relating to prevailing wages and benefits have been complied with and payroll documentation is attached; and
d. All outstanding claims for labor, materials and equipment for the performance of said contract have been paid in full in accordance with the requirements of the Contract; and
e. The above Payment Due This Estimate is a true and correct as of the last day of the period covered by this **CONTRACTORS REQUISITION FOR PROGRESS PAYMENTS**.
f. All subcontractors have been paid in full.

Signature: _____ Date: _____

Title: _____

BNYDC'S CERTIFICATE

We have verified this **CONTRACTORS REQUISITION FOR PROGRESS PAYMENTS**

Contract Time: _____ Cal. Days

Consumed Contract Time: _____ Cal. Days

% of Contract Completed: _____%

Signature: _____ Date: _____
Title

BNYDC APPROVAL

Payment Approval Amount: $ _____

Signature: _____
Title

EXHIBIT G

The following is minimum acceptable insurance coverage requirements for Contracting Services:

I. Insurance Requirements

A. Commercial General Liability Policy issued on an Occurrence form with a combined single limit for Bodily Injury, Personal Injury and Property Damage of at least $1,000,000 per occurrence and $2,000,000 in the aggregate. Coverage shall include endorsements for: Products/Completed Operations; Underground Hazards where applicable; Contractual Liability for tort liability assumed under contract, Personal Injury; Waiver of Subrogation; Policy Aggregate shall apply on per project basis; Mobile Equipment if such equipment not subject to any motor vehicle statutory law.

Additional Insured endorsement as per Insurance Services Organization (a/k/a ISO) form CG 20 10 07 04 Additional Insured Scheduled Organization and form CG 20 37 07 04 Additional Insured – Completed Operations. Such endorsement shall include BNYDC and any other designated party as Additional Insured, as required by written contract to which this Exhibit is attached and part of.

There shall be no coverage restrictions or coverage exclusions on the General Liability Policy pertaining to, but not limited to: gravity related injuries, unsafe workplace, injuries sustained by employee of Contractor or sub-contractor, Third Party over type actions, construction operations, and construction activity.

The insurance procured by the Contractor shall be primary and non-contributory to any other insurance that may be in effect.

B. Statutory Workers Compensation Policy and Employer's Liability Policy of minimum $1,000,000 for work operations in State where project work is performed, including any applicable other states coverage endorsement.

C. Automobile Liability Insurance Policy for Bodily Injury and Property Damage in the amount of $1,000,000 per occurrence covering all owned, non-owned, hired, borrowed vehicles subject to statutory motor vehicle law.

D. Contractors Pollution Liability policy of at least $1,000,000 for damages arising out of bodily injury, property damages, environmental damages caused by a pollution incident from Contractors work, completed operations, or transportation whether work performed by or on behalf of Contractor.

E. Umbrella/Excess Liability Policy of at least $5,000,000 per occurrence. Umbrella Liability policy is to be provided on at least a follow form basis of the underlying General Liability Insurance policy, Automobile Insurance Policy, and Workers' Compensation Insurance policy. The insurance procured by the Contractor shall be primary and non- contributory to any other insurance that may be in effect.

F. Professional Liability (Errors and Omissions) of at least $1,000,000 each claim for wrongful acts while performing and/or providing professional services. Coverage shall continue for at least three (3) years beyond the final performance of services.

G. The following are to be included as additional insured(s) for coverage required in sections A,C,D and E. Each additional insured listed below shall be issued a separate Certificate of Insurance.

Certificate Holder

Brooklyn Navy Yard Development Corporation
Building 77
141 Flushing Avenue, Suite 801
Brooklyn, New York 11205

And as Additional Insureds
Brooklyn Navy Yard Development Corporation
City of New York

Certificate Holder

City of New York
c/o City of New York Department of Small Business Services
One Liberty Plaza, 165 Broadway
New York, NY 10006

And as Additional Insureds
City of New York
Brooklyn Navy Yard Development Corporation

H. A Certificate of insurance using the ACCORD 25 form is to be provided to the Additional Insured and the Certificate must specifically include a copy of the stipulated additional insured endorsement as required in Section A. Certificate Holder must be notified of any cancellation, non-renewal or material modification of existing policy. Notice is to be received 30 days prior to any change in status. In addition to ACCORD 25 form, a completed New York Construction Certificate of Liability Insurance Addendum (ACCORD 855 form) shall be provided.

II. If the Contractor utilizes the services of subcontractor for work performed, the same provisions of this Insurance Requirement Exhibit shall be required of those parties. It is the sole responsibility of the Contractor to maintain compliance of such.

III. Insurance coverage shall be maintained with responsible insurance companies licensed and admitted to do business in the State of New York and such companies shall have an A.M.Best Rating of A- VII. If a Non-Admitted Insurance Company is used, an AM Best rating of A- shall apply.

IV. Any self-insured insurance retentions and, or any deductibles utilized on any of the above required insurance coverage is the sole responsibility of the Contractor, and Contractor agrees to satisfy those retention and or deductible obligations directly with their insurance company.

V. The policies required hereunder shall contain the following provisions:

"A. Notices from the insurer (the "Insurer") to BNYDC ("BNYDC") and the City of New York (the "City"), in connection with this policy, shall be addressed to the General Counsel, BNYDC, at Building 77, 141 Flushing Avenue, Suite 801, Brooklyn, New York 11205 (with a copy to BNYDC's Deputy General Counsel at the same address);

B. The Insurer shall accept notice of accident from BNYDC or the City, within 120 days after receipt by an official of such Additional Insured (as identified above) of notice of such accident as valid and timely notice under this policy;

C. The Insurer shall accept notice of claim from the City within 120 days after such claim has been filed with the Comptroller of the City and notice of claim from BNYDC, within 120 days after receipt by such party as valid and timely notice under this policy;

The Insurer understands and agrees that notice of accident or claim to such Insurer by any one of the following entities shall be deemed notice by all under the policy:
Contractor; or
BNYDC; or
The City; or
Any other Additional Insured.

E. This policy shall not be canceled, terminated or modified by the Insurer or Contractor unless 30 days prior written notice is sent by registered mail to BNYDC or the City, nor shall this policy be canceled, terminated or modified by the Contractor without prior written consent of BNYDC;

F. The presence of engineers, inspectors or other employees or agents of Contractor, BNYDC or the City at the site of the Services performed by Contractor shall not invalidate this policy of insurance;

G. Violation of any of the terms of any other policy issued by the Insurer to Contractor or a subcontractor of Contractor shall not invalidate this policy; and

H. Insurance, if any, carried by BNYDC, the City or the Additional Insureds will not be called upon to contribute to a loss that would otherwise be paid by the Insurer."

EXHIBIT H
PERFORMANCE AND PAYMENT BONDS

Form of Performance Bond

KNOW ALL MEN BY THESE PRESENTS, that_____ (hereinafter called the "Principal") and _____ a corporation organized and existing under the laws of the State of _____(hereinafter called the "Surety"), as Surety, are held and firmly bound unto the Brooklyn Navy Yard Development Corporation the City of New York and The City of New York Department of Small Business Services (hereinafter collectively called the "Obligee") in the sum of _____ Dollars ($_____) for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal and Obligee, have entered into Construction Contract Number _____ dated _____ (hereinafter referred to as "Construction Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal shall:

A. Well and truly perform all the undertakings, covenants, terms, conditions, and agreements of said Construction Contract within the time provided therein and any extensions thereof that may be granted by the Obligee, and during the life of any guaranty required under said Contract; and

B. Shall also well and truly perform all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made; and

C. Shall as required by the Construction Contract indemnify and save harmless Obligee from any and all loss, damage, fines, penalties and/or expense including costs and attorney's fees, which the said Obligee may sustain;

Then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the said Construction Contract or in the said Work to be performed thereunder, or in the specifications thereunder, or in the plans

thereunder, shall in anyway affect Surety's obligation on this Bond, and Surety does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

The Surety, for value received, agrees, if requested to do so by the Obligee, to perform fully and complete the obligations of the Principal mentioned and described in said Construction Contract and any and all modifications thereof pursuant to and in accordance with the undertakings, covenants, terms, conditions and agreements thereof, if the Principal fails, neglects and/or refuses to so perform fully and completely said obligations, and further agrees to commence the performance and completion of said obligations within twenty (20) days after notice from the Obligee of such failure, neglect and/or refusal of the Principal and to perform and complete the same within the time required under said Contract and any and all modifications thereof as extended by the period of time elapsing between the date of such failure, neglect and/or refusal of the Principal and the date of the giving of such notice by the Obligee to the Surety.

Anything contained herein to the contrary notwithstanding, the Surety hereby agrees that a payment or payments made by the Obligee to the Principal which may be at variance with the terms of said contract or any other act of the Obligee which is at variance with, or in violation of, the terms of said contract, shall not serve to release the Surety from its obligations hereunder, in whole or in part, it being the intent of this bond that the Surety's obligations to complete shall be absolute and that any disputes relating to the performance of said contract shall be disposed of at a later date and without interference in, or with the performance of, said Construction Contract.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this ___ day of _____20__ the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

PRINCIPAL _____(Seal)
(Name)

Attest: _____ _____
Secretary (Business Address)

By: _____
(Signature)
Name:

Title:

SURETY _____(Seal)
(Name)

Attest: _____ _____
Secretary (Business Address)
(Business Address)

By: _____
(Signature)
Name:

Title:

ACKNOWLEDGMENT OF SURETY

STATE OF_____)
ss.:
COUNTY OF_____)

On this _____day of _____ in the year 20_ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is the _____of _____, the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.

_____
Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

STATE OF_____)
ss.:
COUNTY OF_____)

On this_____ day of _____ in the year 20_ before me personally came _____to me known and to be the person

described in and who executed the foregoing instrument and __he duly acknowledged that he executed the same.

_____

Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

STATE OF_____)

ss.:

COUNTY OF_____)

On this _____ day of _____ in the year 20_ before me personally came _____ to me known and known to me to be a partner of the firm of _____ described in and who executed the foregoing instrument, and he duly acknowledged to me that he executed the same for an in behalf of said firm.

_____

Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

STATE OF_____)

ss.:

COUNTY OF_____)

On this _____day of _____ in the year 20_ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is the _____of _____, the corporation described in and which executed the above instrument; that __he knows the seal of said corporation; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Board of Directors of said corporation and that __he signed his name thereto by like order.

_____

Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL IF A LIMITED LIABILITY COMPANY

STATE OF_____)
ss.:
COUNTY OF_____)

On this _____day of _____ in the year 20_ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is a member of_____, the limited liability company described in and which executed the above instrument; that __he knows the seal of said limited liability company; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Members of said limited liability company and that __he signed his name thereto by like order.

_____
Notary Public (SEAL)

Form of Payment Bond

KNOW ALL MEN BY THESE PRESENTS, that_____ (hereinafter called the "Principal") and _____ a corporation organized and existing under the laws of the State of _____(hereinafter called the "Surety"), as Surety, are held and firmly bound unto the Brooklyn Navy Yard Development Corporation the City of New York and The City of New York Department of Small Business Services (hereinafter collectively called the "Obligee") in the sum of _____ Dollars ($_____) for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal and Obligee, have entered into Construction Contract Number _____ dated _____ (hereinafter referred to as "Construction Contract".

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the above bounden Principal shall promptly pay all persons having just claims for:

A. Labor, materials, services, insurance, supplies, machinery, equipment, rentals, fuels, oils, implements, tools and/or appliances and all other items of whatever nature, furnished for, used or consumed in the prosecution of the Work called for by said Construction Contract and any and all modifications thereof, whether lienable or non-lienable and whether or not permanently incorporated in said work; and
B. Pension, welfare, vacation and/or other supplemental employee benefit contributions payable under collective bargaining agreements with respect to persons employed upon said Work; and
C. All federal, state and local taxes and/or contributions required by law to be withheld and/or paid with respect to the employment of persons upon said work;

then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the said Construction Contract or in the said Work to be performed thereunder, or in the specifications thereunder, or in the plans thereunder, shall in anyway affect Surety's obligation on this Bond, and Surety does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

Principal and Surety agree that this Bond inures to the benefit of all persons supplying labor and material in the prosecution of the Work provided for in said Construction Contract, as well as to the Obligee, and that such persons may maintain independent actions upon this Bond in their own names.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals this _____ day of _____ 20_ the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

PRINCIPAL _____(Seal)
(Name)

Attest: _____ _____
Secretary (Business Address)

By: _____
(Signature)
Name:

Title:

SURETY _____(Seal)
(Name)

Attest: _____ _____
Secretary (Business Address)
(Business Address)

By: _____
(Signature)
Name:

Title:

ACKNOWLEDGMENT OF SURETY

STATE OF_____)

ss.:

COUNTY OF_____)

On this _____day of _____ in the year 20__ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is the _____of _____, the corporation described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.

_____

Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF AN INDIVIDUAL

STATE OF_____)

ss.:

COUNTY OF_____)

On this_____ day of _____ in the year 20__ before me personally came _____to me known and to be the person described in and who executed the foregoing instrument and __he duly acknowledged that he executed the same.

_____

Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL, IF A PARTNERSHIP

STATE OF_____)

ss.:

COUNTY OF_____)

On this _____ day of _____ in the year 20__ before me personally came _____ to me known and known to me to be a partner of the firm of _____ described in and who

executed the foregoing instrument, and he duly acknowledged to me that he executed the same for an in behalf of said firm.

_____
Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

STATE OF_____)
ss.:
COUNTY OF_____)

On this _____day of _____ in the year 20__ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is the _____of _____, the corporation described in and which executed the above instrument; that __he knows the seal of said corporation; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Board of Directors of said corporation and that __he signed his name thereto by like order.

_____
Notary Public (SEAL)

ACKNOWLEDGMENT OF PRINCIPAL IF A LIMITED LIABILITY COMPANY

STATE OF_____)
ss.:
COUNTY OF_____)

On this _____day of _____ in the year 20__ before me personally came _____ to me known, who being by me duly sworn, did depose and say that _he is a member of_____, the limited liability company described in and which executed the above instrument; that __he knows the seal of said limited liability company; that the seal affixed to said instrument is such seal; that it was so affixed by order of the Members of said limited liability company and that __he signed his name thereto by like order.

_____

Notary Public (SEAL)

EXHIBIT I
PARTIAL RELEASE AND PARTIAL LIEN WAIVER

OWNER: BROOKLYN NAVY YARD DEVELOPMENT CORPORATION and THE CITY OF NEW YORK

PROJECT: _____

CONTRACTOR: _____

CONTRACTOR, in consideration of the current payment of $_____, a portion of the current total contract value of $_____, the current payment bringing the total of all payments to date to $_____ , in addition to which retainage of ___% is withheld as Maintenance and Guarantee per the contract terms, the execution of this Partial Release and Partial Lien Waiver, receipt of which is hereby acknowledged, represents that it has been paid to the date hereof in full for all labor, services, equipment, or material furnished to **OWNER** on the **PROJECT** including extra work claims and does hereby forever release **OWNER** from any and all claims that **CONTRACTOR** may have against **OWNER** arising to the date hereof from the **PROJECT.**

OWNER'S NOTICE: THIS DOCUMENT WAIVES CONTRACTOR'S RIGHTS UNCONDITIONALLY AND STATES THAT CONTRACTOR HAS BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST CONTACTOR IF CONTRACTOR SIGNS IT, EVEN IF CONTRACTOR HAS NOT BEEN PAID. IF CONTRACTOR HAS NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.

CONTRACTOR: Acknowledges that it is not permitted to file any mechanic's lien against land and improvements owned by **OWNER** and Warrants that it will not file a mechanic's lien or other lien against land and improvements owned by **OWNER** and has not and will not assign any claims for payment or right to perfect a lien against such land and improvements.

CONTRACTOR: Warrants and represents that (1) All workmen employed by it or its subcontractor upon this **PROJECT** have been paid applicable prevailing wages and in full to the date hereof; 2) All material men from which the undersigned or its subcontractors have purchased materials used in the **PROJECT** have been paid in full for materials delivered on or prior to the date hereof; (3) All union fringe benefits, dues or

other obligations have been paid in full on or prior to the date hereof; (4) None of such workman and material men has any claim or demand or right of lien against the land and improvements owned by OWNER; and (5) Represents that the signatory hereto is an authorized officer of **CONTRACTOR** with full power to execute this Partial Release and Partial Lien Waiver.

In addition to the rights and obligations provided by the Contract for the **PROJECT** (which is incorporated herein by reference and made a part hereof**),** to the fullest extent permitted by law, the undersigned further agrees to defend, indemnify and hold **OWNER,** its successors and assigns, harmless from all claims, actions, and liens filed by the undersigned's subcontractors, suppliers, material men, and laborers, and those interposed by labor organizations for union fringe benefits and/or other union dues or responsibilities, who performed labor or furnished materials in connection with the work performed to the date hereof at the **PROJECT.**

CONTRACTOR agrees that the **OWNER,** any lender and any title insurer may rely upon this waiver.

In witness whereof, we have here to set our hand and seal this __ day of _____ 20__.

_____

CONTRACTOR

BY: _____

Title: _____

STATE OF NEW YORK)
ss:
COUNTY OF_____)

On the _____day of_____ 20__ before me personally came _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that _he executed the same.

_____
NOTARY PUBLIC

STATE OF NEW YORK)
ss:
COUNTY OF _____)

On the ____ day of _____, 20__ before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____; that he is the _____ of _____ the business described in and which executed the above instrument; and that he signed his name thereto by authority of the Board of Directors of said corporation.

_____
NOTARY PUBLIC

EXHIBIT J
FINAL RELEASE AND FINAL LIEN WAIVER

OWNER: BROOKLYN NAVY YARD DEVELOPMENT CORPORATION and THE CITY OF NEW YORK

PROJECT: _____

CONTRACTOR: _____

CONTRACTOR in consideration of the current payment of $_____, being the final payment for a total contract value of $_____, receipt of which is hereby acknowledged, represents that it has been paid in full for all labor, services, equipment, or material furnished to **OWNER** on the **PROJECT** including extra work claims and does hereby forever release **OWNER** from any and all claims that **CONTRACTOR** may have against **OWNER** arising from the **PROJECT.**

OWNER'S NOTICE: THIS DOCUMENT WAIVES CONTRACTOR'S RIGHTS UNCONDITIONALLY AND STATES THAT CONTRACTOR HAS BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST CONTACTOR IF CONTRACTOR SIGNS IT, EVEN IF CONTRACTOR HAS NOT BEEN PAID. IF CONTRACTOR HAS NOT BEEN PAID, USE A CONDITIONAL RELEASE FORM.

CONTRACTOR: Acknowledges that it is not permitted to file any mechanic's lien against land and improvements owned by **OWNER** and Warrants that it will not file a mechanic's lien or other lien against land and improvements owned by **OWNER** and has not and will not assign any claims for payment or right to perfect a lien against such land and improvements.

CONTRACTOR: Warrants and represents that (1) All workmen employed by it or its subcontractor upon this **PROJECT** have been paid applicable prevailing wages and in full to the date hereof; 2) All material men from which the undersigned or its subcontractors have purchased materials used in the PROJECT have been paid in full for materials delivered on or prior to the date hereof; (3) All union fringe benefits, dues or other obligations have been paid in full on or prior to the date hereof; (4) None of such workman and material men has any claim or demand or right of lien against the land and improvements owned by OWNER; and (5) Represents that the signatory hereto is an

authorized officer of **CONTRACTOR** with full power to execute this Final Release and Final Lien Waiver.

In addition to the rights and obligations provided by the Contract for the **PROJECT** (which is incorporated herein by reference and made a part hereof**),** to the fullest extent permitted by law, the undersigned further agrees to defend, indemnify and hold **OWNER,** its successors and assigns, harmless from all claims, actions, and liens filed by the undersigned's subcontractors, suppliers, material men, and laborers, and those interposed by labor organizations for union fringe benefits and/or other union dues or responsibilities, who performed labor or furnished materials in connection with the work performed at the **PROJECT.**

CONTRACTOR agrees that the **OWNER,** any lender and any title insurer may rely upon this waiver.

In witness whereof, we have here to set our hand and seal this __ day of _____ 20__.

_____

CONTRACTOR

BY: _____

Title: _____

STATE OF NEW YORK)

ss:

COUNTY OF_____)

On the _____day of_____ 20__ before me personally came _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that _he executed the same.

_____

NOTARY PUBLIC

STATE OF NEW YORK)

ss:

COUNTY OF _____)

On the ____ day of _____, 20__ before me personally came _____, to me known, who, being by me duly sworn, did depose and say that he resides at _____; that he is the _____ of _____ the business described in and which executed the above instrument; and that he signed his name thereto by authority of the Board of Directors of said corporation.

_____

NOTARY PUBLIC

EXHIBIT K

WHISTLEBLOWER PROTECTION EXPANSION ACT

1. In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the New York City Administrative Code, respectively,

(a) Contractor shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making a report of information concerning conduct which such officer or employee knows or reasonably believes to involve corruption, criminal activity, conflict of interest, gross mismanagement or abuse of authority by any officer or employee relating to this Contract to (i) the Commissioner of the Department of Investigation, (ii) a member of the New York City Council, the Public Advocate, or the Comptroller, or (iii) the City Chief Procurement Officer, ACCO, Agency head, or Commissioner.

(b) If any of Contractor's officers or employees believes that he or she has been the subject of an adverse personnel action in violation of subparagraph (a) of paragraph 1 of this rider, he or she shall be entitled to bring a cause of action against Contractor to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (i) an injunction to restrain continued retaliation, (ii) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (iii) reinstatement of full fringe benefits and seniority rights, (iv) payment of two times back pay, plus interest, and (v) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.

(c) Contractor shall post a notice provided by the City in a prominent and accessible place on any site where work pursuant to the Contract is performed that contains information about:

(i) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising out of or in connection with the Contract; and
(ii) the rights and remedies afforded to its employees under New York City Administrative Code sections 7-805 (the New York City False Claims Act) and 12-113 (the Whistleblower Protection Expansion Act) for lawful acts taken in connection with the reporting of allegations of fraud, false claims, criminality or corruption in connection with the Contract.

(d) For the purposes of this rider, "adverse personnel action" includes dismissal, demotion, suspension, disciplinary action, negative performance evaluation,

any action resulting in loss of staff, office space, equipment or other benefit, failure to appoint, failure to promote, or any transfer or assignment or failure to transfer or assign against the wishes of the affected officer or employee.

(e) This rider is applicable to all of Contractor's subcontractors having subcontracts with a value in excess of $100,000; accordingly, Contractor shall include this rider in all subcontracts with a value a value in excess of $100,000.

2. Paragraph 1 is not applicable to this Contract if it is valued at $100,000 or less. Subparagraphs (a), (b), (d), and (e) of paragraph 1 are not applicable to this Contract if it was solicited pursuant to a finding of an emergency. Subparagraph (c) of paragraph 1 is neither applicable to this Contract if it was solicited prior to October 18, 2012 nor if it is a renewal of a contract executed prior to October 18, 2012.

REPORT

CORRUPTION, FRAUD, UNETHICAL CONDUCT

RELATING TO A NYC-FUNDED CONTRACT

OR PROJECT

CALL THE NYC DEPARTMENT OF INVESTIGATION

212-825-5959

DOI CAN ALSO BE REACHED BY MAIL OR IN PERSON AT:

New York City Department of Investigation (DOI)
80 Maiden Lane, 17th floor
New York, New York 10038
Attention: COMPLAINT BUREAU

OR FILE A COMPLAINT ON-LINE AT:
www.nyc.gov/doi

All communications are confidential

THE LAW PROTECTS EMPLOYEES OF CITY CONTRACTORS WHO REPORT CORRUPTION

- Any employee of a City contractor, or subcontractor of the City, or a City contractor with a contract valued at more than $100,000 is protected under the law from retaliation by his or her employer if the employee reports wrongdoing related to the contract to the DOI.
- **To be protected by this law, an employee must report to DOI – or to certain other specified government officials –** information about fraud, false claims, corruption, criminality, conflict of interest, gross mismanagement, or abuse of authority relating to a City contract valued at more than $100,000.
- Any employee who makes such a report and who believes he or she has been dismissed, demoted, suspended, or otherwise subject to an adverse personnel action because of that report is entitled to bring a lawsuit against the contractor and recover damages

← Scan the QR Code at Left to File a Complaint

EXHIBIT L

PAID SICK LEAVE LAW

Introduction and General Provisions

The Earned Sick Time Act, also known as the Paid Sick Leave Law ("PSLL"), requires covered employees who annually perform more than 80 hours of work in New York City to be provided with paid sick time.1 Contractors of the City of New York or of other governmental entities may be required to provide sick time pursuant to the PSLL.

1 Pursuant to the PSLL, if fewer than five employees work for the same employer, as determined pursuant to New York City Administrative Code §20-912(g), such employer has the option of providing such employees uncompensated sick time.

The PSLL became effective on April 1, 2014, and is codified at Title 20, Chapter 8, of the New York City Administrative Code. It is administered by the City's Department of Consumer Affairs ("DCA"); DCA's rules promulgated under the PSLL are codified at Chapter 7 of Title 6 of the Rules of the City of New York ("Rules").

Contractor agrees to comply in all respects with the PSLL and the Rules, and as amended, if applicable, in the performance of this agreement. Contractor further acknowledges that such compliance is a material term of this agreement and that failure to comply with the PSLL in performance of this agreement may result in its termination.

Contractor must notify the Agency Chief Contracting Officer of the City agency or other entity with whom it is contracting in writing within ten (10) days of receipt of a complaint (whether oral or written) regarding the PSLL involving the performance of this agreement. Additionally, Contractor must cooperate with DCA's education efforts and must comply with DCA's subpoenas and other document demands as set forth in the PSLL and Rules.

The PSLL is summarized below for the convenience of Contractor. Contractor is advised to review the PSLL and Rules in their entirety. On the website www.nyc.gov/PaidSickLeave there are links to the PSLL and the associated Rules as well as additional resources for employers, such as Frequently Asked Questions, timekeeping tools and model forms, and an event calendar of upcoming presentations and webinars at which Contractor can get more information about how to comply with the PSLL. Contractor acknowledges that it is responsible for compliance with the PSLL notwithstanding any inconsistent language contained herein.

Pursuant to the PSLL and the Rules:

Applicability, Accrual, and Use

An employee who works within the City of New York for more than eighty hours in any consecutive 12-month period designated by the employer as its "calendar year" pursuant to the PSLL ("Year") must be provided sick time. Employers must provide a minimum of one hour of

sick time for every 30 hours worked by an employee and compensation for such sick time must be provided at the greater of the employee's regular hourly rate or the minimum wage. Employers are not required to provide more than forty hours of sick time to an employee in any Year.

An employee has the right to determine how much sick time he or she will use, provided that employers may set a reasonable minimum increment for the use of sick time not to exceed four hours per day. In addition, an employee may carry over up to forty hours of unused sick time to the following Year, provided that no employer is required to allow the use of more than forty hours of sick time in a Year or carry over unused paid sick time if the employee is paid for such unused sick time and the employer provides the employee with at least the legally required amount of paid sick time for such employee for the immediately subsequent Year on the first day of such Year.

An employee entitled to sick time pursuant to the PSLL may use sick time for any of the following:

- such employee's mental illness, physical illness, injury, or health condition or the care of such illness, injury, or condition or such employee's need for medical diagnosis or preventive medical care;
- such employee's care of a family member (an employee's child, spouse, domestic partner, parent, sibling, grandchild or grandparent, or the child or parent of an employee's spouse or domestic partner) who has a mental illness, physical illness, injury or health condition or who has a need for medical diagnosis or preventive medical care;
- closure of such employee's place of business by order of a public official due to a public health emergency; or
- such employee's need to care for a child whose school or childcare provider has been closed due to a public health emergency.

An employer must not require an employee, as a condition of taking sick time, to search for a replacement. However, an employer may require an employee to provide: reasonable notice of the need to use sick time; reasonable documentation that the use of sick time was needed for a reason above if for an absence of more than three consecutive work days; and/or written confirmation that an employee used sick time pursuant to the PSLL. However, an employer may not require documentation specifying the nature of a medical condition or otherwise require disclosure of the details of a medical condition as a condition of providing sick time and health information obtained solely due to an employee's use of sick time pursuant to the PSLL must be treated by the employer as confidential.

If an employer chooses to impose any permissible discretionary requirement as a condition of using sick time, it must provide to all employees a written policy containing those requirements, using a delivery method that reasonably ensures that employees receive the policy. If such employer has not provided its written policy, it may not deny sick time to an employee because of non-compliance with such a policy.

Sick time to which an employee is entitled must be paid no later than the payday for the next regular payroll period beginning after the sick time was used.

Exemptions and Exceptions

Notwithstanding the above, the PSLL does not apply to any of the following:

- an independent contractor who does not meet the definition of employee under section 190(2) of the New York State Labor Law;
- an employee covered by a valid collective bargaining agreement in effect on April 1, 2014 until the termination of such agreement;
- an employee in the construction or grocery industry covered by a valid collective bargaining agreement if the provisions of the PSLL are expressly waived in such collective bargaining agreement;
- an employee covered by another valid collective bargaining agreement if such provisions are expressly waived in such agreement and such agreement provides a benefit comparable to that provided by the PSLL for such employee;
- an audiologist, occupational therapist, physical therapist, or speech language pathologist who is licensed by the New York State Department of Education and who calls in for work assignments at will, determines his or her own schedule, has the ability to reject or accept any assignment referred to him or her, and is paid an average hourly wage that is at least four times the federal minimum wage;
- an employee in a work study program under Section 2753 of Chapter 42 of the United States Code;
- an employee whose work is compensated by a qualified scholarship program as that term is defined in the Internal Revenue Code, Section 117 of Chapter 20 of the United States Code; or
- a participant in a Work Experience Program (WEP) under section 336-c of the New York State Social Services Law.

Retaliation Prohibited

An employer may not threaten or engage in retaliation against an employee for exercising or attempting in good faith to exercise any right provided by the PSLL. In addition, an employer may not interfere with any investigation, proceeding, or hearing pursuant to the PSLL.

Notice of Rights

An employer must provide its employees with written notice of their rights pursuant to the PSLL. Such notice must be in English and the primary language spoken by an employee, provided that DCA has made available a translation into such language. Downloadable notices are available on DCA's website at http://www.nyc.gov/html/dca/html/law/PaidSickLeave.shtml.

Any person or entity that willfully violates these notice requirements is subject to a civil penalty in an amount not to exceed fifty dollars for each employee who was not given appropriate notice.

Records

An employer must retain records documenting its compliance with the PSLL for a period of at least three years, and must allow DCA to access such records in furtherance of an investigation related to an alleged violation of the PSLL.

Enforcement and Penalties

Upon receiving a complaint alleging a violation of the PSLL, DCA has the right to investigate such complaint and attempt to resolve it through mediation. Within 30 days of written notification of a complaint by DCA, or sooner in certain circumstances, the employer must provide DCA with a written response and such other information as DCA may request. If DCA believes that a violation of the PSLL has occurred, it has the right to issue a notice of violation to the employer.

DCA has the power to grant an employee or former employee all appropriate relief as set forth in New York City Administrative Code 20-924(d). Such relief may include, among other remedies, treble damages for the wages that should have been paid, damages for unlawful retaliation, and damages and reinstatement for unlawful discharge. In addition, DCA may impose on an employer found to have violated the PSLL civil penalties not to exceed $500 for a first violation, $750 for a second violation within two years of the first violation, and $1,000 for each succeeding violation within two years of the previous violation.

More Generous Polices and Other Legal Requirements

Nothing in the PSLL is intended to discourage, prohibit, diminish, or impair the adoption or retention of a more generous sick time policy, or the obligation of an employer to comply with any contract, collective bargaining agreement, employment benefit plan or other agreement providing more generous sick time. The PSLL provides minimum requirements pertaining to sick time and does not preempt, limit or otherwise affect the applicability of any other law,

regulation, rule, requirement, policy or standard that provides for greater accrual or use by employees of sick leave or time, whether paid or unpaid, or that extends other protections to employees. The PSLL may not be construed as creating or imposing any requirement in conflict with any federal or state law, rule or regulation.

[EXHIBIT M
EXCAVATION WORK PLAN]

[EXHIBIT N
HEALTH AND SAFETY PLAN]

EXHIBIT O
FEMA RIDERS

EXHIBIT P
M/WBE UTILIZATION PLAN

EXHIBIT Q
COST BREAKDOWN

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT I

ENVIRONMENTAL CERTIFICATION FORM

[attached on following page]

CONTRACTOR EXCAVATION WORK PLAN CERTIFICATION
BNYDC VCP Site V00120

Project Name:	
Project Location:	
Contractor Name:	
Contractor Point of Contact:	
Contractor POC Phone & Email:	

I, _____, certify that I have reviewed the following NYSDEC approved Site
(Print name)
Management Plan (SMP) documents for the Brooklyn Navy Yard (BNY) and will complete all Site work in accordance with the requirements set forth in these plans [*Check to confirm and certify that documents have been received and reviewed*]:

- ☐ Site Management Plan (SMP)
- ☐ Excavation Work Plan (EWP)
- ☐ Health And Safety Plan (HASP)
- ☐ Community Air Monitoring Plan (CAMP)

Additionally, as the contractor's responsible party, I certify that: [*Check all that apply*]

A. ☐ All employees engaged in Site work at the BNY have obtained an OSHA HAZWOPER 40-hour Certification.

B. ☐ A Request to Import/Reuse Fill or Soil form, has been prepared by the contractor and submitted to the BNY and CORE Environmental Consultants, Inc. (CORE).

AND

☐ All imported material(s) meets the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d).

C. ☐ No backfill is being imported to the site.

D. ☐ CORE and BNY will be notified of scheduled work dates to ensure CORE is on Site to provide a Qualified Environmental Professional (QEP) to perform CAMP.

E. ☐ The reconstruction of the Site-wide cover will include a concrete or paving system at a minimum of 6" in thickness.

_____ _____

Sign Date

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT J

EXCAVATION WORK PLAN (EWP)

HEALTH AND SAFETY PLAN (HASP)

COMMUNITY AIR MONITORING PLAN (CAMP)

EWP, HASP and CAMP are excerpted from the Site Management Plan (SMP) attached as Exhibit K. Bidders must comply with all requirements.

[attached on following page]

APPENDIX E

Excavation Work Plan

CORE ENVIRONMENTAL CONSULTANTS

This Excavation Work Plan (EWP) contains procedures for potential future soil disturbances at the Site, including renovation, below-grade utility line repair, and new construction.

E.1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to breach the Site-wide protective cover as defined in Section 2.6 of the Site Management Plan (SMP), the Site owner or their representative will notify the NYSDEC. Currently, this notification will be made to:

Jonathan Greco
NYSDEC Project Manager
625 Broadway
Albany, New York 12233
(518) 402-9694
Jonathan.Greco@dec.ny.gov

This notification will include:

- A detailed description of the work to be performed, including the location and aerial extent of excavation, plans/drawings for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of impacted soil to be excavated, and any work that may impact an engineering control (EC);
- A summary of environmental conditions anticipated to be encountered in the work areas including the nature and concentration levels of constituents of concern, potential presence of grossly impacted media, and plans for any pre-construction sampling;
- A schedule detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and Title 29 of the Code of Federal Regulations Part 1910.120 (29 CFR 1910.120);
- A copy of the contractor's Health and Safety Plan (HASP), in electronic format, if it differs from the HASP provided in Appendix F of the Site Management Plan (SMP);
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

Tenant Notification Requirements

Tenants who wish to disturb the existing Site-wide cover (as defined in Section 2.6 of the SMP) must notify BNYDC in advance of such activities at least 90 days in advance. A project-specific Work Plan will be provided to BNYDC by the tenant describing soil disturbance activities and will

include figures identifying the area(s) to be disturbed. The Change of Use request must include the NYSDEC 60-Day Advance Notification of Site Change of Use, Transfer or Certificate of Completion, and/or Ownership form found at http://www.dec.ny.gov/docs/remediation_hudson_pdf/changeofuse.pdf or in Appendix H of the SMP. BNYDC will review the Change of Use request and submit to NYSDEC.

E.2 SITE SECURITY

Site Security will be utilized to prevent access to the Site and vandalism or destruction of construction equipment, and to minimize health and safety concerns for surrounding properties. Currently the majority of the Site is covered by buildings, concrete, asphalt pavement, and/or millings, with some vegetated areas/landscaping.

In the event of any excavations or building demolitions, the area of excavation will be surrounded with an 8-foot security fence with a minimum of one gate that can be locked at the end of each working day. The fence will encompass the excavation, equipment, and soil storage areas, if any.

E.3 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional (QEP) during all excavations into known or potentially impacted material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the No Further Action (NFA) letter.

Soils not exhibiting obvious signs of impacts may be reused on Site as backfill beneath a remedy-compliant cover comprised of at least 12 inches of soil meeting the lower of the NYSDEC Title 6 of the New York Codes, Rules and Regulations Part 375 (6 NYCRR 375) Commercial Use and Protection of Groundwater Soil Cleanup Objectives (SCOs), a building, or concrete, asphalt, or millings at least 6 inches in thickness. Soils exhibiting visual or olfactory evidence of impacts will be segregated for characterization and potential off-Site disposal.

Further discussion of off-Site disposal of materials and on-Site reuse is provided in Sections E.7 and E.8 of this Appendix.

E.4 SOIL STAGING METHODS

Any soils disturbed during excavation will be stockpiled in an on-Site staging area. Soil will be segregated into stockpiles based on screening performed as discussed in Section E.3 of this Appendix. Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters, and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook maintained at the Site and will be made available for inspection by NYSDEC upon request.

E.5 MATERIALS EXCAVATION AND LOAD-OUT

A QEP or person under their supervision will oversee all invasive work and excavation and load-out of all material not suitable for reuse. The owner or lessee of the property and its contractors are responsible for safe execution of all invasive and other work performed under this EWP.

The presence of utilities and easements on the Site will be investigated by a QEP. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate federal, state, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-Site, as appropriate. The QEP will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site soil tracking. The QEP will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Adjacent streets will be cleaned as needed in order to maintain a clean condition with respect to Site-derived materials.

E.6 MATERIALS TRANSPORT OFF-SITE

All materials transport will be performed by licensed haulers in accordance with appropriate federal, state, and local regulations, including 6 NYCRR 364. Haulers will be appropriately licensed and trucks properly placarded.

Material will be transported by trucks equipped with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes will be developed for each project performed at the Site. This will allow the most efficient truck route with the least disturbance to remaining occupants of the Brooklyn Navy

Yard Industrial Park (BNYIP). All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. The most appropriate route for each project will take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of New York City-mapped truck routes; (c) prohibiting off-Site queuing of trucks entering the Site; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site. Off-Site queuing will be prohibited.

E.7 MATERIALS DISPOSAL OFF-SITE

All material removed from the Site will be treated as contaminated and regulated material and will be transported and disposed of in accordance with all federal, state (including 6 NYCRR 360), and local regulations. If disposal of material from this Site is proposed for unregulated off-Site disposal (i.e. clean soil removed for development purposes), a formal request, with an associated plan, will be made to NYSDEC. Unregulated off-Site management of materials from this Site will not occur without formal NYSDEC approval.

Off-Site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown of disposal facility by class, if appropriate - i.e., hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, construction/demolition (C/D) recycling facility, etc. Actual disposal quantities and associated documentation will be reported to NYSDEC in the Periodic Review Report (PRR). This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading, and facility receipts.

Non-hazardous historic fill and impacted soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6 NYCRR 360-1.2. Material that does not meet Part 375 Unrestricted Use SCOs is prohibited from being taken to a New York State recycling facility (6 NYCRR 360-16 Registration Facility).

E.8 MATERIALS REUSE ON-SITE

Excavated soils will be considered appropriate for reuse as on-Site backfill if the soil does not exhibit obvious signs of impacts. Soils not exhibiting obvious signs of impacts may be reused on Site as backfill beneath a remedy-compliant cover comprised of at least 12 inches of soil meeting the lower of NYSDEC Commercial Use and Protection of Groundwater SCOs as set forth in 6 NYCRR 375-6.8(b), a building, or concrete, asphalt, or millings at least 6 inches in thickness. Soils exhibiting obvious signs of impacts must be sampled prior to reuse below the Site-wide cover and must meet the lower of the Commercial Use and Protection of Groundwater SCOs and the Standards, Criteria, and Guidance (SCGs) set forth in Table 5.4(e)4 of *DER Technical Guidance for*

Site Investigation and Remediation (DER-10), included at the end of this Section. Soil will be stockpiled in accordance with Sections E.3 and E.4 of this EWP.

The QEP will ensure that procedures defined for materials reuse in the SMP are followed and that unacceptable material does not remain on-Site. Impacted on-Site material, including historic fill and impacted soil, that is acceptable for reuse on-Site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-Site will be sampled for asbestos and the results will be reported to NYSDEC for acceptance. Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing generated during Site redevelopment and/or remedial work will not be reused on Site.

Table 5.4(e)4
Reuse of Soil

Soil on the Site Meets:	Reuse on the Site:	Off-site Export & Reuse:
Unrestricted Soil SCGs	Without restrictions	Without restrictions
Meets the Applicable Use-based and Groundwater Protection SCG and where Appropriate Protection of Ecological Resources Soil SCGs for a Site w/ an Institutional Control (IC) & SMP.	In the soil cover/cap or as backfill within the area of the site subject to the IC.	Not Allowed, unless going to a site with IC subject to a 6 NYCRR 360 Beneficial Use Determination (BUD).
Meets Site-Specific Background Soil Levels.	Without restrictions. (Does not apply to sites in the BCP.)	Not Allowed, unless going to a site with IC subject to a 6 NYCRR 360 BUD.
Site-specific cleanup goals for subsurface soil	Placement below the soil cover/cap within the area of the site subject to the IC.	Not Allowed, unless going to a site with IC subject to a 6 NYCRR 360 BUD.

E.9 FLUIDS MANAGEMENT

All liquids to be removed from the Site including, but not limited to, excavation dewatering, decontamination waters, and groundwater monitoring well purge and development waters, will be handled, transported, and disposed of in accordance with applicable federal, state, and local regulations. Dewatering, purge, and development fluids will not be recharged back to the land surface or subsurface of the Site and will be managed off-Site unless prior approval is obtained from NYSDEC.

Impacted water originating from equipment decontamination, excavation dewatering, and monitoring well purging, will be pumped into storage tanks for off-Site disposal. A licensed liquid

waste hauler will remove, transport, and dispose of the liquid in compliance with all applicable regulations.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river), if any, will be performed under a State Pollutant Discharge Elimination System (SPDES) permit.

E.10 SITE-WIDE COVER RESTORATION

After the completion of soil removal and any other invasive activities the Site-wide cover will be restored in a manner that complies with the Decision Document. The existing Site-wide cover is comprised of buildings, concrete and asphalt pavement, and millings. A demarcation layer will be placed to provide a visual reference to the top of the zone of remaining contamination, the zone that requires adherence to special conditions for disturbance of remaining impacted soils defined in the SMP. If the type of cover system changes from that which exists prior to the excavation (e.g., the building slab is replaced by soil cover), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent PRR and in an updated SMP.

E.11 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the QEP and will be in compliance with provisions in the SMP prior to receipt at the Site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC Project Manager, allowing a minimum of five business days for review.

Material from industrial sites, spill sites or other environmental remediation sites, or potentially impacted sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d). Approval will also be based on an evaluation of the land use, protection of groundwater, and protection of ecological resources criteria. Soils that meet ‘exempt’ fill requirements under 6 NYCRR 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Imported materials will be tested at a rate consistent with Table 5.4(e)10 of DER-10, included at the end of this Section. Samples will analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL pesticides, TCL Aroclors, and Target Analyte List (TAL) metals. Sample collection will be performed in accordance with the Quality Assurance Project Plan (QAPP), included as Appendix G of the SMP.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

Contaminant	VOCs	SVOCs, Inorganics & PCBs/Pesticides	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
> 1000	Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER		

E.12 STORMWATER POLLUTION PREVENTION

Smaller soil disturbances, such as those required for utility maintenance, conducted after issuance of the NFA letter, will likely not require coverage under the SPDES permit system or the preparation of a Stormwater Pollution Prevention Plan (SWPPP) due to the small size of the excavation.

For larger disturbances, such as in the event of a building demolition, a SWPPP and Notice of Intent (NOI) will be required as well as applicable inspections to maintain compliance with the SPDES permit system. Silt fencing or hay bales will be installed around the entire perimeter of the construction area. Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook maintained at the Site and will be made available for inspection by NYSDEC upon request. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barriers and hay bale checks functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

E.13 CONTINGENCY PLAN

If underground storage tanks (USTs) or other previously unidentified sources for impacts to subsurface media are found during post-remedial subsurface excavations or development-related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Analyses will be performed for TCL VOCs, TCL SVOCs, TCL pesticides, TCL Aroclors, and TAL metals unless the Site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytical parameters will be proposed to NYSDEC for approval prior to sampling.

The NYSDEC Project Manager will be promptly notified in the event that unknown or unexpected impacted media is identified by screening during invasive Site work. Reportable quantities of petroleum product will also be reported to the NYSDEC Spills Hotline. These findings will be also included in the PRR in compliance with the SMP.

E.14 COMMUNITY AIR MONITORING

A Site-specific Community Air Monitoring Plan (CAMP) is contained in the HASP, included as Appendix F to the SMP. CAMP procedures will be implemented for all excavations on Site, regardless of size.

E.15 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors on- and off-Site. Specific odor control methods will be determined for each project to adequately address potential odors specific to that project. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and the New York State Department of Health (NYSDOH) will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the PRR.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

E.16 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, un-vegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

E.17 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor for all large excavation work that may be performed.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX F

Health and Safety Plan

CORE ENVIRONMENTAL CONSULTANTS

HEALTH AND SAFETY PLAN
Brooklyn Navy Yard Industrial Park
63 Flushing Avenue
Brooklyn, New York 11205
Site No. V00120

Prepared for:

BROOKLYN NAVY YARD

Brooklyn Navy Yard Development Corporation
63 Flushing Avenue, Unit 300
Brooklyn, New York 11205

Prepared by:

CORE ENVIRONMENTAL CONSULTANTS

CORE Environmental Consultants, Inc.
22-48 119th Street
College Point, New York 11356

March 23, 2018

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1.0 INTRODUCTION

The Brooklyn Navy Yard Development Corporation (BNYD) retained CORE Environmental Consultants, Inc. (CORE) to provide environmental consulting services related to the Brooklyn Navy Yard Industrial Park (BNYIP) Site located at 63 Flushing Avenue, Brooklyn, New York. This Site-specific Health and Safety Plan (HASP) establishes health and safety requirements, responsibilities, and procedures to protect workers during implementation of the final remedy at the Site.

1.1 PROJECT DESCRIPTION

The purpose of this HASP is to set forth appropriate health and safety procedures to be followed by CORE personnel and contractors during on-Site remedial activities, including intrusive activities, and soil, groundwater, and sub-slab vapor sampling, if required.

This document will serve not only to explain the chemical and physical hazards associated with working on Site, but will also outline approved measures for dealing with such hazards. The project Health and Safety Officer (HSO) will be responsible for the development and implementation of project Health and Safety protocols. In addition, the contractor(s) will be required to designate a Site HSO for their personnel and to follow, at a minimum, the requirements of this HASP. All personnel who will be involved with earthwork (excavation, trenching, sampling, or any activity that results in a cover breach) on Site must have completed the appropriate Hazardous Waste Operations (HAZWOPER) Site Worker Training - i.e., 24 hour or 40 hour, as required by the Occupational Safety and Health Administration (OSHA) in Title 29 of the Code of Federal Regulations (29 CFR), Part 1910.120(e)(2), 1910.120(e)(3), and 1910.120(e)(8), as applicable, and the required medical surveillance as required by 29 CFR Part 1910.120(f).

The remedy will include:

Site Walk-throughs

Perform thorough Site-wide walk-throughs to evaluate the presence and condition of the Site-wide cover.

Remedial work may also include:

Soil Boring Program

Soil boring programs will involve evaluation of the nature and extent of impacts to soil through the advancement of borings at various locations on Site.

Excavation

Excavation may be performed during Site redevelopment or Site-wide cover repair. In addition, remediation of polychlorinated biphenyl (PCB)-impacted soil will require excavation.

Sample Analysis

Soil samples collected to classify impacts in PCB-impacted areas will be analyzed for, at a minimum, Target Compound List (TCL) Aroclors. Samples may also be analyzed for TCL volatile organic compounds (VOCs), TCL semi-volatile organic compounds (SVOCs), TCL pesticides, and Target Analyte List (TAL) metals, depending on the needs of each specific investigation.

Community Air Monitoring

Community air monitoring will be performed in accordance with New York State Department of Health (NYSDOH) guidance to guarantee the safety of both workers and Site occupants during any subsurface intrusive activities such as soil boring installation or excavation. The Site-specific community air monitoring requirements are discussed in Section 7.0.

1.2 SITE DESCRIPTION

The Site is located in Brooklyn, Kings County, New York and is identified as Block 2023, Lot 1 by the New York City Department of Finance. The Voluntary Cleanup Agreement (VCA) parcel is an approximately 150-acre portion of the lot that is bound by the East River to the north, Flushing Avenue to the south, Kent Avenue to the east, and Navy Street and the New York City Department of Environmental Protection (NYCDEP) Red Hook Wastewater Treatment Plant (WWTP) to the west. The Site is zoned M3-1 by the New York City Department of City Planning, indicating that it can be used for light and heavy manufacturing purposes. Site occupants are engaged in commercial and light manufacturing activities.

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2.0 KEY PERSONNEL

Personnel responsible for implementation of this Health and Safety Plan are:

Name	Company/Title	Address	Contact Information
Ronald Tramposch	CORE Site HSO	22-48 119th Street College Point, NY 11356	Office: (718) 786-4730 Mobile: (917) 804-8717 Email: RPT@coreenv.com
Shani Leibowitz	BNYDC Sr. Vice President	63 Flushing Avenue Brooklyn, NY 11205	Office: (718) 907-5955 Email: SLeibowitz@bnydc.org

SITE HEALTH AND SAFETY OFFICER

The responsibilities of the Site HSO are as follows:

- Implement this HASP on Site;
- Enforce day-to-day health and safety protocols on Site;
- Require that all personnel entering the Site understand the provisions of this HASP;
- Conduct periodic training sessions on use/maintenance of personal protective equipment (PPE) and safety practices;
- Conduct daily health and safety meetings each morning;
- Direct and advise CORE's Site personnel, visitors, and contractor(s) on the specific hazards associated with the Site as well as any changes related to health and safety requirements at the Site;
- Conduct necessary health and safety monitoring;
- Oversee air monitoring program, including monitoring logs;
- Monitor Site conditions and determine if changes in PPE levels are required;
- Execute work stoppages, if required; and
- Report changes in Site conditions and changes in PPE requirements to the Project HSO.

Daily Health and Safety Meeting Forms are included in Attachment A.

3.0 MEDICAL SURVEILLANCE REQUIREMENTS

All personnel who engage in waste Site activities for 30 days or more per year will participate in a Medical Surveillance Program. All project personnel involved in on-Site activities in impacted areas will be required to undergo annual medical examinations. This examination must take place not more than one year prior to and one year after the completion of Site work and must be conducted by a physician who is board-certified in occupational medicine. The physician should be familiar with the job-related duties of each worker examined. The physician must certify whether the individual is fit to conduct work on hazardous waste Sites using personal protection, or whether he or she must work within certain restrictions.

Any person exposed to high levels of hazardous substances will be required to undergo a repeat medical exam at, or before, the conclusion of the project to determine possible health impacts. Any person suffering a lost-time injury or illness must receive medical approval prior to returning to work. When employment is terminated for any reason, the employee must receive an exit medical examination.

All medical records will be held by the employer for the period of employment plus at least 30 years, in accordance with OSHA regulations on confidentiality and any other applicable regulations and will be made available to OSHA upon request. The components of Medical Surveillance include:

- Medical and occupational history;
- Physical examination, with particular attention to the cardiopulmonary system, general physical fitness, skin, blood-forming, hepatic, renal, and nervous systems;
- Blood and urine analyses;
- Pulmonary function testing; and
- Additional tests as appropriate, such as x-ray, stress tests, etc.

4.0 SITE HAZARD/RISK ANALYSIS

Physical hazards include the dangers of tripping and falling on uneven ground, operation of heavy equipment such as drill rigs, vehicular traffic, and utilities either above-ground or buried. The following are physical hazards which may be encountered during remedial activities

4.1 HAZARD ANALYSIS

PPE is the initial level of protection based on the activity hazards and Site conditions which have been identified. Upgrades to respiratory protection may be required based on the action levels discussed in Section 7.0. General on-Site provisions will include: extra nitrile, leather, and/or Kevlar gloves, extra protective coveralls, drinking water and electrolyte fluids, reflective vest, first aid kit, fire extinguisher, hearing protection, and washing facilities.

If Site conditions suggest the existence of a situation more hazardous than anticipated, the Site personnel will evacuate the immediate area. The hazard, level of precautions, and PPE will then be reevaluated.

4.2 HANDLING DRUMS AND CONTAINERS

Regulations for handling drums and containers are specified by OSHA in 29 CFR 1910.120(j). Potential hazards associated with handling drums include vapor generation, fire, explosions, and possible physical injury. Handling of drums/containers during remedial activities may be necessary. If drum/container handling is necessary, it will be performed in accordance with applicable regulations.

4.3 ELECTRICAL HAZARDS

4.3.1 Utilities

The Site may have shallow, buried utilities and also overhead utilities in certain areas. It will be necessary for parties disturbing the existing ground surface and conducting operations with heavy equipment having high clearances to exercise caution in performing project-related work with respect to the presence of utilities. Utility companies with active, buried lines in the Site area will be asked by the contractor performing intrusive activities to mark their facilities. Employees will use these data to choose work locations.

4.3.2 Underground Utilities

No excavating, drilling, boring, or other intrusive activities will be performed until an underground utility survey, conducted by knowledgeable persons or agencies, has been made. This survey will identify underground and in-workplace utilities such as the following:

- Electrical lines and appliances;
- Telephone lines;

- Cable television lines;
- Gas lines;
- Pipelines;
- Steam lines;
- Water lines;
- Sewer lines; and/or
- Pressurized air lines.

The location of utilities will be discussed with CORE personnel and contractors during a Site safety briefing. Utilities identified during survey should be marked or access otherwise restricted to avoid chance of accidental contact.

Even when a utility search has been completed, drilling, boring, and excavation should commence with caution until advanced beyond the depth at which such utilities are usually located. Utilities will be considered "live" or active until reliable sources demonstrate otherwise. Geophysical surveys, including ground penetrating radar (GPR) and electromagnetic (EM) survey, if necessary, will be completed in the area of all indoor boring locations to further refine the presence and locations of potential subsurface utilities.

4.3.3 Overhead Utilities

CORE does not anticipate performing work in the area of overhead utilities; however, if present, clearances will be adequate for the safe movement of vehicles and for the operation of construction equipment.

Overhead or above-ground electric lines should be considered active until a reliable source has documented them to be otherwise. Elevated work platforms, ladders, scaffolding, man-lifts, and drill or vehicle superstructures will be erected a minimum of 20 feet (the actual distance is dependent upon the voltage of the line) from overhead electrical lines until the line is de-energized, grounded, or shielded so arcing cannot occur between the work location or superstructure.

4.4 PHYSICAL HAZARDS

Drilling and excavation programs pose the greatest potential threat to the safety of Site personnel. The following sections describe specific safety measures to be implemented during specific activities.

4.4.1 Heat Stress

Employees may be exposed to the hazards associated with heat stress when ambient temperatures exceed 70 degrees Fahrenheit (ºF). Employees should increase water intake while working in conditions of high heat. Enough water should be available so that each employee can consume one quart of water per hour. In addition, they should increase number of rest breaks and/or rotate employees in shorter work shifts. Employees should rest in cool, dry, shaded areas for at least five minutes. Employees should not wait until they feel sick to cool down. Watch for signs and symptoms of heat exhaustion and fatigue. In the event of heat stroke, bring the victim to a cool environment, call for help, and initiate first aid procedures.

The following prevention, recognition, and treatment strategies will be implemented to protect personnel from heat stress. Personnel will be trained to recognize the symptoms of heat stress, and to apply the appropriate treatment.

Prevention

- Provide plenty of liquids. A 50 percent solution of fruit punch (or similar) in water, or plain water to be taken with salted foods such as pretzels will be available in the support zone.
- Buddy system. No individual will attempt to undertake any activity alone.
- Provide cooling devices. A spray hose and a source of water will be provided to reduce body temperature, cool protective clothing, and/or act as a quick-drench shower in case of an exposure incident.
- Adjustment of the work schedule. As is practicable, the most labor intensive tasks should be carried out during the coolest part of the day.

Recognition and Treatment

Any person who observes any of the following forms of heat stress, either in himself or in another worker, will report this information to the Site HSO as soon as possible.

1. Heat Rash (or prickly heat)

   Cause: Continuous exposure to hot and humid air, aggravated by chafing clothing.

   Symptoms: Eruption of red pimples around sweat ducts accompanied by intense itching and tingling.

   Treatment: Remove source of irritation and cool skin with water or wet clothes.

2. Heat Cramps (or heat prostration)

   Cause: Profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Sudden development of pain and/or muscle spasms in the abdominal region.

Treatment: Remove the worker to the contamination reduction zone. Provide fluids orally. Remove protective clothing. Decrease body temperatures and allow a period of rest in cool location.

3. Heat Exhaustion

Cause: Overexertion in a hot environment and profuse perspiration accompanied by inadequate replenishment of body water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing, pale and clammy skin, approximately normal body temperature.

Treatment: Perform the following while simultaneously making arrangements for transport to a medical facility: Remove the worker to the contamination reduction zone. Remove protective clothing. Lie the worker down on his or her back, in a cool place, and raise the feet 6 to 12 inches. Keep warm, but loosen all clothing. If conscious, provide sips of a salt water solution, using one teaspoon of salt in 12 ounces of water. Transport the worker to a medical facility.

4. Heat Stroke

Cause: Same as heat exhaustion.

Symptoms: Dry and hot skin, dry mouth, dizziness, nausea, headache, rapid pulse.

Treatment: Cool worker immediately by immersing or spraying with cool water or sponge bare skin after removing protective clothing. Transport to hospital.

4.4.2 Cold Stress

Exposure to cold weather, wet conditions and extreme wind-chill factors may result in excessive loss of body heat (hypothermia) and/or frost bite. To guard against cold exposure and to prevent cold injuries, appropriate warm clothing should be worn, warm shelter must be readily available, rest periods should be adjusted as needed, and the physical conditions of on Site field personnel should be closely monitored. Personnel and supervisors working on Site will be made aware of the signs and symptoms of frost bite and hypothermia such as shivering, reduced blood pressure, reduced coordination, drowsiness, impaired judgment, fatigue, pupils dilated but reactive to light,

and numbing of the toes and fingers. The potential for wetting of protective clothing should be of concern, since wet clothing (from sweat or splashes) will provide poor insulation against the cold.

4.4.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps, and generators. Employees who will perform suspected or established high noise tasks and operations for short durations (less than 1 hour) will wear hearing protection. If deemed necessary by the HSO, additional hearing protection may be added and the need to monitor sound levels for Site activities will be determined. Other employees who do not need to be in proximity should distance themselves from the equipment generating the noise.

4.4.4 Hand and Power Tools

In order to complete the various tasks for the project, personnel may use hand and power tools. The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. Work gloves, safety glasses, and hard hats will be worn by the operating personnel when using hand and power tools.

4.4.5 Slips, Trips, and Falls

Working in and around the Site may pose slip, trip, and fall hazards due to slippery and uneven surfaces. Personnel will wear proper foot gear and will employ good work practice and housekeeping procedures to minimize the potential for slips, trips, and falls.

4.4.6 Manual Lifting

Manual lifting of objects and equipment may be required. Failure to follow proper lifting technique can result in back injuries and strains. Employees should use a buddy system and/or power equipment to lift heavy loads whenever possible and should evaluate loads before trying to lift them. Carrying heavy loads with a buddy and proper lifting techniques include: 1) make sure footing is solid; 2) make back straight with no curving or slouching; 3) center body over feet; 4) grasp the object firmly and as close to your body as possible; 5) lift with legs; and 6) turn with your feet, don't twist.

4.4.7 Overhead Dangers

Overhead dangers, including but not limited to falling debris and equipment, can occur while operating drill rigs and excavation equipment. CORE personnel will maintain a minimum distance from large overhead operations and proper communication with heavy equipment operators and their handlers, should work necessitate their presence beyond the minimum safety distance. Proper PPE will be worn during these types of activities including steel-toed/shank boots, safety vests, and hard hats.

4.4.8 Cuts and Lacerations

Field activities that involve drilling and sampling activities usually involve contact with various types of machinery. At least one person on Site must be currently certified in first aid and cardiopulmonary resuscitation (CPR) techniques. Personnel trained and certified in first aid should be prepared to take care of cuts and bruises as well as other minor injuries. CORE will have a first aid kit approved by the American Red Cross available during all field activities.

4.4.9 Traffic Hazards

All traffic, vehicular and pedestrian, shall be maintained and protected at all times consistent with local, state, and federal, and agency regulations regarding such traffic and in accordance with direction of the Owners. Traffic hazards will be limited as the remediation project is to be completed primarily on private land and not in public right of way areas.

4.5 CHEMICAL HAZARDS

Chemicals that may potentially be encountered at the Site include SVOCs, primarily polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and metals. The health/safety characteristics and exposure limits of these compounds are listed in Table 1. The risk of exposure can be by dermal, ingestion, or respiratory routes, depending on the type of compound and intrusive activity being performed.

If during subsurface intrusive activities, the potential for workers to be exposed to particulates and compounds, such as dusts, SVOCs, PCBs, and metals, in soil through inhalation/ingestion/dermal contact routes, workers may need to apply water or an amended water solution to the area to help control the generation of airborne dusts, and particulates. Workers may also use respiratory protection including the use of an air-purifying respirator equipped with approved filter/cartridges. An analysis of the work tasks and potential for chemical exposure should be performed to determine the correct PPE, and/or respirator cartridge(s), if needed. The analysis should include a chemical waste profile to help ensure that PPE specified will be appropriate for the respective chemical hazard(s).

4.6 BIOLOGICAL HAZARDS

There are no anticipated biological hazards associated with the Site.

5.0 SITE CONTROL

In order to keep unauthorized personnel from entering the work areas subsurface intrusive activities without proper protective equipment, and for good control of overall Site safety, two work zones will be established. The two work zones are the support zone and the contamination reduction zone/exclusion zone. Actual zone width will be determined by optimal size of work area and by obstructions, if any. A brief description of the Site work zones follows.

5.1 SUPPORT ZONE

The support zone at the Site will be a mobile unit (automobile) including a cellular telephone for communication. The support zone will be located as near as practicable to the active work areas and decontamination areas.

5.2 CONTAMINATION REDUCTION ZONE/EXCLUSION ZONE

The contamination reduction zone and exclusion zone will be incorporated into one zone at each project-specific location. This zone will be mobile and the location will be dependent upon where active work is being performed. The decontamination of personnel, light equipment, and heavy equipment will be performed prior to leaving the contamination reduction zone.

A temporary storage location will be established at the Site for any stockpiles generated during excavation or construction activities. The location will be situated away from vehicular and pedestrian traffic, and will be secured via fencing or other apparatus.

5.3 SITE VISITATION

It is possible that the Owners or officials from regulating bodies and jurisdiction will visit the Site during operations. It is also possible that an OSHA representative will wish to inspect the Site. All such officials must meet the requirements of occasional Site workers (24 hour OSHA-approved training and Site-specific training) before going into any active contamination reduction zone/exclusion zone. Visitors other than the Owners, NYCDEC, or OSHA representatives will be subject to the additional requirements of having to receive written permission from the Owners to conduct a Site visit. Because of the nature of the work, the work zone will be continually supervised. Signs will be used to prevent the entrance of unauthorized visitors.

All visitors must supply their own PPE and will be directed to appropriate disposal areas for soil or used PPE.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Since personnel working on Site may be exposed to unexpected levels of hazardous airborne chemicals or compounds released during subsurface intrusive activities, or may come in contact with SVOCs, PCBs, and/or metals in soil, various levels of protection will be utilized during field activities. Components of all levels of personal protection that will be available are listed in Table 2. Planned levels of protection for various activities are given in Table 3.

In the event that unexpected levels of organic vapors are encountered, any personnel working at Level D protection will don their respirators at once (upgrade to Level C). The Site HSO will consult with the Project HSO to decide if and when Level D protection may be resumed, or if a higher level of PPE is required. Some modification in safety equipment (e.g., switching from polycoated disposable coveralls to standard disposable coveralls) may be implemented in order to balance concerns for full contaminant protection against concerns for the possibility of heat stress resulting from the need to wear more restrictive PPE. Such modifications may be implemented only if approved in advance by the Site HSO, following consultation with the Project HSO. PPE which fully complies with the requirements of all required levels of protection should be immediately available at all times on the Site.

Level C respiratory protection will be provided using The National Institute for Occupational Safety and Health (NIOSH) -approved half-face respirators, with appropriate NIOSH approved cartridge for removal of organic vapors. All team members will be fit-tested for respirators using irritant smoke. Due to difficulties in achieving a proper seal between face and mask, persons with facial hair will not be allowed to work in areas requiring respiratory protection.

For the fullest protection of on-Site personnel, the supervising field engineer/geologist will conduct organic vapor monitoring at closely spaced intervals during subsurface intrusive activities. Monitoring will be accomplished by real-time monitoring equipment, such as a photoionization detector (PID).

The primary purpose of this monitoring will be to assess the adequacy of respiratory protection and to make it possible to stop work quickly if explosive or hazardous gases are encountered, or if an oxygen-deficient atmosphere is detected. The air monitoring to be carried out during all intrusive activities is summarized below.

Site personnel timesheets with employee and Project Manager signatures will serve to document the amount of time spent on Site by each team member.

7.0 COMMUNITY AIR MONITORING PLAN

Air monitoring will be performed throughout subsurface intrusive activities by trained CORE personnel. Air will be monitored for particulates. Monitoring is restricted to particulates as volatile organic compounds (VOCs) were not identified as constituents of potential concern (COPCs) during previous Site investigations. If VOCs are encountered during excavation activities, monitoring for volatiles utilizing a photoionization detector (PID) should be reevaluated and this Community Air Monitoring Plan (CAMP) updated accordingly. All air monitoring results and meteorological data (e.g., temperature range, wind speed, wind direction, etc.), if applicable, will be recorded on monitoring logs. Air quality monitoring will not be performed during precipitation events.

Community air monitoring will be performed in accordance with NYSDOH guidance to guarantee the safety of both workers and Site occupants. The NYSDOH Generic CAMP is included as Attachment B. Attachment B also includes the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) #4031 for Fugitive Dust Suppression and Particulate Monitoring at Inactive Hazardous Waste Sites.

The purpose of the CAMP is to protect air quality outside of the project area from any dust or particulates generated during subsurface intrusive activities. This CAMP is applicable during the following activities:

- Drilling activities
- Test pit excavation and/or excavation for Site redevelopment

7.1 METEOROLOGICAL MONITORING

Wind is the primary mechanism for dust and particulate transport outside of the project area. Primary wind direction will be determined prior to the start of each workday, and may be reestablished at any time if a change in wind direction is observed.

7.2 TOTAL VOLATILES

During intrusive activities air monitoring for VOCs will be performed within the work/breathing zone utilizing a PID equipped with a 10.2 eV lamp. When readings up to 1 part per million (ppm) above background in the breathing zone are observed, work activity will continue. Monitoring will be continuous, and recorded at 15-minute intervals.

Levels less than 1 ppm of total volatiles are permissible. If the concentrations of VOCs in ambient air in the work zone area exceed 1 ppm for the 15-minute average, work activity must be temporarily halted. Air monitoring is to remain continuous while work is halted. If vapor levels decrease below 1 ppm, work can resume with continued monitoring. If vapor levels between 1 and 25 ppm are detected, work must be halted, the vapor source identified, abatement actions taken,

and air monitoring continued. If sustained readings from 1 to 25 ppm above background in the breathing zone are observed, work will only be allowed to continue after an upgrade to Level C PPE. Intrusive activities will be shut down if vapor in the work area exceed 25 ppm.

7.3 PARTICULATE MONITORING

For intrusive activities, particulate concentrations will be monitored continuously at the upwind and downwind perimeter boundaries of the work zone. Tri-pod mounted real-time monitoring equipment capable of detecting particulate matter less than 10 micrometers (PM-10) in size will be utilized. Monitoring will be continuous and recorded every minute with 15-minute running averages. Potential fugitive dust migration off Site should also be visually assessed during intrusive activities.

- If the downwind PM-10 level is 100 micrograms per cubic meter (µg/m^3) greater than upwind/background concentrations over any 15-minute average period, dust suppression procedures will occur.
- If downwind PM-10 concentrations reach levels of 150 µg/m^3 (or more) greater than upwind/background concentrations, work must be halted while additional dust suppression measures are implemented.

7.4 AIR MONITORING EQUIPMENT CALIBRATION

The particulate monitor will be calibrated to 0 µg/m^3 daily (prior to field activities) and the results will be recorded. Intrusive activities will not begin until all instruments are calibrated and ambient air conditions are recorded. The particulate monitor will be recalibrated throughout the day as necessary.

CAMP monitoring forms are included as Attachment C.

7.5 WORK STOPPAGE RESPONSES

The following responses will be initiated whenever one or more of the action levels necessitating a work stoppage is exceeded:

- The Site HSO will be consulted immediately;
- All personnel will be cleared from the work area until appropriate mitigation techniques have been implemented;
- Monitoring will be continued until the end of the work day; and
- NYSDEC and NYSDOH will be notified as soon as possible.

Any chemical release to air, water, or soil must be reported to the Site HSO at once. Any exposure resulting from protective equipment failure must be immediately reported to the Site HSO and to the Project HSO in writing within 24 hours.

8.0 DECONTAMINATION PROCEDURES

8.1 DECONTAMINATION OF PERSONNEL

Decontamination of personnel will be performed at each contamination reduction zone/exclusion zone. This can be accomplished by washing and rinsing the outer gloves and outer boots over the decontamination trough. Disposable clothing can then be removed and discarded into a 30-gallon trash can with a vinyl liner. If personnel are in Level C protection, the above procedures will be followed and the respirator will be removed, sanitized, and placed in a plastic bag.

8.2 DECONTAMINATION OF EQUIPMENT

Heavy Equipment

Decontamination of heavy equipment (such as excavators) will be accomplished by steam cleaning on a decontamination pad constructed of wood and covered with water retaining polyethylene sheeting with a minimum thickness of 6 mil. Washing of heavy equipment will be completed with attention to minimize any overspray of water, debris and/or soil. All wash water and debris will be collected and containerized in Department of Transportation (DOT)-approved 55-gallon drums for later off-Site disposal. The polyethylene sheeting will be examined frequently for any tears or punctures that may cause a leak. The sheeting will be discarded in a municipal trash dumpster.

Mid-Weight Equipment

Decontamination of mid-weight equipment (such as shovels, augers, etc.) will be accomplished by scrubbing the equipment with a heavy duty bristle brush in a 5-gallon bucket containing water and Alconox® detergent. After washing and scrubbing, the equipment will be rinsed by placing it in a separate bucket of water to remove soap and debris. The wash and rinse water will be containerized in DOT-approved 55-gallon drums for later off-Site disposal.

Light Equipment

Decontamination of light equipment (such as tools, containers, monitoring instruments, radios, clipboards, etc.) will be accomplished by wiping equipment off with clean, damp cloths. The cloths can be discarded in the trash can with disposable clothing.

9.0 EMERGENCY PROCEDURES

The most likely incidents for which emergency measures might be required are:

- A sudden release of hazardous gases/vapors during drilling or excavating;
- An explosion or fire occurring during drilling or excavating; and/or
- A heavy equipment-related accident, or other accident resulting in personal injury.

Emergency procedures established to respond to these incidents are covered under the sections that follow.

9.1 COMMUNICATIONS

A portable telephone will be maintained by the Site HSO during the entire project. The phone will be frequently checked to ensure an appropriate signal is available for the phone to work properly.

9.2 FIRE/EXPLOSION

It will be the responsibility of the contractors to have a fire extinguisher available at the drill rig and/or excavation locations. The operator will have further responsibility of taking fire prevention measures such as the continuous removal from the rig of accumulated oil, grease, or other combustible materials.

In the event of a fire that cannot be controlled with available equipment, or in the event of an explosion, the local fire department will be summoned immediately by the Site HSO, who shall apprise them of the situation upon their arrival. The Owners/occupants will also be notified.

9.3 FIRST AID

First aid for personal injuries will be administered by the Site HSO. All accidents, however insignificant, will be reported to the Site HSO. Personnel designated to administer first aid will have received a minimum of eight hours training in first aid and CPR, and be certified by the American Red Cross. If a Site worker should require further treatment, he/she will be transported to the hospital. The on-Site vehicle will carry a copy of the HASP which includes written directions to the hospital, as well as a map showing the route.

The following sections are intended as a “quick guide” to basic first aid only. Effective CPR and first aid require hands-on training that is best accomplished by attending a class in person.

One common formula for performing first aid:

Do a primary scene and patient survey, followed by checking airway, breathing, and circulation (ABCs).

Survey the scene and approach the victim. Determine whether the scene is safe. Look for dangers, such as downed power lines, traffic, unstable vehicles, or accidents. Determine what may have happened, how many victims are involved, and if any bystanders can help. If several persons appear to be injured, perform triage.

Survey the patient and perform an initial assessment. Get consent from a conscious victim (parent/guardian if the victim is a minor) before providing care. If the victim is unconscious, consent is implied. Use infection control precautions and check for signs and symptoms of any life-threatening conditions and care for them. To perform an initial assessment:

- Check the victim for consciousness and obtain consent if the victim is conscious;
- Check the ABCs (airway, breathing and circulation); and
- Check for severe bleeding.

Provide brief care for the conditions. If the patient lacks air or circulation, they may begin to suffer brain damage after approximately four minutes. After ten minutes, they most likely will have some permanent brain damage. To care for breathing and circulation means first clearing the airway, and briefly attempting to restart their breathing or circulation with rescue breathing or CPR (and use of a portable defibrillator, where available). This step is crucial, because an unconscious person's airway can be blocked by a normal, comfortable-looking head position (e.g., on their back with a pillowed head). Often, simply tilting the head back will open the airway and restart their breathing. Likewise, many people recovering from a blocked airway vomit, and if they are unconscious, they can drown in the vomit. The standard prevention for both these issues is to turn a breathing, unconscious patient on their side, turning their head and spine in the same movement to avoid spinal injury, pillowing their head on one of their arms. Do not move casualties unless it is necessary to remove them from danger, or to make treatment possible (such as onto a hard surface for CPR).

1. Call for emergency services

Calling for emergency medical services must take priority over extended care such as long term rescue breathing or extended CPR, since these techniques are intended to gain time for emergency services to arrive as part of the chain of survival. However, if bystanders are available, both can be pursued at the same time. If you ask others to call an ambulance for you, make sure they report back to you once released by the emergency operator to confirm that the call has been made.

2. Do a secondary patient survey, and provide appropriate emergency first aid

The secondary survey is to gather information about conditions or injuries that may not be life threatening, but may become so if not cared for. Perform a secondary survey only if you are sure that the victim has no life-threatening conditions. A properly trained and certified person performs three stages in the secondary survey:

1. Interview the victim and include bystanders to supplement info from the patient:
    - Signs and Symptoms - Visible indications of injury and patient reported sensations (e.g. pain)
    - Allergies - especially those relevant to injury (i.e. allergy to latex, penicillin, etc.)
    - Medications - what current or recent medications the patient is taking
    - Past Medical History - any related history, or medical conditions that could complicate treatment (e.g. heart condition)
    - Last meal - last food and/or drink
    - Events - confirm how injury most likely occurred
2. Vitals
    - LOC - Level of Consciousness description (e.g. - alert, aware, disoriented, confused, unresponsive) or AVPU (Alert, Voice, Pain, Unresponsive)
    - Breathing Rate - Number of breaths per minute. Calculate by counting breaths for ten seconds and multiplying by six, or 15 seconds and multiplying by four.
    - Pulse Rate - Number of heart beats per minute. Calculate by counting pulse for ten seconds and multiplying by six, or 15 seconds and multiplying by four. Pulse for an unconscious person is taken on the neck (carotid pulse) and on the wrist (radial pulse) for a conscious person.
    - Skin Condition - Pale vs. normal, cool/cold vs. hot, clammy/sweaty vs. dry
3. Head-to-toe examination
    - Perform a head-to-toe examination
    - Look for medical alert bracelets or medallions.
    - Compare one side of the patient against the other
    - Look for pain or deformity

9.4 EMERGENCY ASSISTANCE

The following table list telephone numbers of police, fire, hospital, and other agencies whose services might be required, or from whom information might be needed. A hospital route map and directions to The Brooklyn Hospital Center, is included in Attachment D.

Name	Contact Numbers
The Brooklyn Hospital Center 121 DeKalb Avenue Brooklyn, New York 11201	Main Number: (718) 250-8000
NYCDEP	311
Fire Department	911
Police Department	911
Poison Information Center	1-800-222-1222
NYSDEC Emergency Hotline	1-800-457-7362
BNYDC	(718) 852-1441

10.0 SAFETY CONCERNS AND CONTINGENCY MEASURES

Normally, it is subsurface intrusive activities that pose the greatest potential threat to the safety of Site personnel. Subsurface intrusive activities at the Site will be conducted under the OSHA Safety and Health Standards (29 CFR Part 1926/191) relative to heavy equipment operation. The following sections describe specific safety measures to be implemented during specific activities.

10.1 BUDDY SYSTEM

The buddy system is an arrangement in which persons are paired, as for mutual safety or assistance. All field work will be completed by at least a two person team.

10.2 EXCAVATION

An active excavation exclusion sub-zone is established by opening the ground surface. A personal air monitor will be used to monitor in real time in this zone. Action levels will be considered to have been reached when a continuous, steady reading has been observed.

If at any time during subsurface intrusive activities, underground storage tanks (USTs), metal, or concrete are penetrated, excavation activities will cease immediately. After obtaining instrument readings, the project geologist/Site HSO will decide whether to continue or discontinue excavation.

10.3 DECONTAMINATION WATER

Investigation-derived waste (IDW) will be containerized in DOT-approved 55-gallon steel drums. All containers will be labeled with the contents and date, and will be stored at an on-Site staging area for later off-Site transport and disposal.

A waste management firm capable of handling both hazardous and nonhazardous wastes, such as National Response Corporation (NRC) of Great River, New York, will be employed to perform waste analysis and profiling, transport, and disposal for all IDW.

TABLES

TABLE 1
HAZARD CHARACTERISTICS OF SUSPECTED CONTAMINANTS

Substance	Incompatibles/Reactive	Exposure Routes/Target Organs	Standards
Polycyclic aromatic hydrocarbons (PAHs)	Strong oxidizers	Inhalation, ingestion, skin and/or eye contact Respiratory system, skin bladder; lung, kidney, and skin cancers	NIOSH REL: TWA 0.1 mg/m^3 OSHA PEL: 0.2 mg/m^3 TWA
Polychlorinated biphenyls (PCBs)	Strong oxidizers	Inhalation, ingestion, skin and/or eye contact Eyes, skin, liver, reproductive system	NIOSH REL: TWA 0.001 mg/m^3 OSHA PEL: 0.05 mg/m^3 TWA (skin)
Arsenic	Strong oxidizers, bromine azide, hydrogen gas	Inhalation, skin absorption, ingestion, skin and/or eye contact Liver, kidneys, skin, lungs, lymphatic system; lung and lymphatic cancers	NIOSH: 15-min 0.002 mg/m^3 OSHA PEL: 0.010 mg/m^3 TWA
Copper	Oxidizers, alkalis, sodium azide, acetylene	Inhalation, ingestion, skin and/or eye contact Eyes, skin, respiratory system, liver, kidneys	NIOSH REL: TWA 1 mg/m^3 OSHA PEL: 1 mg/m^3 TWA

NIOSH = National Institute for Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

REL = NIOSH recommended exposure limits, up to 10 hour work day exposure limit, 40 hours/week.

PEL = OSHA permissible exposure limit, 8 hour exposure limit, 40 hours/week, 29 CFR 1910.1000.

REL, PEL in mg/m^3 = (PEL in ppm x molecular weight) / 24.45.

CORE ENVIRONMENTAL CONSULTANTS

TABLE 2
COMPONENTS OF PERSONAL PROTECTION LEVELS

Level D Protection	Level C Protection
• Safety glasses with side shields (or goggles)	• Hard Hat
• Hard Hat	• Ploy-coated disposable (or standard disposable) overalls
• Face Shield (optional)	• Inner gloves of tight-fitting latex or vinyl
• Ordinary coveralls	• Outer gloves of neoprene or nitrile
• Ordinary work gloves	• Steel-toe, steel-shank work shoes or boots (chemical resistant)
• Steel-toe, steel-shank works shoes or boots (chemical resistant)	• Outer boots of neoprene or butyl rubber
• Ordinary work gloves	• Disposable outer “booties” (optional work shoes or boots)
	• Full-face air-purifying respirator (to be worn)**
	• Taping of gloves and boots to disposable coveralls

** Respirator to be fitted with NIOSH/MSHA - approved high-efficiency filter (HEPA) combination respirator cartridges approved for organic vapors, particulates, gases, and fumes. Half-face respirator, face shield, and safety glasses with side shields (or goggles) may be substituted with approval of the Site HSO.

TABLE 3
ANTICIPATED LEVELS OF PERSONAL PROTECTION FOR PLANNED ACTIVITIES

Task	PPE Level	Site-Specific Requirements	Respirator
Mobilization/Demobilization			
Reconnaissance	D	Safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D - None
Mobilization/Demobilization of Equipment and Supplies	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D – None
Establishment of Site Security, Work Zones, and Staging Area	D	Hard hat, safety glasses, steel toe/shank safety boot, reflective vest, leather work gloves, hearing protection as needed	D - None
Groundwater/Soil Sampling			
Soil Borings, Excavation, Digging Test Pits, Backfilling, Grading Observation, Sampling	D	Hard hat, safety glasses, steel toe/shank safety boot with overboot as needed, reflective vest, leather work gloves as needed, nitrile gloves, hearing protection as needed, Tyvek as needed	Level D – None Level C – If action levels exceeded

TABLE 4
ACTION LEVELS DURING INTRUSIVE ACTIVITIES

Particulates ($\mu g/m^3$)	Responses
100 $\mu g/m^3$ or more above Background (15 minute average)	Implement dust suppression measures Continued monitoring every 15 minutes
150 $\mu g/m^3$ Sustained reading	If action level of 150 $\mu g/m^3$ is continuously exceeded, work stoppage to implement additional dust suppression measures Continued monitoring every 15 minutes

ATTACHMENTS

ATTACHMENT A

Health and Safety Field Meeting Forms

CORE ENVIRONMENTAL CONSULTANTS

HEALTH AND SAFETY FIELD MEETING FORM

Date:_____ Time:_____

Project Name:_____

Location:_____

Meeting Conducted by:_____

Topics Discussed:

Physical Hazards:_____

Chemical Hazards:_____

Personal Protection_____

Decontamination:_____

Special Site Considerations:_____

_____

_____

Emergency Information:_____

Hospital Location:_____

Attendees

Name (printed)	Company	Signature

Meeting Conducted by:_____
Signature

CORE ENVIRONMENTAL CONSULTANTS

HEALTH AND SAFETY FIELD MEETING FORM
(cont.)

Attendees

Name (printed)	Company	Signature

Meeting Conducted by:_____
Signature

ATTACHMENT B

NYSDOH Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM #4031

FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs

FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation

SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM -- FUGITIVE DUST SUPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

DATE: Oct 27, 1989

Michael J. O'Toole, Jr. (signed)

1. Introduction

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous waste sites. This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

   Object to be measured: Dust, Mists, Aerosols
   Size range: <0.1 to 10 microns
   Sensitivity: 0.001 mg/m^3
   Range: 0.001 to 10 mg/m^3
   Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust

   Operating Conditions:
   Temperature: 0 to 40°C
   Humidity: 10 to 99% Relative Humidity

   Power: Battery operated with a minimum capacity of eight hours continuous operation

   Automatic alarms are suggested.

   Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation

shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

    1. Applying water on haul roads.
    2. Wetting equipment and excavation faces.
    3. Spraying water on buckets during excavation and dumping.
    4. Hauling materials in properly tarped or watertight containers.
    5. Restricting vehicle speeds to 10 mph.
    6. Covering excavated areas and material after excavation activity ceases.
    7. Reducing the excavation size and/or number of excavations.

    Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in

unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

ATTACHMENT C

CAMP Monitoring Forms

FIELD INSTRUMENT CALIBRATION

CORE ENVIRONMENTAL CONSULTANTS

Project Name:	**Date:**
Project Address:	
Site Inspector:	

Calibration #1

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

Calibration #2

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

Calibration #3

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

Calibration #4

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

Calibration #5

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

Calibration #6

Instrument Make and Model No:_____ Time: _____

Calibration standard:_____

Instrument reading: _____

PARTICULATE MONITORING

CORE ENVIRONMENTAL CONSULTANTS

Project Name:	**Date:**
Project Address:	**Weather:**
Site Inspector:	**Wind Speed/Direction:**

All concentrations in $\mu g/m^3$

Time	Upwind	Time	Downwind

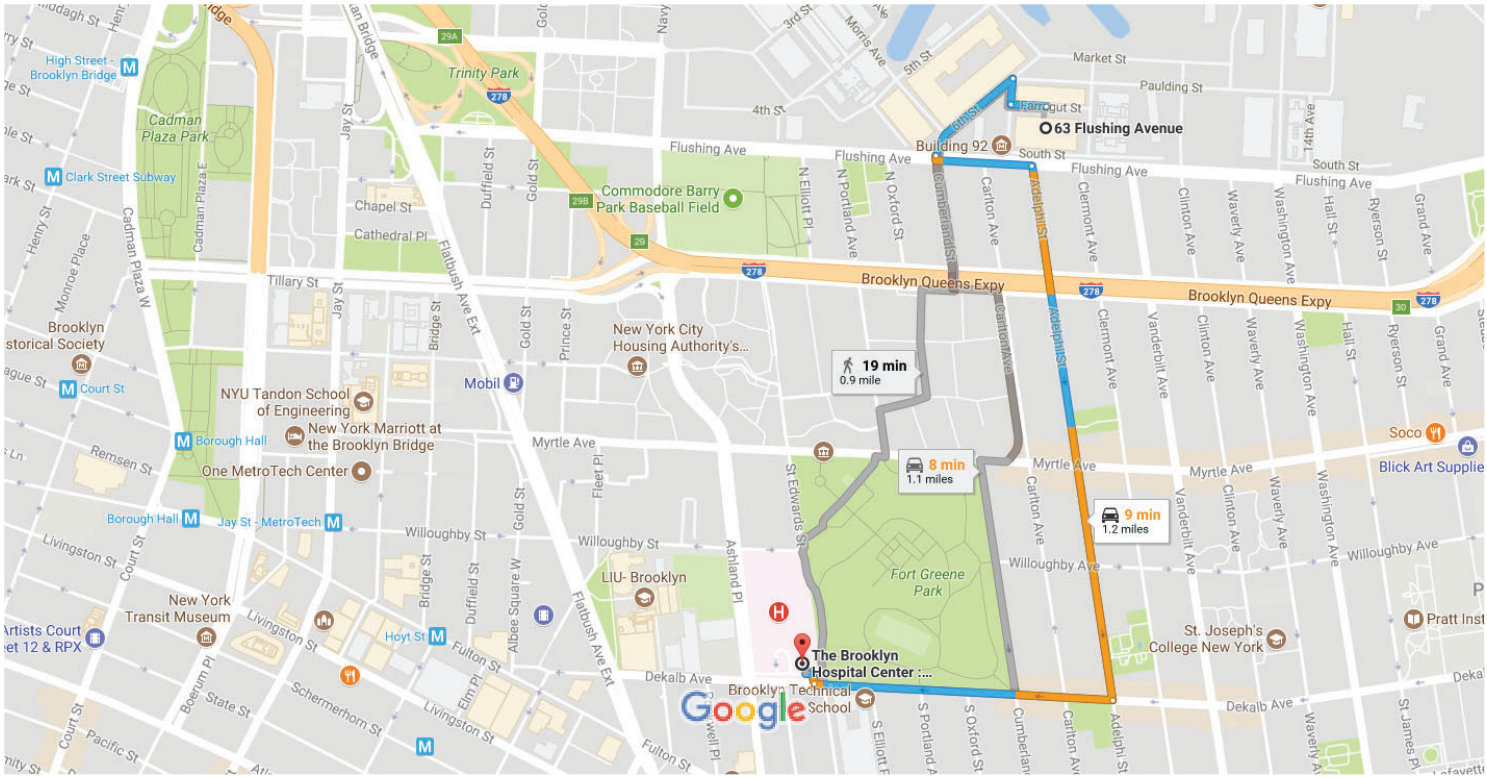
ATTACHMENT D

Hospital Route Map/Directions

Google Maps

63 Flushing Avenue, Brooklyn, NY to The Brooklyn Hospital Center : Emergency Room

Drive 1.2 miles, 9 min



Map data ©2017 Google 500 ft

63 Flushing Ave

Brooklyn, NY 11205

1. Head west on Farragut St toward 7th Ave
   - Restricted usage road

203 ft

2. Turn right onto 7th Ave
   - Restricted usage road

148 ft

3. Turn left onto 6th St
   - Restricted usage road

0.1 mi

4. Turn left onto Flushing Ave

0.1 mi

5. Turn right onto Adelphi St

0.6 mi

6. Turn right onto Dekalb Ave

0.3 mi

7. Turn right
   - Destination will be on the right

95 ft

ATTACHMENT B

NYSDOH Generic Community Air Monitoring Plan

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM #4031

FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs

FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation

SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM -- FUGITIVE DUST SUPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

DATE: Oct 27, 1989

Michael J. O'Toole, Jr. (signed)

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2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

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2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

   Object to be measured: Dust, Mists, Aerosols
   Size range: <0.1 to 10 microns
   Sensitivity: 0.001 mg/m^3
   Range: 0.001 to 10 mg/m^3
   Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust

   Operating Conditions:
   Temperature: 0 to 40°C
   Humidity: 10 to 99% Relative Humidity

   Power: Battery operated with a minimum capacity of eight hours continuous operation

   Automatic alarms are suggested.

   Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation

shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

    1. Applying water on haul roads.
    2. Wetting equipment and excavation faces.
    3. Spraying water on buckets during excavation and dumping.
    4. Hauling materials in properly tarped or watertight containers.
    5. Restricting vehicle speeds to 10 mph.
    6. Covering excavated areas and material after excavation activity ceases.
    7. Reducing the excavation size and/or number of excavations.

    Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in

unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT K

SITE MANAGEMENT PLAN (SMP)

This project is located within the Voluntary Cleanup Agreement (VCA) area of the Brooklyn Navy Yard (BNY) site. Therefore, the Bidder must comply with all BNY Site Management Plan (SMP) requirements.

[included on share site]

Site Management Plan (SMP) 10-18-2022.pdf

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT L

FEMA RIDER

[attached on following page]

UNIFORM FEDERAL CONTRACT PROVISIONS RIDER FOR FEDERALLY FUNDED PROCUREMENT CONTRACTS

(Version 01.20.2021)

[Instructions to Agencies: This Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts ("Rider") must be attached to all federally funded procurement contracts (of any dollar amount) that are subject to 2 CFR Part 200 (Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards). This Rider does not apply to subrecipient or subaward agreements. Procurement contracts funded by HUD's CDBG Program, CDBG-DR Program, or by FEMA must also include the program-specific rider.]

A. *Definitions.* As used in this Rider:

(1) "Awarding Entity" means the entity awarding the Contract. The Awarding Entity may be the City or a contractor at any tier.

(2) "City" means the City of New York.

(3) "Commissioner" means the head of the City agency entering into this Contract.

(4) "Construction" means the building, rehabilitation, alteration, conversion, extension, demolition, painting or repair of any improvement to real property.

(5) "Contract" refers to the contract or the agreement between the Awarding Entity and the Contractor.

(6) "Contractor" means the entity performing the services pursuant to a Contract.

(7) "Federal Agency" means the U.S. agency or agencies funding this Contract in whole or in part.

(8) "Government" means the U.S. government.

(9) "Rider" means this Uniform Federal Contract Provisions Rider.

B. *Termination and Remedies for Breach of Contract.* The following provisions concerning remedies for breach of contract and termination apply to Contracts between the City and the City's Contractor.

(1) **Remedies for Breach of Contract.** If the Contractor violates or breaches the Contract, the City may avail itself of any or all of the remedies provided for elsewhere in this Contract. If there are no remedies provided for elsewhere in this Contract, the City may avail itself of any or all of the following remedies.

After declaring the Contractor in default pursuant to the procedures in paragraph (a) of subdivision (2) of this section (B) below, the City may (i) withhold payment for unsatisfactory services, (ii) suspend or terminate the Contract in whole or in part; and/or (iii) have the services under this Contract completed by such means and in such manner, by contract procured with or without competition, or otherwise, as the City may deem advisable in accordance with all applicable Contract provisions and law. After

completion of the services under this Contract, the City shall certify the expense incurred in such completion, which shall include the cost of procuring that contract. Should the expense of such completion, as certified by the City, exceed the total sum which would have been payable under the Contract if it had been completed by the Contractor, any excess shall be promptly paid by the Contractor upon demand by the City. The excess expense of such completion, including any and all related and incidental costs, as so certified by the City may be charged against and deducted out of monies earned by the Contractor.

(2) **Termination.** The City shall have the right to terminate the Contract in whole or in part for cause, for convenience, due to force majeure, or due to reductions in federal funding. If the Contract does not include termination provisions elsewhere, the following termination provisions apply:

a. **Termination for Cause**. The City shall have the right to terminate the Contract, in whole or in part, for cause upon a determination that the Contractor is in default of the Contract. Unless a shorter time is determined by the City to be necessary, the City shall effect termination according to the following procedure:

i. *Notice to Cure.* The City shall give written notice of the conditions of default signed by the Commissioner, setting forth the ground or grounds upon which such default is declared ("Notice to Cure"). The Contractor shall have ten (10) days from receipt of the Notice to Cure or any longer period that is set forth in the Notice to Cure to cure the default. The Commissioner may temporarily suspend services under the Contract pending the outcome of the default proceedings pursuant to this section.

ii. *Opportunity to be Heard.* If the conditions set forth in the Notice to Cure are not cured within the period set forth in the Notice to Cure, the Commissioner may declare the Contractor in default. Before the Commissioner may exercise his or her right to declare the Contractor in default, the Contractor must be given an opportunity to be heard upon not less than five (5) business days' notice. The Commissioner may, in his or her discretion, provide for such opportunity to be in writing or in person. Such opportunity to be heard shall not occur prior to the end of the cure period but notice of such opportunity to be heard may be given prior to the end of the cure period and may be given contemporaneously with the Notice to Cure.

iii. *Notice of Termination.* After an opportunity to be heard, the Commissioner may terminate the Contract, in whole or in part, upon finding the Contractor in default. The Commissioner shall give the Contractor written notice of such termination ("Notice of Termination"), specifying

the applicable provision(s) under which the Contract is terminated and the effective date of termination. If no date is specified in the Notice of Termination, the termination shall be effective either 10 calendar days from the date the notice is personally delivered or 15 calendar days from the date Notice of Termination is sent by another method. The Notice of Termination shall be personally delivered, sent by certified mail return receipt requested, or sent by fax and deposited in a post office box regularly maintained by the United States Postal Service in a postage pre-paid envelope.

iv. *Grounds for Default.* The City shall have the right to declare the Contractor in default:

1. Upon a breach by the Contractor of a material term or condition of this Contract, including unsatisfactory performance of the services;

2. Upon insolvency or the commencement of any proceeding by or against the Contractor, either voluntarily or involuntarily, under the Bankruptcy Code or relating to the insolvency, receivership, liquidation, or composition of the Contractor for the benefit of creditors;

3. If the Contractor refuses or fails to proceed with the services under the Contract when and as directed by the Commissioner;

4. If the Contractor or any of its officers, directors, partners, five percent (5%) or greater shareholders, principals, or other employee or person substantially involved in its activities are indicted or convicted after execution of the Contract under any state or federal law of any of the following:

a. a criminal offense incident to obtaining or attempting to obtain or performing a public or private contract;

b. fraud, embezzlement, theft, bribery, forgery, falsification, or destruction of records, or receiving stolen property;

c. a criminal violation of any state or federal antitrust law;

d. violation of the Racketeer Influence and Corrupt Organization Act, 18 U.S.C. § 1961 et seq., or the Mail Fraud Act, 18 U.S.C. § 1341 et seq., for acts in connection with the submission of bids or proposals for a public or private contract;

e. conspiracy to commit any act or omission that would constitute grounds for conviction or liability under any statute described in subparagraph (d) above; or

f. an offense indicating a lack of business integrity that seriously and directly affects responsibility as a City vendor.

5. If the Contractor or any of its officers, directors, partners, five percent (5%) or greater shareholders, principals, or other employee or person substantially involved in its activities are subject to a judgment of civil liability under any state or federal antitrust law for acts or omissions in connection with the submission of bids or proposals for a public or private contract; or

6. If the Contractor or any of its officers, directors, partners, five percent (5%) or greater shareholders, principals, or other employee or person substantially involved in its activities makes or causes to be made any false, deceptive, or fraudulent material statement, or fail to make a required material statement in any bid, proposal, or application for City or other government work.

v. *Basis of Settlement*. The City shall not incur or pay any further obligation pursuant to this Contract beyond the termination date set by the City in its Notice of Termination. The City shall pay for satisfactory services provided in accordance with this Contract prior to the termination date. In addition, any obligation necessarily incurred by the Contractor on account of this Contract prior to receipt of notice of termination and falling due after the termination date shall be paid by the City in accordance with the terms of this Contract. In no event shall such obligation be construed as including any lease or other occupancy agreement, oral or written, entered into between the Contractor and its landlord.

b. **Termination for Convenience**. The City shall have the right to terminate the Contract for convenience, by providing written notice ("Notice of Termination") according to the following procedure. The Notice of Termination shall specify the applicable provision(s) under which the Contract is terminated and the effective date of termination, which shall be not less than 10 calendar days from the date the notice is personally delivered or 15 days from the date the Notice of Termination is sent by another method. The Notice of Termination shall be personally delivered, sent by certified mail return receipt requested, or sent by fax and deposited in a post office box regularly maintained by the United States Postal Service in a postage pre-paid envelope. The basis of

settlement shall be as provided for in subparagraph (v) of paragraph (a) of subdivision (2) of this section (B), above.

c. **Termination due to Force Majeure**

i. For purposes of this Contract, a force majeure event is an act or event beyond the control and without any fault or negligence of the Contractor ("Force Majeure Event"). Force Majeure Events may include, but are not limited to, fire, flood, earthquake, storm or other natural disaster, civil commotion, war, terrorism, riot, and labor disputes not brought about by any act or omission of the Contractor.

ii. In the event the Contractor cannot comply with the terms of the Contract (including any failure by the Contractor to make progress in the performance of the services) because of a Force Majeure Event, then the Contractor may ask the Commissioner to excuse the nonperformance and/or terminate the Contract. If the Commissioner, in his or her reasonable discretion, determines that the Contractor cannot comply with the terms of the Contract because of a Force Majeure Event, then the Commissioner shall excuse the nonperformance and may terminate the Contract. Such a termination shall be deemed to be without cause.

iii. If the City terminates the Contract due to a Force Majeure Event, the basis of settlement shall be as provided for in subparagraph (v) of paragraph (a) of subdivision (2) of this section (B), above.

d. **Termination due to Reductions in Federal Funding**

i. This Contract is funded in whole or in part by funds secured from the Federal government. Should the Federal government reduce or discontinue such funds, the City shall have, in its sole discretion, the right to terminate this Contract in whole or in part, or to reduce the funding and/or level of services of this Contract caused by such action by the Federal government, including, in the case of the reduction option, but not limited to, the reduction or elimination of programs, services or service components; the reduction or elimination of contract-reimbursable staff or staff-hours, and corresponding reductions in the budget of this Contract and in the total amount payable under this Contract. Any reduction in funds pursuant to this paragraph shall be accompanied by an appropriate reduction in the services performed under this Contract.

ii. In the case of the reduction option referred to in subparagraph (i), above, any such reduction shall be effective as of the date set forth in a written notice thereof to the Contractor, which shall be not less than 30 calendar days from the date of such notice. Prior to sending such notice of reduction, the City shall advise the Contractor that such option is being exercised and afford the Contractor an opportunity to make within seven calendar days any suggestion(s) it may have as to which program(s), service(s), service component(s), staff or staff-hours might be reduced or eliminated, provided, however, that the City shall not be bound to utilize any of the Contractor's suggestions and that the City shall have sole discretion as to how to effectuate the reductions.

iii. If the City reduces funding pursuant to this paragraph (d), the basis of settlement shall be as provided for in subparagraph (v) of paragraph (a) of subdivision (2) of this section (B), above.

C. Standard Provisions. The Contractor shall comply with, include in its subcontracts, and cause its subcontractors to comply with the following provisions, as applicable:

(1) *Reporting.* Contractor shall be required to produce and deliver such reports relating to the services performed under the Contract as may be required by the Awarding Entity, City or any other State or Federal governmental agency with jurisdiction.

(2) *Non-Discrimination*. Contractor shall not violate any Federal, State, or City law prohibiting discrimination concerning employment, the provision of services, and, if applicable, housing, funded by this Contract.

(3) *Environmental Protection.* If the Contract is in excess of $150,000, the Contractor shall comply with all applicable standards, orders, or regulations issued under the Clean Air Act (42 U.S.C. § 7401-7671q), Federal Water Pollution Control Act as amended (33 U.S.C. §§ 1251-1387), Section 508 of the Clean Water Act (33 U.S.C. § 1368), Executive Order 11738, and Environmental Protection Agency regulations (provisions of 40 CFR Part 50 and 2 CFR Part 1532 related to the Clean Air Act and Clean Water Act). Violations must be reported to the Federal Agency and the Regional Office of the Environmental Protection Agency (EPA). The Contractor shall include this provision in all subcontracts.

(4) *Energy Efficiency*. The Contractor shall comply with mandatory standards and policies relating to energy efficiency that are contained in the New York State energy conservation plan issued in compliance with the Energy Policy Conservation Act (Pub. L. 94-163).

(5) *Debarment.* The Contractor certifies that neither it nor its principals or affiliates are currently in a state of debarment, suspension, exclusion, disqualification, or other ineligible status as a result of prior performance, failure, fraud, or violation of City or New York State laws. The Contractor further certifies that neither it nor its principals or affiliates are debarred, suspended, excluded, disqualified, or otherwise ineligible for participation in Federal assistance programs. The City reserves the right to terminate this

Contract if knowledge of debarment, suspension, exclusion, disqualification or other ineligibility has been withheld by the Contractor.

(6) *Lobbying.* The Contractor certifies, to the best of its knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of it, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement;

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, it will complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," (which is available on the HUD website or here: https://www.hudexchange.info/resources/documents/HUD-Form-Sflll.pdf) in accordance with its instructions; and

(c) It will require that the language of this Section (C)(6) be included in the award documents for all subcontracts at all tiers.

(d) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

(7) *Solid Waste Disposal Act*. Pursuant to 2 CFR § 200.323, Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds $ 10,000 or the value of the quantity acquired during the preceding fiscal year exceeded $ 10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

(8) *Prohibition on certain telecommunications and video surveillance services or equipment*.

(a) The Contractor is prohibited from obligating or expending loan or grant funds to:
(1) Procure or obtain;
(2) Extend or renew a contract to procure or obtain; or
(3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered

telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115–232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(b) In implementing the prohibition under Public Law 115–232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.

(c) The Contractor's attention is directed to Public Law 115–232, section 889 for additional information.

(d) The Contractor's attention is directed to § 200.471.

(9) Domestic preferences for procurements.

(a) As appropriate and to the extent consistent with law, the Contractor should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award.

(b) For purposes of this section:
(1) ''Produced in the United States'' means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

(2) ‘‘Manufactured products’’ means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

(10) *Documentation of Costs.* All costs shall be supported by properly executed payrolls, time records, invoices, or vouchers, or other official documentation evidencing in proper detail the nature and propriety of the charges. All checks, payrolls, invoices, contracts, vouchers, orders or other accounting documents, pertaining in whole or in part to the Agreement, shall be clearly identified and regularly accessible.

(11) *Records Retention.* The Contractor shall retain all books, documents, papers, and records relating to the services performed under the Contract in accordance with 2 C.F.R. §200.334.

(12) *Records Access.* The Contractor shall grant access to the City, State or any other pass-through entity, the Federal Agency, Inspectors General, and/or the Comptroller General of the United States, or any of their duly authorized representatives, to any books, documents, papers, and/or records of the Contractor that are pertinent to the Contract for the purpose of making audits, examinations, excerpts, and transcripts. The right also includes timely and reasonable access to the Contractor’s personnel for the purpose of interview and discussion related to such documents. The rights of access in this section are not limited to the required retention period but last as long as the records are retained.

(13) *Small Firms, M/WBE Firms, and Labor Surplus Area Firms.* Contractor shall take the following affirmative steps in the letting of subcontracts, if subcontracts are to be let, in order to ensure that minority firms, women’s business enterprises, and labor surplus area firms are used when possible:

a. Placing qualified small and minority businesses and women’s business enterprises on solicitation lists;

b. Assuring that small and minority businesses, and women’s business enterprises are solicited whenever they are potential sources;

c. Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority businesses, and women’s business enterprises;

d. Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women’s business enterprises; and

e. Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce.

(14) *Intangible Property*.

a. Pursuant to 2 CFR § 200.315, the Government reserves a royalty-free, non-exclusive, and irrevocable right to obtain, reproduce, publish, or otherwise use, and to authorize others to use, for Government purposes: (a) the copyright in any work developed under the Contract or subcontract; and (b) any rights of copyright to which a Contractor purchases ownership with grant support.

b. Any reports, documents, data, photographs, deliverables, and/or other materials produced pursuant to the Contract ("Copyrightable Materials"), and any and all drafts and/or other preliminary materials in any format related to such items produced pursuant to the contract, shall upon their creation become the exclusive property of the City. The Copyrightable Materials shall be considered "work-made-for-hire" within the meaning and purview of Section 101 of the United States Copyright Act, 17 U.S.C. § 101, and the City shall be the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might exist. To the extent that the Copyrightable Materials do not qualify as "work-made-for-hire," the Contractor hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to the Copyrightable Materials to the City, free and clear of any liens, claims, or other encumbrances. The Contractor shall retain no copyright or intellectual property interest in the Copyrightable Materials. The Copyrightable Materials shall be used by the Contractor for no purpose other than in the performance of this Contract without the prior written permission of the City. The City may grant the Contractor a license to use the Copyrightable Materials on such terms as determined by the City and set forth in the license.

c. The Contractor acknowledges that the City may, in its sole discretion, register copyright in the Copyrightable Materials with the United States Copyright Office or any other government agency authorized to grant copyright registrations. The Contractor shall fully cooperate in this effort, and agrees to provide any and all documentation necessary to accomplish this.

d. The Contractor represents and warrants that the Copyrightable Materials: (i) are wholly original material not published elsewhere (except for material that is in the public domain); (ii) do not violate any copyright law; (iii) do not constitute defamation or invasion of the right of privacy or publicity; and (iv) are not an infringement, of any kind, of the rights of any third party. To the extent that the Copyrightable Materials incorporate any non-original material, the Contractor has obtained all necessary permissions and clearances, in writing, for the use of such non-original material under this Contract, copies

of which shall be provided to the City upon execution of this Contract.

e. The Contractor shall promptly and fully report to the City any discovery or invention arising out of or developed in the course of performance of this Contract and the Contractor shall promptly and fully report to the Government to make a determination as to whether patent protection on such invention shall be sought and how the rights in the invention or discovery, including rights under any patent issued thereon, shall be disposed of and administered in order to protect the public interest.

f. If the Contractor publishes a work dealing with any aspect of performance under this Agreement, or with the results of such performance, the City shall have a royalty-free, non-exclusive irrevocable license to reproduce, publish, or otherwise use such work for City governmental purposes.

D. Special Provisions for Construction Contracts. If this Contract involves Construction work, design for Construction, or Construction services, all such work or services performed by the Contractor and its subcontractors shall be subject to the following requirements in addition to those set forth above in paragraphs (A), (B), and (C):

(1) *Federal Labor Standards.* The Contractor will comply with the following:

a. The Davis-Bacon Act (40 U.S.C. §§ 3141-3148): <u>If required by the federal program legislation</u>, in Construction contracts involving an excess of $2000, <u>and subject to any other federal program limitations</u>, all laborers and mechanics must be paid at a rate not less than those determined by the Secretary of Labor to be prevailing for the City, which rates are to be provided by the City. These wage rates are a federally mandated minimum only, and will be superseded by any State or City requirement mandating higher wage rates. The Contractor also agrees to comply with Department of Labor Regulations pursuant to the Davis-Bacon Act found in 29 CFR Parts 1, 3, 5 and 7 which enforce statutory labor standards provisions.

b. <u>If required by the federal program legislation and subject to any other federal program limitations,</u> Sections 103 and 107 of the Contract Work Hours and Safe Standards Act (40 U.S.C. §§ 3701-3708), which provides that no laborer or mechanic shall be required or permitted to work more than eight hours in a calendar day or in excess of forty hours in any workweek, unless such laborer or mechanic is paid at an overtime rate of 1½ times his/her basic rate of pay for all hours worked in excess of these limits, under any Construction contract costing in excess of $2000. In the event of a violation of this provision, the Contractor shall not only be liable to any affected employee for

his/her unpaid wages, but shall be additionally liable to the United States for liquidated damages.

c. Copeland Anti-Kickback Act: If required by the federal program legislation and subject to any other federal program limitations: (i) the Contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. Part 3 as may be applicable, which are incorporated by reference into this Contract; (ii) The Contractor or subcontractor shall insert in any subcontracts the language contained in (i) of this subsection and also a clause requiring the subcontractors to include the language in subsection (i) in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor of this subsection; and (iii) A breach of this subsection may be grounds for termination of the Contract, and for debarment as a contractor or subcontractor as provided in 29 C.F.R. § 5.12.

d. If this Contract involves Construction work, design for Construction, or Construction services, a more complete detailed statement of Federal Labor Standards annexed hereto as FEDERAL EXHIBIT 2. If there is a conflict between the provisions of this Article D and FEDERAL EXHIBIT 2, the stricter standard shall be controlling.

(2) *Equal Employment Opportunity.* Executive Order 11246, as amended, and as supplemented in Department of Labor regulations (41 CFR chapter 60) for Construction contracts or subcontracts in excess of $10,000. The Contractor shall include the notice found at FEDERAL EXHIBIT I in all Construction subcontracts. For the purposes of the Equal Opportunity Construction Contract Specifications and Clause below, the term "Construction Work" means the construction, rehabilitation, alteration, conversion, extension, demolition or repair of buildings, highways, or other changes or improvements to real property, including facilities providing utility services. The term also includes the supervision, inspection, and other onsite functions incidental to the actual construction .

Standard Federal Equal Employment Opportunity Construction Contract Specifications for Contracts and Subcontracts in Excess of $10,000.

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this Contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any Construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this Contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this Contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each Construction trade in which it has employees in the covered area. Covered Construction Contractors performing Construction Work in geographical areas where they do not have a Federal or federally assisted Construction contract shall apply the minority and female goals established for the geographical areas where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246 as amended, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the

availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each Construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.

c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where Construction Work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility

for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of Construction Work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female Construction contractors and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a Contractor association, joint Contractor-union, Contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted

as fulfilling any one or more of its obligations under 7a through p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the Program are reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246 or suspended or is otherwise excluded from or ineligible for participation in federal assistance programs.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, Construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, Contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for hiring of local or other areas residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

(3) **Equal Opportunity Clause** (for contracts for Construction Work) required by 41 CFR § 60-1.4(b).

During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.

(3) The Contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.

(4) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(5) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(6) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by

the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(7) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(8) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

E. Rights to Inventions. [Special Provisions For Contracts Involving Experimental, Developmental, or Research Work.]

(1) If this Contract involves the performance of experimental, developmental, or research work by the Contractor or its subcontractors, and the entity performing such work is a Nonprofit Organization or Small Business Firm as defined below, the following provisions apply in addition to those set forth above in paragraphs (a), (b ad (c), unless the Contract specifically states that this provision is superseded:

a. *Definitions*. The following definitions apply to this section (D).

i. "Invention" means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code, or any novel variety of plant which is or may be protected under the Plant Variety Protection Act (7 U.S.C. § 2321 *et seq.*).

ii. "Subject invention" means any invention of the Contractor conceived or first actually reduced to practice in the performance of work under this Contract, provided that in the case of a variety of plant, the date of determination (as defined in section 41(d) of the Plant Variety Protection Act, 7 U.S.C. 2401(d)) must also occur during the period of Contract performance.

iii. "Practical Application" means to manufacture in the case of a composition or product, to practice in the case of a

process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or government regulations, available to the public on reasonable terms.

iv. "Made" when used in relation to any invention means the conception or first actual reduction to practice of such invention.

v. "Small Business Firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in government procurement and subcontracting at 13 CFR 121.3-8 and 13 CFR 121.3-12, respectively, will be used.

vi. "Nonprofit Organization" means a university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c) and exempt from taxation under section 501(a) of the Internal Revenue Code (25 U.S.C. 501(a)) or any nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

vii. "Statutory period" means the one-year period before the effective filing date of a claimed invention during which exceptions to prior art exist per 35 U.S.C. 102(b), as amended by the Leahy-Smith America Invents Act, Public Law 112-29.

viii. The "contractor" means any person, small business firm or nonprofit organization, or as set forth in section 1, paragraph (b)(4) of Executive Order 12591, as amended, any business firm regardless of size, which is a party to a funding agreement.

b. *Allocation of Principal Rights*. The Contractor may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 U.S.C. 203. With respect to any subject invention in which the Contractor retains title, the Federal government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the world.

c. *Invention Disclosure ,Election of Title and Filing of Patent Application by Contractor*.

i. The Contractor will disclose each subject invention to the City and the Federal Agency within two months after the inventor discloses it in writing to Contractor personnel responsible for patent matters. Such disclosure shall be in the form of a written report and shall identify the contract under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale or public use of the invention and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after such disclosure, the Contractor will promptly notify the City and the Federal Agency of the acceptance of any manuscript describing the invention for publication or of any on sale or public use planned by the Contractor.

ii. The Contractor will elect in writing whether or not to retain title to any such invention by notifying the City and the Federal Agency within two years of disclosure to the City and the Federal Agency. However, in any case where a patent, a printed publication, public use, sale, or other availability to the public has initiated the one year statutory period wherein valid patent protection can still be obtained in the United States, the period for election of title may be shortened by the Federal Agency to a date that is no more than 60 days prior to the end of the statutory period.

iii. The Contractor will file its initial patent application on a subject invention to which it elects to retain title within one year after election of title or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use. If the Contractor files a provisional application as its initial patent application, it shall file a non-provisional application within 10 months of the filing of the provisional application. The Contractor will file patent applications in additional countries or international patent offices within earlier ten months of the first filed patent application or six months from the date permission is granted by the Commissioner of Patents to file foreign patent

applications where such filing has been prohibited by a Secrecy Order.

iv. For any subject invention with Federal agency and contractor co-inventors, where the Federal agency employing such co-inventor determines that it would be in the interest of the government, pursuant to 35 U.S.C. 207(a)(3), to file an initial patent application on the subject invention, the Federal agency employing such co-inventor, at its discretion and in consultation with the contractor, may file such application at its own expense, provided that the contractor retains the ability to elect title pursuant to 35 U.S.C. 202(a).

v. Requests for extension of the time for disclosure, election, and filing under paragraphs (i), (ii), and (iii) of this clause may, at the discretion of the Federal agency, be granted. When a contractor has requested an extension for filing a non-provisional application after filing a provisional application, a one-year extension will be granted unless the Federal agency notifies the contractor within 60 days of receiving the request.

d. Conditions When the Government May Obtain Title

The Contractor will convey to the Federal Agency, upon written request, title to any subject invention --

i. If the Contractor fails to disclose or elect title to the subject invention within the times specified in (c) of this clause, or elects not to retain title., .

ii. In those countries in which the Contractor fails to file patent applications within the times specified in paragraph (c) of this clause; provided, however, that if the Contractor has filed a patent application in a country after the times specified in (c) of this clause, but prior to its receipt of the written request of the Federal Agency, the Contractor shall continue to retain title in that country.

iii. In any country in which the Contractor decides not to continue the prosecution of any non-provisional patent application for, to pay a maintenance annuity or renewal fee on, or to defend in a reexamination or opposition proceeding on, a patent on a subject invention.

e. Minimum Rights to Contractor and Protection of the Contractor Right to File

i. The Contractor will retain a nonexclusive royalty-free license throughout the world in each subject invention to which the Government obtains title, except if the Contractor fails to disclose the invention within the times specified in (c), above. The Contractor's license extends to its domestic subsidiary and affiliates, if any, within the corporate structure of which the Contractor is a party and includes the right to grant sublicenses of the same scope to the extent the Contractor was legally obligated to do so at the time the Contract was awarded. The license is transferable only with the approval of the Federal Agency except when transferred to the successor of that party of the Contractor's business to which the invention pertains.

ii. The Contractor's domestic license may be revoked or modified by the funding Federal Agency to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions at 37 CFR Part 404 and agency licensing regulations (if any). This license will not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the funding Federal Agency to the extent the Contractor, its licensees, or the domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

iii. Before revocation or modification of the license, the funding Federal Agency will furnish the Contractor a written notice of its intention to revoke or modify the license, and the Contractor will be allowed thirty days (or such other time as may be authorized by the funding Federal Agency for good cause shown by the Contractor) after the notice to show cause why the license should not be revoked or modified. The Contractor has the right to appeal, in accordance with applicable regulations in 37 CFR Part 404 and Federal Agency regulations (if any) concerning the licensing of Government-owned inventions, any decision concerning the revocation or modification of the license.

f. Contractor Action to Protect the Government's Interest

i. The Contractor agrees to execute or to have executed and promptly deliver to the Federal Agency all instruments necessary to (i) establish or confirm the

rights the Government has throughout the world in those subject inventions to which the Contractor elects to retain title, and (ii) convey title to the Federal Agency when requested under paragraph (d) above and to enable the Government to obtain patent protection throughout the world in that subject invention.

ii. The Contractor agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the Contractor each subject invention made under contract in order that the Contractor can comply with the disclosure provisions of paragraph (c), of this clause, to assign to the Contractor the entire right, title and interest in and to each subject invention made under Contract, and to execute all papers necessary to file patent applications on subject inventions and to establish the Government's rights in the subject inventions. This disclosure format should require, as a minimum, the information required by paragraph (c)(1) of this clause. The Contractor shall instruct such employees through employee agreements or other suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to U.S. or foreign statutory bars.

iii. For each subject invention, the contractor will, no less than 60 days prior to the expiration of the statutory deadline, notify the Federal agency of any decision: Not to continue the prosecution of a non-provisional patent application; not to pay a maintenance, annuity or renewal fee; not to defend in a reexamination or opposition proceeding on a patent, in any country; to request, be a party to, or take action in a trial proceeding before the Patent Trial and Appeals Board of the U.S. Patent and Trademark Office, including but not limited to post-grant review, review of a business method patent, inter partes review, and derivation proceeding; or to request, be a party to, or take action in a non-trial submission of art or information at the U.S. Patent and Trademark Office, including but not limited to a pre-issuance submission, a post-issuance submission, and supplemental examination..

iv. The Contractor agrees to include, within the specification of any United States patent applications and any patent issuing thereon covering a subject invention, the following statement, "This invention was made with government support under (identify the

contract) awarded by (identify the Federal Agency). The government has certain rights in the invention."

g. Subcontracts

i. The Contractor will include this clause, suitably modified to identify the parties, in all subcontracts, regardless of tier, for experimental, developmental or research work to be performed by a subcontractor. The subcontractor will retain all rights provided for the Contractor in this clause, and the Contractor will not, as part of the consideration for awarding the subcontract, obtain rights in the subcontractor's subject inventions.

ii. The Contractor will include in all other subcontracts, regardless of tier, for experimental developmental or research work the patent rights clause required by 2 CFR § 200.315(c) and Appendix II to 2 CFR Part 200.

iii. In the case of subcontracts, at any tier, when the prime award with the Federal Agency was a contract (but not a grant or cooperative agreement), the Agency, subcontractor, and the Contractor agree that the mutual obligations of the parties created by this clause constitute a contract between the subcontractor and the Federal Agency with respect to the matters covered by the clause; provided, however, that nothing in this paragraph is intended to confer any jurisdiction under the Contract Disputes Act in connection with proceedings under paragraph (j) of this clause.

h. *Reporting on Utilization of Subject Inventions.* The Contractor agrees to submit on request periodic reports no more frequently than annually on the utilization of a subject invention or on efforts at obtaining such utilization that are being made by the Contractor or its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Contractor, and such other data and information as the Federal Agency may reasonably specify. The Contractor also agrees to provide additional reports as may be requested by the Federal Agency in connection with any march-in proceeding undertaken by the Federal Agency in accordance with paragraph (j) of this clause. As required by 35 U.S.C. § 202(c)(5), the Federal Agency agrees it will not disclose such information to persons outside the Government without permission of the Contractor.

i. *Preference for United States Industry.* Notwithstanding any other provision of this clause, the Contractor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any subject inventions in the United States unless such

person agrees that any products embodying the subject invention or produced through the use of the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by the Federal Agency upon a showing by the Contractor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

j. *March-in Rights*. The Contractor agrees that with respect to any subject invention in which it has acquired title, the Federal Agency has the right in accordance with the procedures in 37 CFR § 401.6 and any supplemental regulations of the Federal Agency to require the Contractor, an assignee or exclusive licensee of a subject invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Contractor, assignee, or exclusive licensee refuses such a request the Federal Agency has the right to grant such a license itself if the Federal Agency determines that:

   i. Such action is necessary because the Contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use.

   ii. Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Contractor, assignee or their licensees;

   iii. Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Contractor, assignee or licensees; or

   iv. Such action is necessary because the agreement required by paragraph (i) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such agreement.

k. *Special Provisions for Contracts with Nonprofit Organizations.* If the Contractor is a nonprofit organization, it agrees that:

   i. Rights to a subject invention in the United States may not be assigned without the approval of the Federal Agency, except where such assignment is made to an organization which has as one of its primary functions

the management of inventions, provided that such assignee will be subject to the same provisions as the Contractor;

ii. The Contractor will share royalties collected on a subject invention with the inventor, including Federal employee co-inventors (when the Federal Agency deems it appropriate) when the subject invention is assigned in accordance with 35 U.S.C. § 202(e) and 37 CFR § 401.10;

iii. The balance of any royalties or income earned by the Contractor with respect to subject inventions, after payment of expenses (including payments to inventors) incidental to the administration of subject inventions, will be utilized for the support of scientific research or education; and

iv. It will make efforts that are reasonable under the circumstances to attract licensees of subject invention that are Small Business Firms and that it will give a preference to a Small Business Firm when licensing a subject invention if the Contractor determines that the Small Business Firm has a plan or proposal for marketing the invention which, if executed, is equally as likely to bring the invention to practical application as any plans or proposals from applicants that are not Small Business Firms; provided, that the Contractor is also satisfied that the Small Business Firm has the capability and resources to carry out its plan or proposal. The decision whether to give a preference in any specific case will be at the discretion of the Contractor. However, the Contractor agrees that the Federal Aency may review the Contractor's licensing program and decisions regarding Small Business applicants, and the Contractor will negotiate changes to its licensing policies, procedures, or practices with the Federal Agency when the Federal Agency's review discloses that the Contractor could take reasonable steps to implement more effectively the requirements of this paragraph (k)(iv). In accordance with 37 CFR 401.7, the Federal agency or the contractor may request that the Secretary review the contractor's licensing program and decisions regarding small business applicants.

l. *Communication.* The central point of contact at the Federal Agency for communications on matters relating to this clause may be obtained from the City upon request.

FEDERAL EXHIBIT 1

NOTICE TO BIDDERS

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246, as amended) FOR ALL CONSTRUCTION CONTRACTS AND SUB-CONTRACTS IN EXCESS OF $10,000.

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all Construction Work in the covered area, are as follows:

Goals and Timetables for Minorities

Trade	Goal (percent)
Electricians	9.0 to 10.2
Carpenters	27.6 to 32.0
Steamfitters	12.2 to 13.5
Metal Lathers	24.6 to 25.6
Painters	28.6 to 26.0
Operating Engineers	25.6 to 26.0
Plumbers	12.0 to 14.5
Iron Workers (structural)	25.9 to 32.0
Elevator Constructors	5.5 to 6.5
Bricklayers	13.4 to 15.5
Asbestos Workers	22.8 to 28.0
Roofers	6.3 to 7.5
Iron Workers (ornamental)	22.4 to 23.0
Cement Masons	23.0 to 27.0
Glazers	16.0 to 20.0
Plasterers	15.8 to 18.0
Teamsters	22.0 to 22.5
Boilermakers	13.0 to 15.5
All Other	16.4 to 17.5

Goals and Timetables for Women

From April 1, 1980 until the present	6.9

These goals are applicable to all the Contractor's Construction Work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs Construction Work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and nonfederally involved Construction.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the Contractor shall made a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any Construction subcontract in excess of $10,000 at any tier for Construction Work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this Contract, the "covered area" is the City of New York.

EXHIBIT 2
Federal Labor Standards Provisions (Non-Davis Bacon)[1]
Federal Emergency Management Agency
(10/27/2015)

Applicability: The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. Compliance with the Copeland "Anti-Kickback" Act.

1. **Contractor.** The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

2. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clause in paragraph 1 above and such other clauses as the FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

3. **Breach.** A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.

B. **Compliance with the Contract Work Hours and Safety Standards Act.** The provisions of this Section B are applicable where the amount of the prime contract exceeds $100,000.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-halftimes the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1) of this Section B the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In

[1] This version of Exhibit 2 applies to contracts funded by FEMA Grant and Cooperative Agreement Programs, including the Public Assistance Program. Do not use this version of Exhibit 2 in connection with FEMA programs that are subject to the Davis-Bacon Act; such programs are the Emergency Management Preparedness Grant Program, the Homeland Security Grant Program, Nonprofit Security Grant Program, Tribal Homeland Security Grant Program, Port Security Grant Program, and Transit Security Grant Program.

addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

3. **Withholding for unpaid wages and liquidated damages.** The City of New York shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated §damages as provided in the clause set forth in paragraph (2) of this section.

4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs (1) through (4) of this Section B and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1) through (4) of this section B.

C. **Health and Safety.** The provisions of this paragraph C are applicable where the amount of the prime contract exceeds $100,000.

1. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

2. The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

3. The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as FEMA or the Secretary of Labor shall direct as a means of enforcing such provisions.

FEDERAL EMERGENCY MANAGEMENT AGENCY ("FEMA") RIDER
(1/20/2021)

For use with contracts funded by the FEMA Grant and Cooperative Agreement Programs, including the Public Assistance Program

(This Rider should not be used with contracts funded by the following FEMA Programs: Emergency Management Preparedness Grant Program, Homeland Security Grant Program, Nonprofit Security Grant Program, Tribal Homeland Security Grant Program, Port Security Grant Program, and Transit Security Grant Program. This Rider should be accompanied by the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts.)

1. Suspension and Debarment. Section C(5) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts is supplemented with the following provisions:

   (a) This contract is a covered transaction for purposes of 2 C.F.R. Parts 180 and 3000. As such, the Contractor is required to verify that none of the Contractor, its principals (defined at 2 C.F.R. § 180.995), or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935). By entering into this contract, the Contractor certifies that it is in compliance with 2 C.F.R. Parts 180 and 3000.

   (b) The Contractor must comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C during the term of this contract and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.

   (c) The certification in paragraph (a), above, and section C(5) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts is a material representation of fact relied upon by the City of New York. If it is later determined that the Contractor did not comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C, in addition to remedies available to the City of New York and, if applicable, the State of New York, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.

2. Davis-Bacon Act. For the purposes of Section D(1)(a) of the Uniform Federal Contract Provisions Rider, compliance with the Davis-Bacon Act (40 U.S.C. §§ 3141-3148) is not required of the Contractor pursuant to FEMA regulations. However, if this Contract is funded by another federal funding source (e.g., the U.S. Department of Housing and Urban Development CDBG or CDBG-DR programs), compliance with the Davis-Bacon Act is required to the extent required by law and as set forth in the contract documents.

3. Rights to Inventions Made Under a Contract or Agreement. Section E of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts does not apply to the following FEMA Programs: Public Assistance Program, Hazard Mitigation Grant Program, Fire Management Assistance Grant Program, Crisis Counseling Assistance and Training Grant Program, Disaster Case Management Program, and Federal Assistance to Individuals and Households – Other Needs Assistance Grant Program.

4. Copeland "Anti-Kickback" Act. The Contractor shall comply with provisions of the Copeland "Anti-Kickback" Act (18 U.S.C. § 874) as delineated in the Uniform Federal Contract Provisions Rider, FEMA Exhibit 2, Section (A).

5. Contract Work Hours and Safety Standards Act. The Contractor shall comply with the provisions of the Contract Work Hours and Safety Standards Act as delineated in the Uniform Federal Contract Provisions Rider, FEMA Exhibit 2, Section (B).

6. Access to Records.

    (a) The Contractor agrees to provide the City of New York, the FEMA Administrator, the Comptroller General of the United States, or any of their authorized representatives access to any books, documents, papers, and records of the Contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts, and transcriptions.

    (b) The Contractor agrees to permit any of the foregoing parties to reproduce said documents by any means or to copy excerpts and transcriptions as reasonably needed.

    (c) The Contractor agrees to provide the FEMA Administrator or his/her authorized representative access to construction or other work sites pertaining to the work being completed under the contract.

    (d) In compliance with the Disaster Recovery Act of 2018, the City of New York and the Contractor acknowledge and agree that no language in this contract is intended to prohibit audits or internal reviews by the FEMA Administrator or the Comptroller General of the United States.

7. Logos. The Contractor shall not use DHS seal(s), logos, crests, or reproductions of flags or likenesses of DHS agency officials without specific FEMA pre-approval.

8. Compliance with Law. The Contractor acknowledges that FEMA financial assistance will be used to fund all or a portion of the contract. The Contractor will comply with all applicable federal law, regulations, executive orders, FEMA policies, procedures, and directives.

9. Federal Government not a Party. The Contractor acknowledges and understands that the Federal Government is not a party to this contract and is not subject to any obligations or liabilities to the City, Contractor or any other party pertaining to any matter resulting from the contract.

10. False Claims. The Contractor acknowledges that 31 U.S.C. Chap. 38 applies to the Contractor's actions pertaining to this contract.

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT M

PROJECT DRAWINGS & SPECIFICATIONS

[attached on following page]

BROOKLYN NAVY YARD

Restoration of Boilers at Building 62

63 Flushing Avenue
Brooklyn, NY 11205

BNYD 1907/1907A

Final Bid Document
July 31, 2026

LOCATION MAP

DRAWING LIST

INFORMATIONAL DRAWINGS
G-000.00 COVER SHEET
G-100.00 GENERAL NOTES

CIVIL DRAWINGS
CS-100.00 SITE IMPROVEMENT PLAN

ARCHITECTURAL DRAWINGS
D-100.00 FLOOR PLANS & ELEVATIONS
A-100.00 FLOOR PLANS & ELEVATIONS
A-200.00 BUILDING ELEVATIONS & SECTIONS
A-300.00 SECTION, DETAILS, & DOOR SCHEDULE
A-400.00 SECTION, DETAILS, & DOOR SCHEDULE
EN-100.00 COMCHECK

STRUCTURAL DRAWINGS
S-000.00 GENERAL NOTES
S-001.00 GENERAL NOTES
FO-100.00 FOUNDATION PLAN
S-100.00 BOILER PLATFORM FRAMING PLAN
S-300.00 BOILER PLATFORM SECTIONS
S-600.00 DETAILS

MECHANICAL DRAWINGS
EN-100.00 ENERGY ANALYSIS SPECIAL INSPECTIONS BLDG 62
M-000.00 HVAC LEGENDS, SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES
M-100.00 BOILER DEMOLITION, NEW WORK PLAN, AND SCHEDULES
M-200.00 HVAC DETAILS

ELECTRICAL DRAWINGS
E-000.00 ELECTRICAL LEGENDS
E-100.00 ELECTRICAL DEMOLITION AND POWER PLAN
E-200.00 ELECTRICAL LIGHTING PLAN, SCHEDULES, AND DETAILS

PLUMBING DRAWINGS
P-001.00 GENERAL NOTES, LEGENDS, AND ABBREVIATIONS
P-100.00 PLUMBING GAS PLANS

RPZ DRAWINGS
RPZ-1
RPZ-2
RPZ-3
RPZ-4

H 2 M architects + engineers

538 Broad Hollow Road
4th Floor East
Melville, NY 11747
P:(631)756-8000
F:(631)694-4122

Melville, NY 11747
Albany, NY 12205
White Plains, NY 10601
New City, NY 10956
Parsippany, NJ 07054
Howell, NJ 07731

B N Y

Brooklyn Navy Yard Development Corporation

Restoration of Substation at Building 62

63 FLUSHING AVENUE, SUITE 300
BROOKLYN, NY 11205

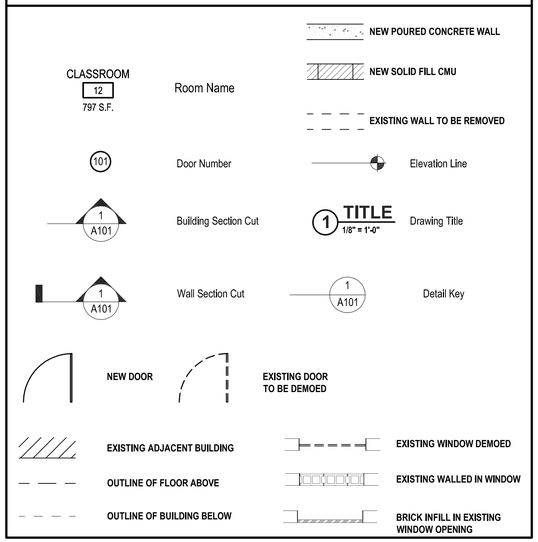
G-000.00

Plotted on Aug 04, 2026 - 4:54pm By cdelgatto
X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 43686V1 - Mitigation\02-BIM-CAD\Con-docs\general\G0.0_Building 62_COVER.dwg Last Modified Jul 31, 2026 -

GENERAL NOTES

1. THE DRAWING AND SPECIFICATION ARE COMPLEMENTARY. THE BOUND PROJECT SPECIFICATION CONTAINS THE CONDITIONS OF THE CONTRACT, PROCEDURES AND TECHNICAL SPECIFICATIONS.
2. THE CONTRACTOR WILL CHECK AND VERIFY ALL CONDITIONS AT THE SITE BEFORE STARTING OF WORK AND THEY WILL FAMILIARIZE THEMSELVES WITH THE INTENT OF THESE PLANS AND MAKE SURE WORK AGREES WITH SAME. IF DURING CONSTRUCTION, A CONDITION EXISTS WHICH DISAGREES WITH THAT INDICATED ON THE PLANS, THE CONTRACTOR WILL STOP WORK AND NOTIFY ARCHITECT. SHOULD THEY FAIL TO FOLLOW THIS PROCEDURE AND CONTINUE WITH WORK, THEY WILL ASSUME ALL RESPONSIBILITY AND LIABILITY ARISING FROM THEIR ACTIONS.
3. THE CONTRACTOR SHALL OBTAIN ANY AND ALL PERMITS REQUIRED FOR THE PERFORMANCE OF THE WORK AND THE OWNER SHALL PAY ALL FEES IN CONNECTION WITH THEREOF UNLESS OTHERWISE AGREED UPON.
4. THE DESIGN, PREPARATIONS OF NECESSARY CONSTRUCTION DOCUMENTS AND THE SECURING OF ALL REQUIRED PERMITS AND APPROVALS FROM THE APPROPRIATE ADMINISTRATIVE AUTHORITY SHALL BE COMPLETED PRIOR TO THE COMMENCEMENT OF THE WORK AND SHALL INCLUDE ALL WORK.
5. DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS CONFIRMED BY FIELD VERIFIED CONDITIONS TAKE PRECEDENCE. IF A DISCREPANCY ARISES BASED ON FIELD VERIFIED CONDITIONS, CONSULT WITH ARCHITECT BEFORE PROCEEDING WITH WORK OR ORDERING MATERIALS.
6. THE CONTRACTOR SHALL NOT MAKE DEVIATIONS FROM THE DESIGN DRAWINGS WITHOUT WRITTEN DIRECTIONS FROM THE ARCHITECT. REPORT ANY ERRORS, INACCURACIES, MISSING DIMENSIONAL REQUIREMENTS OR CONFLICTS TO THE ARCHITECT/ENGINEER IN WRITING BEFORE BEGINNING ANY WORK.
7. IF THERE IS A DISCREPANCY ON THE CONSTRUCTION DOCUMENTS. THE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY SO THAT THE DISCREPANCIES CAN BE RESOLVED. UNLESS OTHERWISE INDICATED IN WRITING BY ARCHITECT, THE MORE CONSERVATIVE INTERPRETATION OF THE CONSTRUCTION DOCUMENTS SHALL APPLY.
8. VERIFY EXACT LAYOUT COMPATIBILITY WITH ALL EXISTING CONDITIONS AND COORDINATE ALL WORK TO BE UNDERTAKEN PRIOR TO BEGINNING ANY WORK. NOTIFY THE ARCHITECT IN WRITING BEFORE BEGINNING WORK IF ANY DISCREPANCIES ARE FOUND WITH CONDITIONS ENCOUNTERED. CONTRACTOR WILL BE RESPONSIBLE FOR ALL TEMPORARY MEASURES, TIME LOST, CHANGES TO THE WORK SCOPE WITH ANY ADDITIONAL COMPENSATION IF CONTRACTOR FAILS TO PROVIDE AFOREMENTIONED VERIFICATIONS, NOTIFICATIONS AND COORDINATION PRIOR TO COMMENCING WORK.
9. ALL PENETRATIONS REQUIRED TO ACCOMMODATE ALL WORK DETAILED OR SPECIFIED FOR THEIR SCOPE SHALL BE LOCATED SIZED, MADE & VERIFIED BY THE CONTRACTOR.
10. DISTURB ONLY THE AREAS OF THE SITE AFFECTED BY NEW CONSTRUCTION, UNLESS NOTED OTHERWISE. CONTRACTOR SHALL PROTECT ALL ADJACENT EXISTING CONSTRUCTION, ITEMS, FINISHES, ETC. AND SHALL PATCH, REPAIR AND/OR REPLACE, AND REFINISH AS REQUIRED TO RESTORED AS PER SITE MANAGEMENT PLAN (SMP) REQUIREMENTS - 6" OF ASPHALT OR CONCRETE AND 12" TOPSOIL BENEATH THAT IS CAPABLE OF SUPPORTING VEGETATION ANY AND ALL AREAS DAMAGED DURING CONSTRUCTION.
11. PROTECT ADJOINING PROPERTIES WHEN CONDUCTING WORK.
12. ALL WORK SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE APPLICABLE CODES (SMP) AND WITH THE RULES AND REGULATIONS OF ALL LOCAL AGENCIES, DEPARTMENTS OR LAWS HAVING JURISDICTION OVER ANY PORTION OR SPECIFIC PHASE OF THE WORK. THE CONTRACTOR SHALL COORDINATE THE WORK WITH PUBLIC UTILITY COMPANIES HAVING JURISDICTION.
13. ALL WORK WILL BE IN ACCORDANCE WITH THE IBC OF NEW YORK STATE, INTERNATIONAL FIRE CODE, INTERNATIONAL PLUMBING CODE, INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL ENERGY CONSERVATION CONSTRUCTION CODE AND ALL LOCAL AND STATE ZONING AND BUILDING CODES AND ORDINANCES HAVING JURISDICTION.
14. CONTRACTOR SHALL STRICTLY ADHERE TO MANUFACTURERS PRINTED INSTRUCTIONS AND WILL GUARANTEE TO THE OWNER THAT ALL MATERIALS AND EQUIPMENT INCORPORATED IN THE WORK WILL BE NEW UNLESS OTHERWISE SPECIFIED, AND THAT ALL WORK WILL BE OF GOOD QUALITY, FREE FROM DEFECTS AND FAULTS FOR A MINIMUM OF ONE (1) YEAR, UNLESS SPECIFIED OTHERWISE, STARTING FROM THE DATE OF SUBSTANTIAL COMPLETION AND ACCEPTANCE OF WORK.
15. CONFIRM ALL CHANGES TO WORK IN WRITING TO THE ARCHITECT AND OWNER AND RECEIVE APPROVAL OF ALL CHANGES IN WRITING BEFORE COMMENCING RELATED WORK.
16. DIMENSIONS NOTED AS "EQUAL" OR "EQ" WITHIN A ROOM REFER TO A DISTANCE RELATIONSHIP CONTAINED ONLY IN THAT ROOM AT AN OPPOSING OR PARALLEL WALL UNLESS NOTED OTHERWISE.
17. VERIFY AND ADJUST APPROXIMATE DIMENSIONS (+/-) IN THE FIELD. VERIFY WITH A/E PRIOR TO COMMENCING CONSTRUCTION.
18. ALL ITEMS DETAILED OR SPECIFIED TO RUN WITHIN OR ATTACHED TO WALLS AND CEILINGS SHALL BE CONCEALED OR RECESSED UNLESS NOTED OTHERWISE.
19. CONTRACTORS SHALL BE RESPONSIBLE FOR MAINTAINING WATER-TIGHT WEATHER PROTECTIONS THROUGHOUT ALL WORK AREA & EXISTING AREAS IMMEDIATELY ADJACENT TO THOSE WORK AREAS, FOR THE DURATION OF THE ENTIRE PROJECT.
20. ALL SECTIONS AND DETAILS SHALL BE CONSIDERED TYP. AND APPLY FOR THE SAME AND SIMILAR CONDITIONS, UNLESS OTHERWISE SPECIFICALLY NOTED.
21. ANY ITEM OF WORK NECESSARY FOR PROPER COMPLETION OF CONSTRUCTION, WHICH IS NOT SPECIFICALLY COVERED ON THE DRAWINGS SHALL BE CONSIDERED INCLUDED IN THIS WORK AND SHALL BE PERFORMED IN A MANNER DEEMED GOOD PRACTICE OF THE TRADE INVOLVED.
22. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE SAFETY OF THE PUBLIC, WORKERS AND THE PROPERTY DURING CONSTRUCTION OPERATIONS THROUGHOUT AND UNTIL COMPLETION OF ALL WORK.
23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACTS AND OMISSIONS OF ALL OF THE CONTRACTORS EMPLOYEES AND ALL SUBCONTRACTORS, THEIR AGENTS, EMPLOYEES AND ALL OTHER PERSONS PERFORMING ANY OF THE WORK UNDER THE CONTRACT WITH THE CONTRACTOR. THE CONTRACTOR SHALL BE FULLY INSURED WITH LIABILITY, DISABILITY AND WORKERS COMPENSATION INSURANCES.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUATELY BRACING AND PROTECTING ALL WORK DURING CONSTRUCTION AGAINST DAMAGE, BREAKAGE, COLLAPSE, DISTORTION AND MISALIGNMENT.
25. THE ARCHITECT SHALL NOT BE RESPONSIBLE FOR THE PERFORMANCE OR THE WORK OF THE GENERAL CONTRACTOR, OWNER OR ANY OTHER SUBCONTRACTORS NOR SHALL THE ARCHITECT GUARANTEE THEIR PERFORMANCE OR THEIR WORK.
26. CONTRACTOR SHALL NOTIFY ARCHITECT IMMEDIATELY IF THEY CANNOT COMPLY WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS (DRAWINGS AND SPECIFICATIONS), APPLICABLE CODES AND LOCAL REQUIREMENTS.
27. THE CONTRACTOR SHALL INDEMNIFY AND HOLD THE ARCHITECT AND THE ARCHITECTS AGENTS HARMLESS FROM AND AGAINST ALL LOSS, DAMAGE OR EXPENSE (INCLUDING REASONABLE ATTORNEY FEES) RESULTING FROM ANY CLAIM.
28. THE ARCHITECT SHALL NOT BE RESPONSIBLE FOR ANY CHANGES TO THIS PROJECT MADE BY OWNER, GENERAL CONTRACTOR OR ANY SUBCONTRACTOR OR MATERIAL SUPPLIER UNLESS PROPERLY AUTHORIZED, IN WRITING, BY THE ARCHITECT.
29. ALL DRAWINGS, SPECIFICATIONS, AND ANY COPIES SHALL REMAIN THE PROPERTY OF THE ARCHITECT. THEY ARE TO BE USED ONLY WITH RESPECT TO THE CONTRACTORS WORK ON THIS PROJECT AND SHALL NOT BE USED, IN ANY MANNER, ON ANY OTHER PROJECT.
30. THESE DOCUMENTS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. WORKER AND PUBLIC SAFETY, CARE OF ADJACENT PROPERTIES DURING CONSTRUCTION, AND COMPLIANCE WITH STATE AND FEDERAL REGULATIONS REGARDING SAFETY IS, AND SHALL REMAIN, THE CONTRACTORS RESPONSIBILITY.
31. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT THE PREMISES FROM DUST, DIRT OR DAMAGE, DURING AND UNTIL COMPLETION AND FINAL ACCEPTANCE OF THE PROJECT. ALL ITEMS REMOVED FROM THE PROJECT SITE DURING THE CONSTRUCTION SHALL REMAIN THE PROPERTY OF THE OWNER UNLESS NOTED OTHERWISE, WITH THE EXCEPTION OF DEBRIS THAT SHALL BE REMOVED FROM THE PROJECT SITE AND LEGALLY DISPOSED OF ON A DAILY BASIS.
32. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF ALL WORK INCLUDING SITE, MECHANICAL, ELECTRICAL AND PLUMBING TRADES.
33. OMIT
34. DATUM ELEVATION AT FINISHED FIRST FLOOR IS EL: +0'-0". ALL VERTICAL DIMENSIONS FOR THE FLOOR PLANS, ELEVATIONS, SECTIONS AND DETAILS ARE REFERENCED FROM THIS DATUM. SEE PLANS FOR DATUM RELATIONSHIP TO ACTUAL APPLICABLE NGVD (NATIONAL GEODETIC VERTICAL DATUM) ELEVATION. COORDINATE WITH ANY DRAWINGS REFERENCING NGVD ELEVATIONS ACCORDINGLY.

SYMBOL LEGEND



GENERAL CODE ANALYSIS

OCCUPANCY CLASSIFICATION: F-1
(2022 NYC BUILDING CODE CHAPTER 3)

CONSTRUCTION TYPE: TYPE IIB
(2022 NYC BUILDING CODE CHAPTER 6)

FIRE RATING: 1 HOUR
(2022 NYC BUILDING CODE CHAPTER 5)

ALL WORK SHALL BE IN ACCORDANCE WITH, BUT NOT LIMITED TO, ALL APPLICABLE CODES:
2022NEW YORK CITY GENERAL ADMINISTRATIVE PROVISIONS FOR CONSTRUCTION CODES
2022 NEW YORK CITY BUILDING CODE (AND THE 1968 BUILDING CODE FOR ALTERATIONS)
2022 NEW YORK CITY FIRE CODE
2022 NEW YORK CITY PLUMBING CODE
2020 NEW YORK CITY MECHANICAL CODE
2020 NEW YORK CITY FUEL GAS CODE
2011 NEW YORK CITY ELECTRIC CODE
2020 NEW YORK CITY ENERGY CONSERVATION CODE
ASHRAE 90.1-2016 (ENERGY STANDARD FOR BUILDINGS EXCEPT LOW-RISE RESIDENTIAL BUILDINGS)
ICC/ANSI A117.1-2009 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
NFPA 101-2015 LIFE SAFETY CODE

SPECIAL INSPECTION ITEMS :

STRUCTURAL STEEL - WELDING	BC 1704.3.1
STRUCTURAL STEEL - DETAILS	BC 1704.3.2
STRUCTURAL STEEL - HIGH STRENGTH BOLTING	BC 1704.3.3
CONCRETE- CAST IN PLACE	BC 1704.4
MASONRY	BC 1704.5
SUBGRADE INSPECTION	BC 1704.7.1
SUBSURFACE CONDITIONS - FILL PLACEMENT AND IN-PLACE DENSITY	BC 1704.7.2 BC 1704.7.3
SUBSURFACE INVESTIGATIONS (BORING/ TEST PIT ----------TR4----------	BC 1704.7.4
MECHANICAL SYSTEMS	BC 1704.16
EXCAVATIONS - SHEETING, SHORING, AND BRACING	BC 1704.20.2
MECHANICAL SYSTEMS	BC 1704.20.4
HEATING SYSTEMS	BC 1704.25
CHIMNEYS	BC 1704.26
UNDERPINNINGS	BC 1705.25.4 BC 1817
CONCRETE DESIGN MIX----------TR3----------	BC 1905.3
CONCRETE SAMPLING AND TESTING----------TR2----------	BC 1905.6
POST INSTALLED ANCHORS	BC 1705.37
FLOOD ZONE COMPLIANCE	BC G105.3

PROGRESS INSPECTION ITEMS :

PRELIMINARY	28-116.2.1, BC 110.2
FOOTING AND FOUNDATION	BC 110.2.3.1
LOWEST FLOOR ELEVATION	BC 110.3.2
ENERGY CODE COMPLIANCE INSPECTIONS----------TR8----------	BC 110.3.5
FIRE-RESISTANT RATED CONSTRUCTION	BC 110.3.4
FINAL	28 -116.2.4.2 BC 110.5

ENERGY CODE PROGRESS INSPECTION:

INSULATION PLACEMENT AND R VALUES	(IIA1)
SHUTOFF DAMPERS	(IIB2)
HVAC-R AND SERVICE WATER HEATING EQUIPMENT	(IIB3)
HVAC-R AND SERVICE WATER HEATING SYSTEM CONTROLS	(IIB4)
HVAC-R AND SERVICE WATER PIPING DESIGN AND INSULATION	(IIB5)
INTERIOR LIGHTING POWER	(IIC3)
EXTERIOR LIGHTING POWER	(IIC4)
MAINTENANCE INFORMATION	(IID1)

SCOPE:

TO REMOVE EXISTING BOILER EQUIPMENT ADDITION AT BUILDING 62 AND REPLACE WITH NEW CMU BUILDING ADDITION IN ORDER TO ELEVATE THE NEW BOILER EQUIPMENT ABOVE THE DFE @ 16.8'

H2M architects + engineers
538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

KEVIN M. PAUL, R.A. EXP. DATE
NY REGISTERED ARCHITECT Lic. No. 027976
"IN COMPLIANCE WITH ARTICLE 145, SECTION 7209 OF THE N.Y.S EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY LICENSE PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
LAM	LAM	KMP	

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT
Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

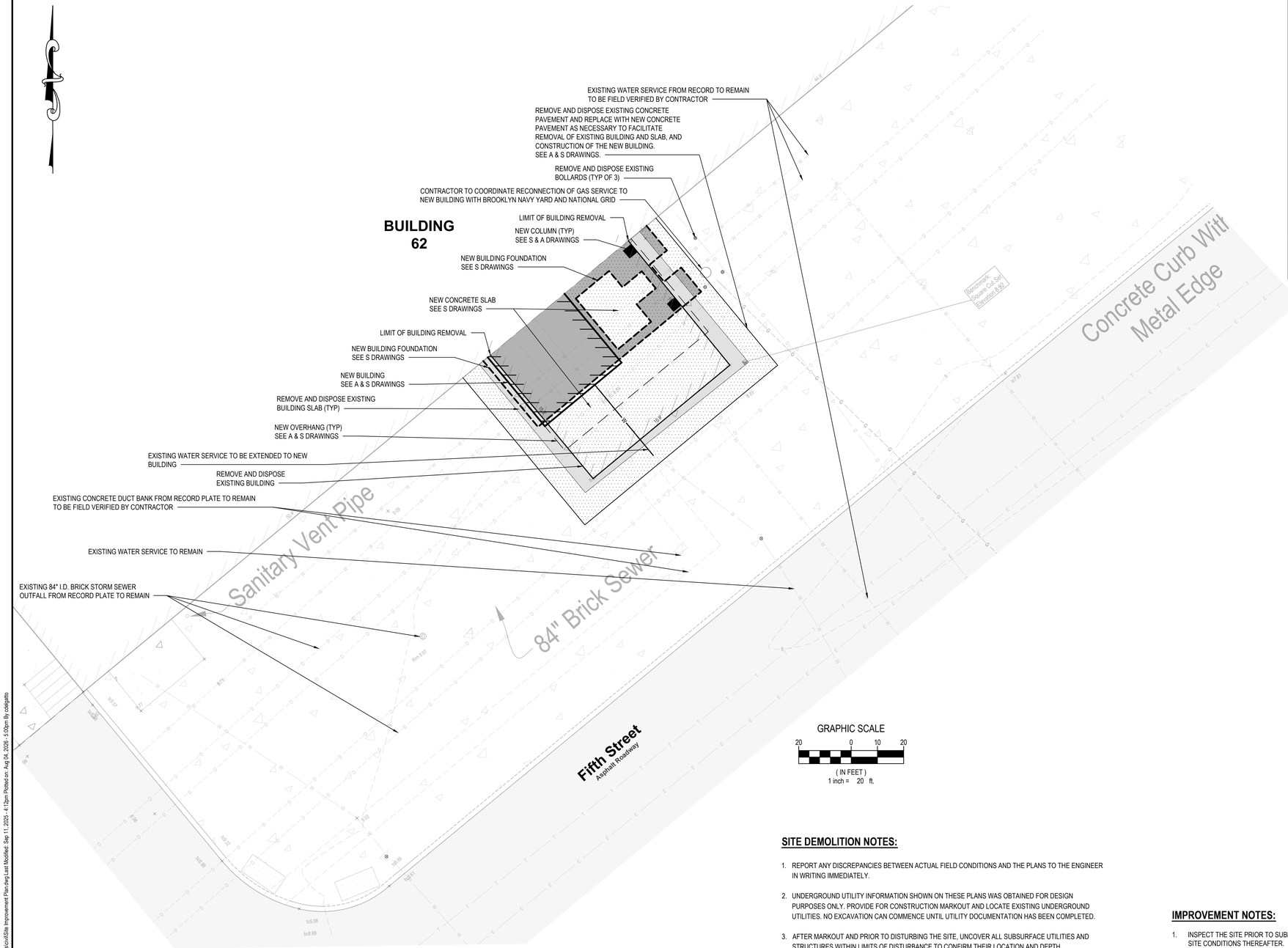
STATUS
FINAL BID DOCUMENT

SHEET TITLE
GENERAL NOTES

DRAWING No.
G-100.00

SHEET No.
02 OF 24

X:\BNYD (Brooklyn Navy Yard\...\4070\BNYD1907A - 4388\01 - Mitigation\02-BIM-CAD\Cmn-docs\sem\G-100.00 (Bldg 62) Arq Last Modified: Apr 20, 2026 - 2:26pm Plotted on: Aug 03, 2026 - 2:39pm By:Imonsiek



GRAPHIC SCALE

20 0 10 20

(IN FEET)
1 inch = 20 ft.

EXISTING CONDITIONS NOTES:

1. EXISTING SURVEY PREPARED BY H2M architects + engineers. DATED MAY 12, 2025.
2. MARKOUT OF UNDERGROUND UTILITIES COMPLETED BY THE LEXIS GROUP.
3. BENCHMARK - (SQUARE CUT SET, CORNER OF BUILDING SLAB, NAVD 1988).
4. LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES BOTH PUBLIC AND CUSTOMER OWNED, WERE OBTAINED FROM EITHER OLD MAPS, SURVEYS, DRAWINGS/RECORDS SUPPLIED BY OTHERS AND/OR UTILITY MARKOUT. THE OWNER AND ENGINEER DO NOT GUARANTEE OR ACCEPT RESPONSIBILITY FOR ANY DAMAGE TO SUCH FACILITIES DUE TO DISCREPANCIES IN LOCATION AND SIZE SHOWN ON THE PLANS OR THOSE UTILITIES AND STRUCTURES NOT SHOWN.

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EXISTING UTILITY NOTES

SUBSURFACE UTILITY ENGINEERING (SUE) QUALITY LEVELS OF SERVICE (ACCURACY)
ALL UTILITIES ARE QUALITY LEVEL B (QL-B) UNLESS OTHERWISE NOTED

QL-A = QUALITY LEVEL A (TEST HOLES)
DATA TYPICALLY ACQUIRED AT ONE POINT ON AN UNDERGROUND UTILITY FEATURE EXPOSED BY AIR VACUUM EXCAVATION OR OTHER MEANS. THE HORIZONTAL AND VERTICAL LOCATION OF THIS REFERENCE POINT IS ACQUIRED AND REPORTED TO ACCEPTABLE SURVEY TOLERANCES. THE ACQUIRED DATA FULFILLS SECTION 5.4.5 ON PAGE 6 OF ASCE STANDARD 38-02.

QL-B = QUALITY LEVEL B (UTILITY DESIGNATION)
DEPICTION OF AN UNDERGROUND UTILITY LINE ESTABLISHED BY SENSING THE LOCATION WITH ELECTRONIC INSTRUMENTATION. LINEWORK AND UTILITY SURFACE FEATURES ARE ACQUIRED BY SURVEYING POINTS ALONG ALIGNMENT TO ACCEPTABLE SURVEY TOLERANCES.

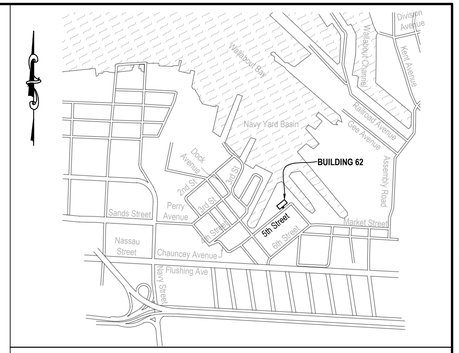
QL-C = QUALITY LEVEL C (RECORDS PLOTTING)
UTILITY INFORMATION OBTAINED FROM RECORD INFORMATION AND PLOTTED TO CORRELATE WITH SURFACE UTILITY FEATURES WHICH HAVE BEEN SURVEY LOCATED AND ACCURATELY REDUCED ON TO DESIGN/CONSTRUCTION DOCUMENTS.

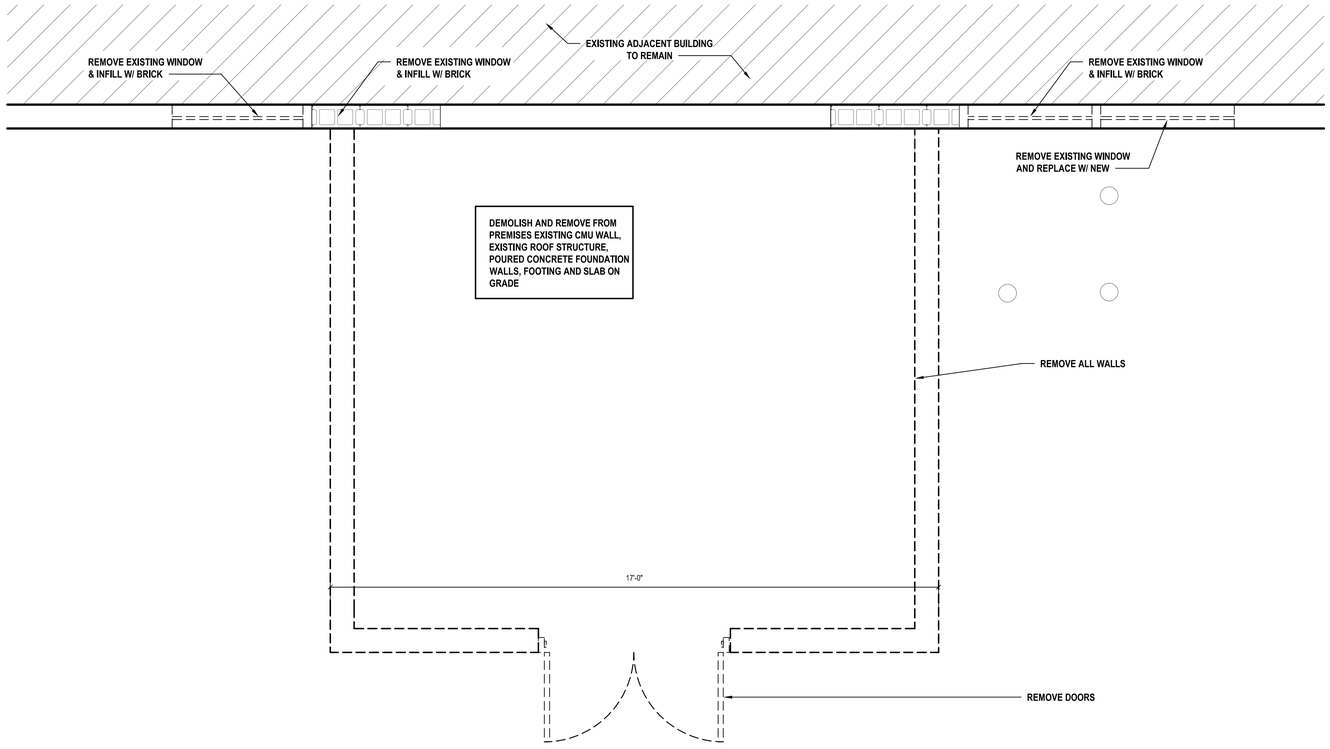
QL-D = QUALITY LEVEL D (RECORDS DRAFTING)
DEPICTION OF UNDERGROUND UTILITY LINES BY TRANSPOSITION FROM UTILITY RECORDS OR PLACED FROM VERBAL RECOLLECTIONS WITHOUT BENEFIT OF SURVEYED SURFACE FEATURES. ACCURACY OF INFORMATION IS QUESTIONABLE.

EOI
END OF INFORMATION PERTAINS TO THE LOSS OF SIGNAL THAT HAS BEEN APPLIED TO AN UNDERGROUND UTILITY AND THEN DETECTED TO ELECTRONICALLY LOCATE THE UTILITY. COMMONLY FOUND WHERE UTILITIES CHANGE TO NON-CONDUCTIVE MATERIALS, ARE CUT OR AT END OF UTILITY.

SITE DEMOLITION NOTES:

1. REPORT ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE PLANS TO THE ENGINEER IN WRITING IMMEDIATELY.
2. UNDERGROUND UTILITY INFORMATION SHOWN ON THESE PLANS WAS OBTAINED FOR DESIGN PURPOSES ONLY. PROVIDE FOR CONSTRUCTION MARKOUT AND LOCATE EXISTING UNDERGROUND UTILITIES. NO EXCAVATION CAN COMMENCE UNTIL UTILITY DOCUMENTATION HAS BEEN COMPLETED.
3. AFTER MARKOUT AND PRIOR TO DISTURBING THE SITE, UNCOVER ALL SUBSURFACE UTILITIES AND STRUCTURES WITHIN LIMITS OF DISTURBANCE TO CONFIRM THEIR LOCATION AND DEPTH.
4. NO COMPENSATION WILL BE MADE FOR ANY INCONVENIENCE CAUSED BY ENCOUNTERING UTILITIES AND STRUCTURES WHICH ARE NOT SHOWN, OR ARE INACCURATELY SHOWN ON THE PLANS.
5. REPAIR ANY DAMAGE TO EXISTING UTILITIES RESULTING FROM CONTRACTOR OPERATIONS IMMEDIATELY AT NO COST TO OWNER.
6. REPAIR ANY DAMAGE TO EXISTING SITE FEATURES SCHEDULED TO REMAIN RESULTING FROM CONTRACTOR OPERATIONS AT NO COST TO OWNER.
7. SAWCUT CONCRETE PAVEMENT BACK TO NEAREST EXPANSION/CONTROL JOINT.
8. PROVIDE TEMPORARY FENCING TO PROTECT WORK AREAS.
9. NOTIFY OWNER AND ENGINEER IMMEDIATELY IN WRITING WHEN UNKNOWN STRUCTURES OR SUSPECTED HAZARDOUS OR CONTAMINATED MATERIALS ARE ENCOUNTERED PRIOR TO REMOVAL OR DISTURBANCE.
10. TAKE APPROPRIATE MEASURES TO PROTECT PEDESTRIANS AND VEHICULAR TRAFFIC DURING REMOVAL ACTIVITIES, AND PROVIDE TEMPORARY MEASURES FOR THE PROTECTION AND SAFETY OF THE PUBLIC UNTIL FINAL ACCEPTANCE BY THE OWNER.
11. BACKFILL ALL VOIDS RESULTING FROM THE REMOVAL OF EXISTING SITE FEATURES. BACKFILL TO BE SOIL, FREE OF ORGANIC MATERIAL, DEBRIS, TRASH, CLAY AND STONES LARGER THAN 4 INCHES.

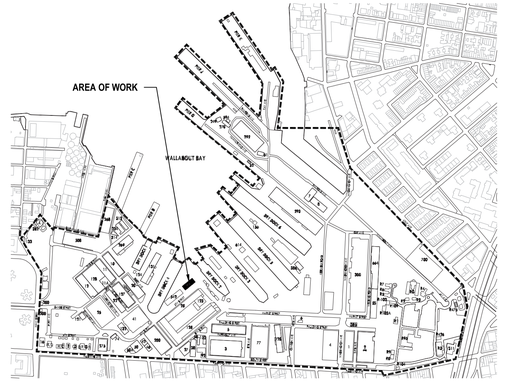

Vanderbilt Ave
Flushing Ave
Navy Yard Basin
Dock Street
Perry Avenue
Sands Street
Nassau Street
Chauncey Avenue
Navy Street
Sterling Place
Myrtle Avenue
Park Avenue
Division Avenue
Clermont Avenue
Vanderbilt Avenue
Kent Avenue
Sterling Place
Taylor Street
Rodney Street
Hewes Street
Lee Avenue
Marcy Avenue
Hooper Street
Broadway
Bedford Avenue
Driggs Avenue
Roebling Street
Havemeyer Street
Metropolitan Avenue
Grand Street
Union Avenue
Lorimer Street
Manhattan Avenue
Nassau Avenue
Greenpoint Avenue
Norman Avenue
Meeker Avenue
Morgan Avenue
Johnson Avenue
Maspeth Avenue
Flushing Avenue
Waverly Avenue
Gold Street
Clinton Street
Bridge Street
Fleet Street
Jay Street
Boerum Place
Smith Street
Hoyt Street
Bond Street
Nevins Street
Third Avenue
Fourth Avenue
Fifth Avenue
Adelphi Street
Clermont Avenue
Vanderbilt Avenue
Kent Avenue
Wythe Avenue
Berry Street
Whythe Avenue
Navy Street
Sands Street
Concord Street
Gold



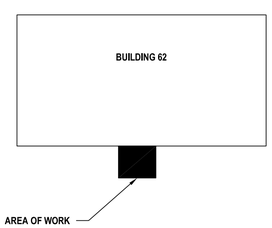
First Floor Demo Plan
SCALE: 1/2"= 1'-0"

GENERAL DEMOLITION NOTES

1. ALL DEMOLITION WORK SHALL BE IN COMPLIANCE WITH ALL APPLICABLE CODES AND REGULATIONS.
2. THE CONTRACTOR SHALL TAKE CARE NOT TO DAMAGE ADJOINING SURFACES OUTSIDE THE CONTRACT AREA OR SCOPE OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE TO RESTORE EXISTING CONDITIONS AND/OR FINISHES DAMAGED DURING CONSTRUCTION INCLUDING PATCHING AND PAINTING DEEMED NECESSARY BY THE ARCHITECT AT NO ADDITIONAL COST TO THE OWNER.
3. THE CONTRACTOR SHALL TAKE CARE AS TO ADEQUATELY PROTECT ALL ADJOINING AREAS INCLUDING HVAC OPENINGS FROM DUST AND DEBRIS DURING DEMOLITION AND CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO WIPE DOWN AND CLEAN AREA OF WORK UPON COMPLETION OF THE PROJECT.
4. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL CONSTRUCTION DEBRIS AND UNWANTED MATERIAL OFF SITE IN ACCORDANCE WITH CONTRACT SPECIFICATIONS AS WELL AS IN ACCORDANCE WITH THE SMP AND CONTRACTORS' ENVIRONMENTAL WORK PLAN SPECIFICATIONS.



SITE KEY PLAN
SCALE:N.T.S.



BLDG KEY PLAN
SCALE:N.T.S.

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	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

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PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT
Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

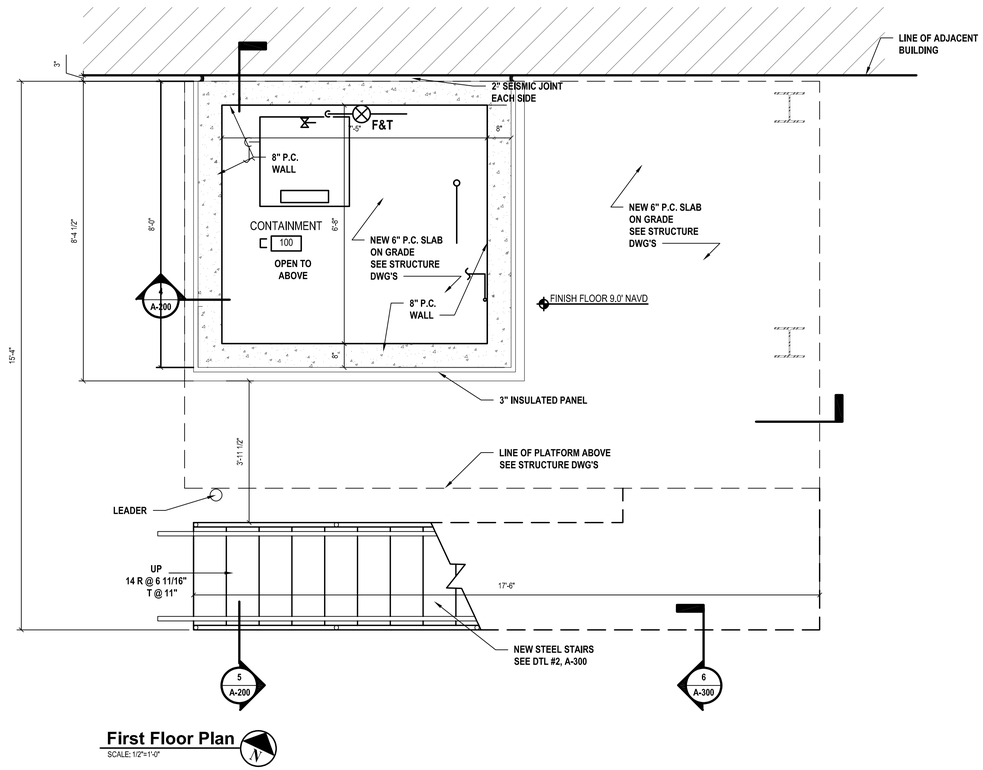
STATUS
FINAL BID DOCUMENT

SHEET TITLE
Floor Plans & Elevations

DRAWING No.
D-100.00

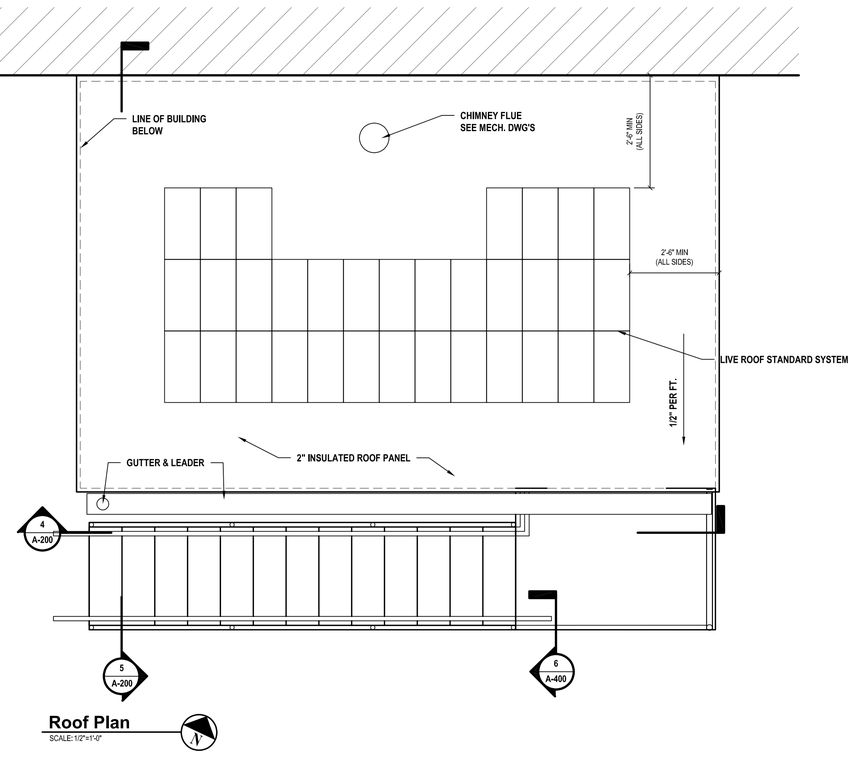
SHEET No.
04 OF 24

X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4 BW\1 - MB\gabriel\D2.BIM\C4\2D\Con-doc\sheet\D-100.00 (Mob, \D2.dwg Last Modified: Apr 20, 2026 - 2:27pm Plotted on: Aug 03, 2026 - 2:41pm By: lmocalle



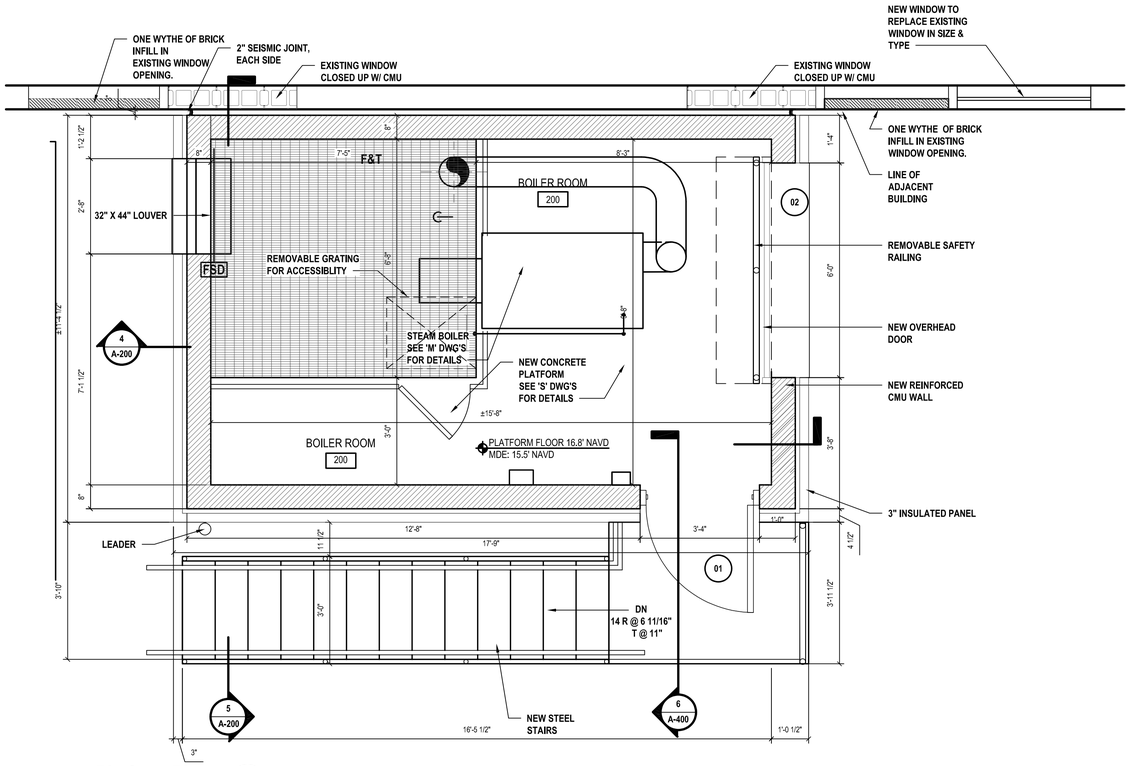
First Floor Plan

SCALE: 1/2"=1'-0"



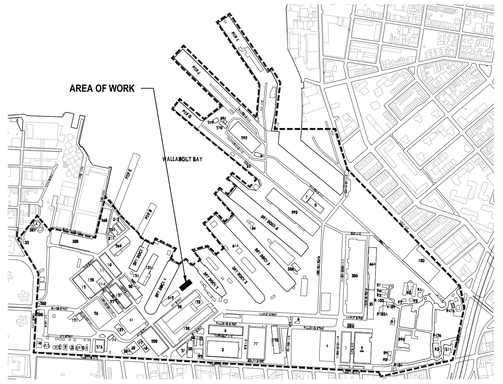
Roof Plan

SCALE: 1/2"=1'-0"



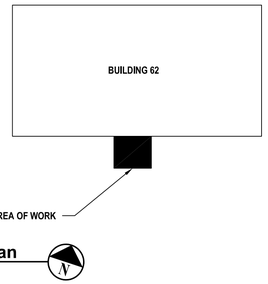
Platform Plan

SCALE: 1/2"=1'-0"



Site Key Plan

SCALE: N.T.S.



Bldg Key Plan

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Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

B N Y

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

STATUS: **FINAL BID DOCUMENT**

SHEET TITLE: **Floor Plans & Elevations**

DRAWING No.: **A-100.00**

SHEET No.: 05 OF 24

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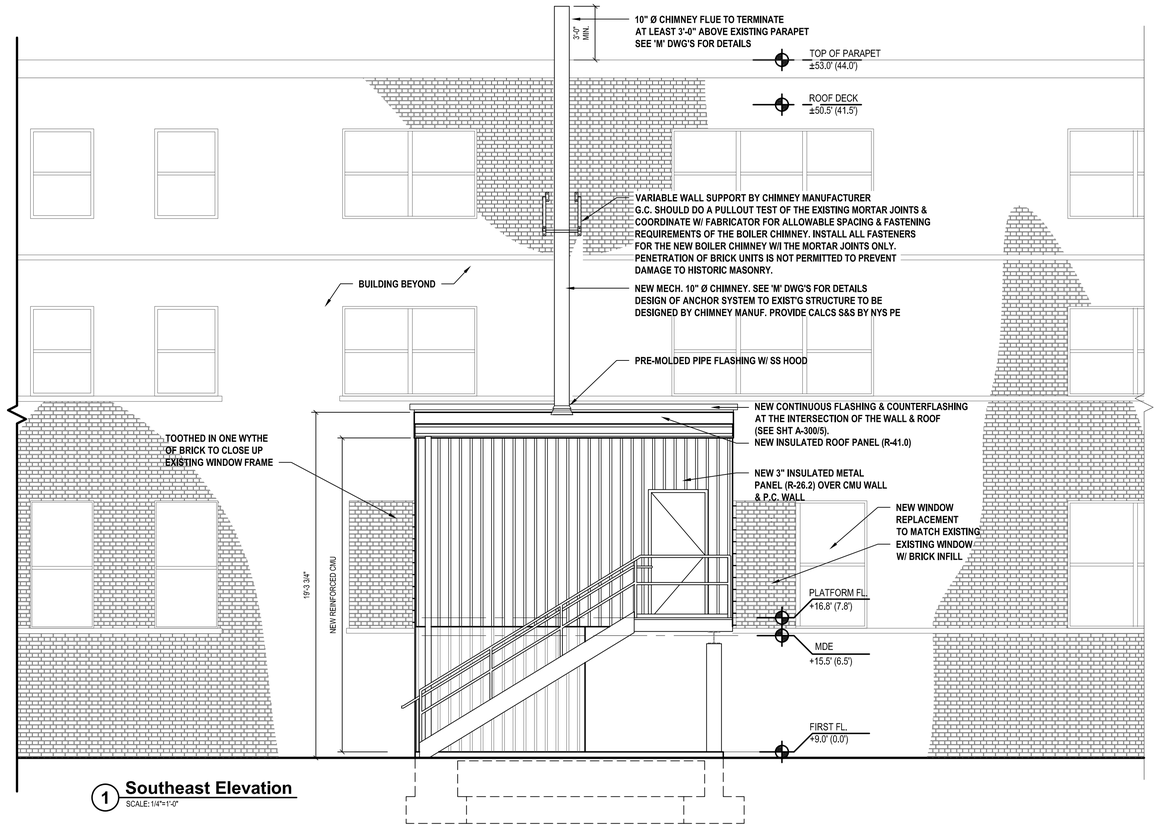
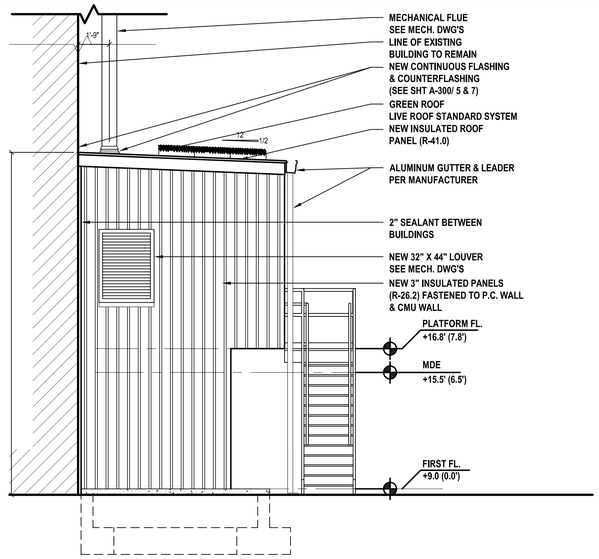


1 **Southeast Elevation**
SCALE: 1/4"=1'-0"



2 **Southwest Elevation**
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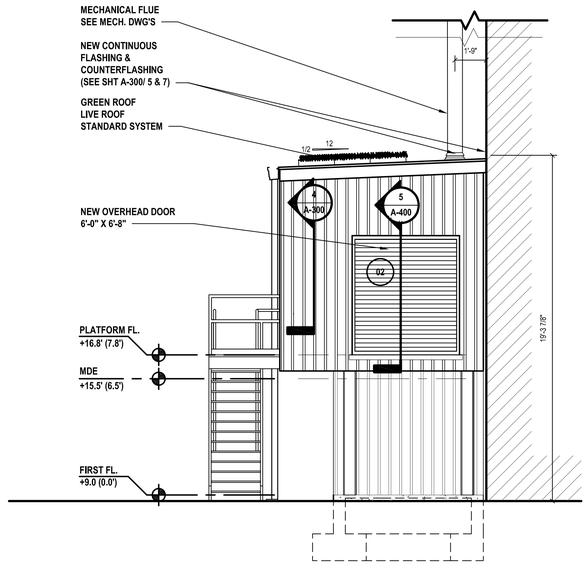
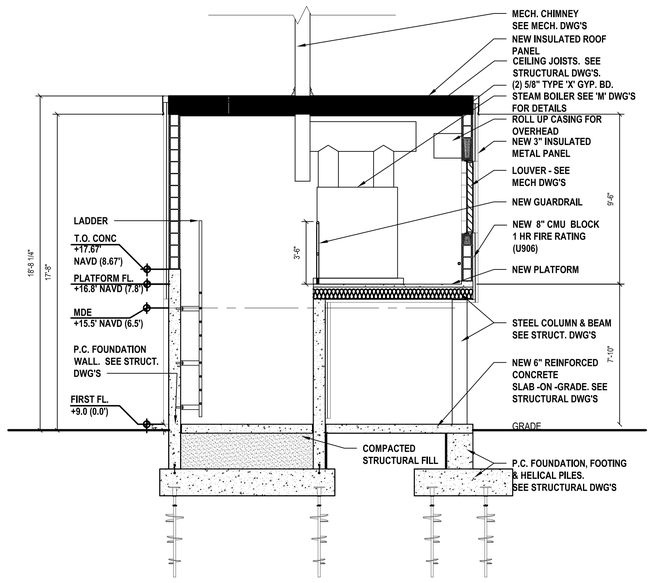
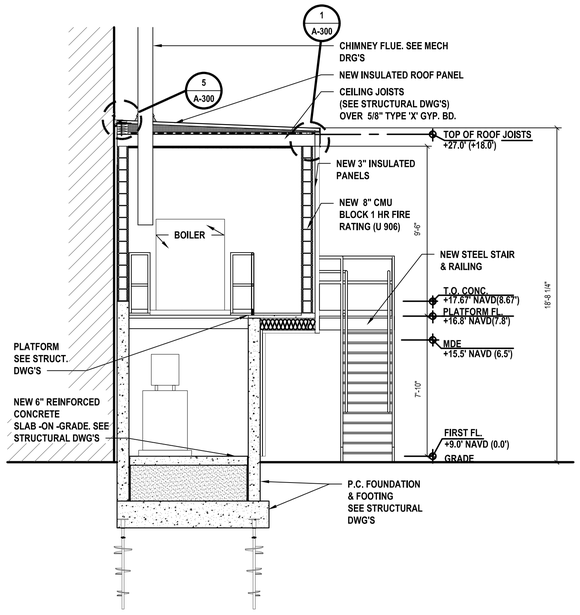


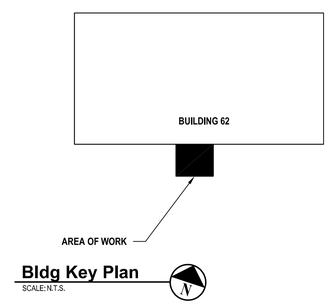
3 **Northeast Elevation**
SCALE: 1/4"=1'-0"



4 **Building Section**
SCALE: 1/4"=1'-0"



5 **Building Section**
SCALE: 1/4"=1'-0"



Bldg Key Plan
SCALE: N.T.S.

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Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

STATUS
FINAL BID DOCUMENT

SHEET TITLE
Building Elevations & Sections

DRAWING No.
A-200.00

SHEET No.
06 OF 24

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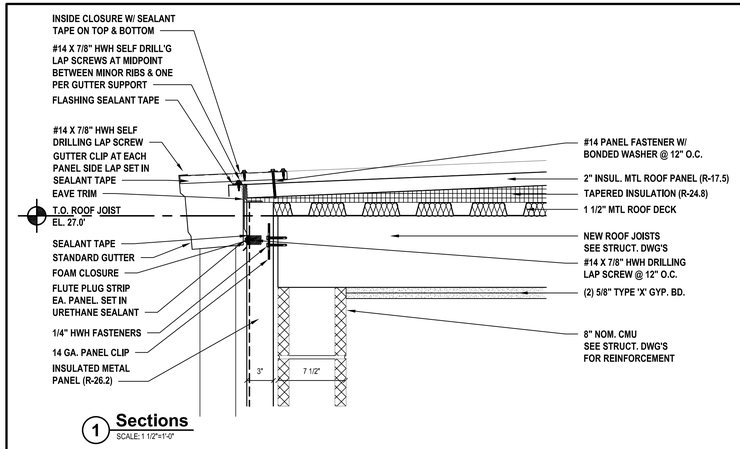
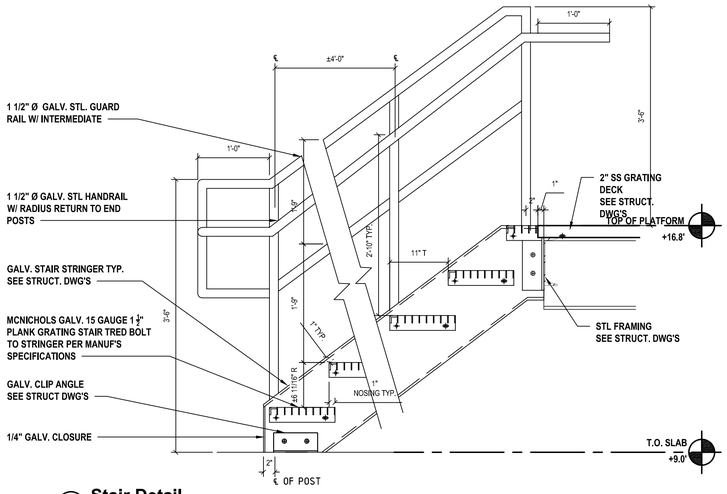


1 **Sections**
SCALE: 1 1/2"=1'-0"



2 **Stair Detail**
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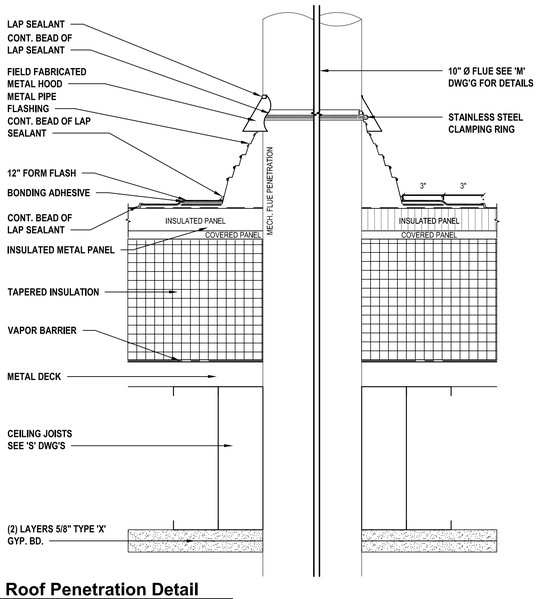

7 **Roof Penetration Detail**
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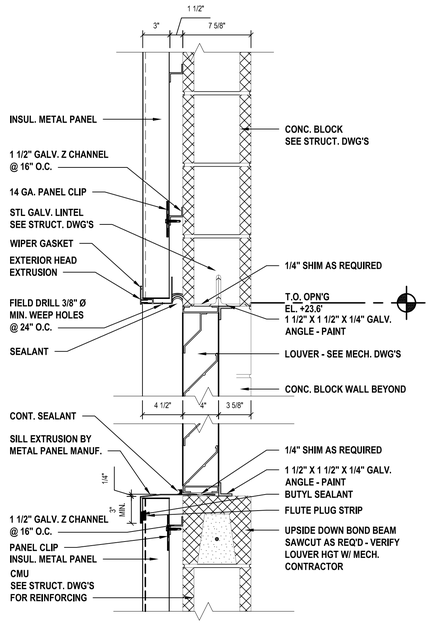
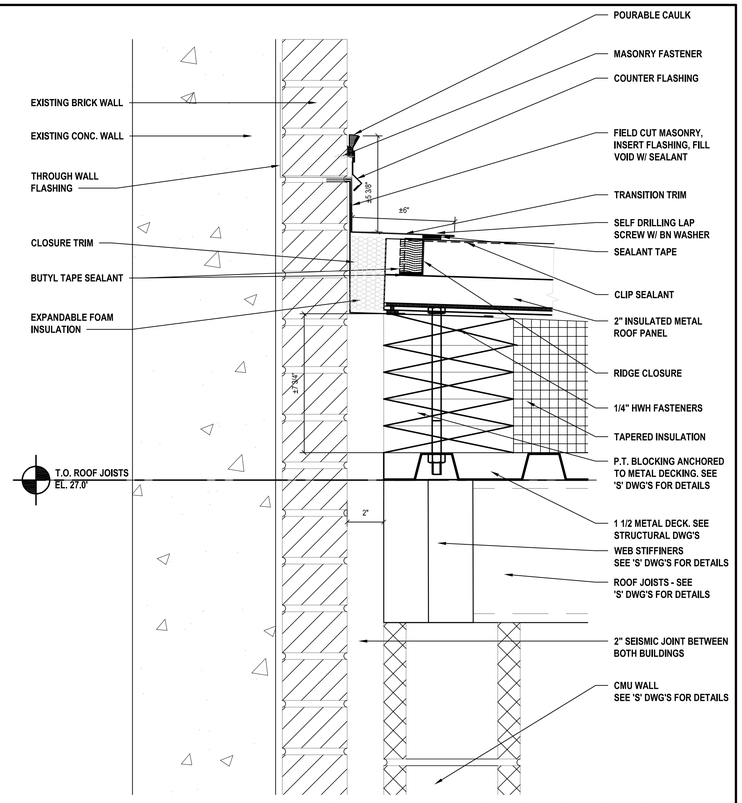


4 **Louver Detail**
SCALE: 1 1/2"=1'-0"



5 **Transition Masonry Wall to High Eave Detail**
SCALE: 3"=1'-0"

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Brooklyn, NY 11205

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SHEET TITLE
Section, Details, & Door Schedule

DRAWING No.
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SHEET No.
07 OF 24

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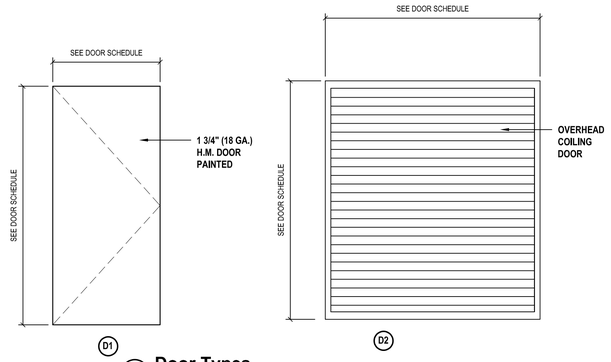
DOOR AND FRAME SCHEDULE

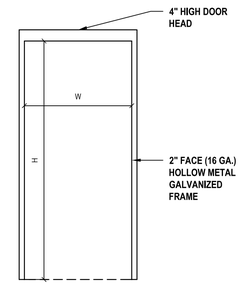
MARK	DOOR SIZE WD	DOOR SIZE HGT	DOOR SIZE THK	DOOR MATL	DOOR EL	FRAME MATL	FRAME DETAIL HEAD	FRAME DETAIL JAMB	FRAME DETAIL SILL	FIRE RATING LABEL	NOTES
1	3'-0"	7'-0"	2"	HM	D1	HM	H1	J1	DTL #4	--	--
2	6'-0"	6'-10"	1 3/4"	2 5/8" SLAT	D2	--	DTL #5	J2	DTL #5	--	OVERHEAD COILING DOOR



D1 D2

1 Door Types

SCALE: 1/2"=1'-0"



F1 Frame Type

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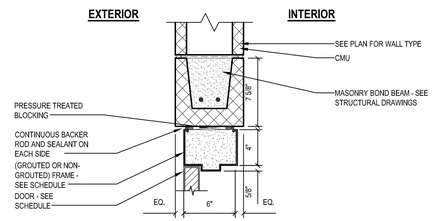
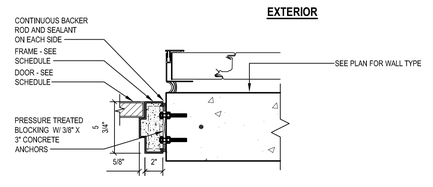


H1 Door Head (Bond Beam)

Scale: 1 1/2" =1'-0"

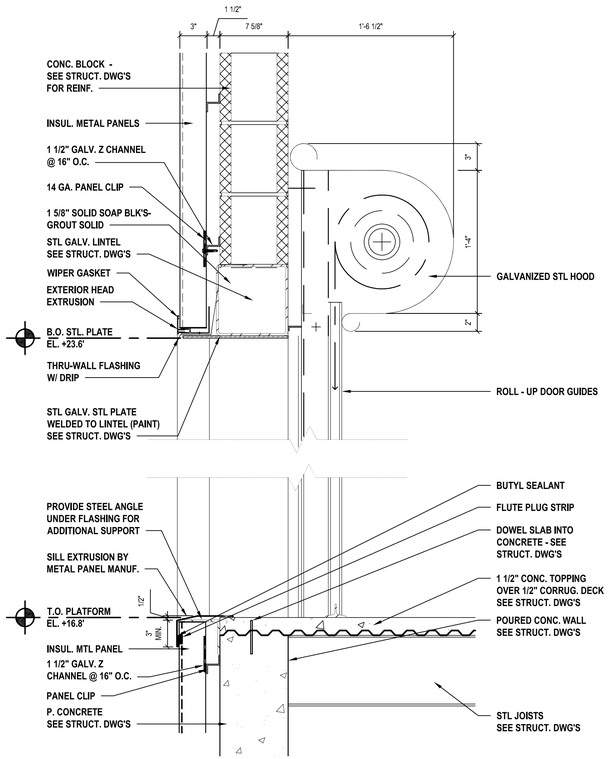
H2M Ref # DH1B-001



J1 Door Jamb

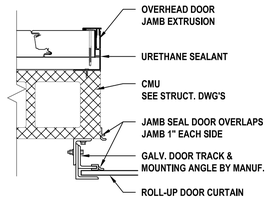
Scale: 1 1/2" =1'-0"

H2M Ref # DJ1-001



5 Roll-up Door Section

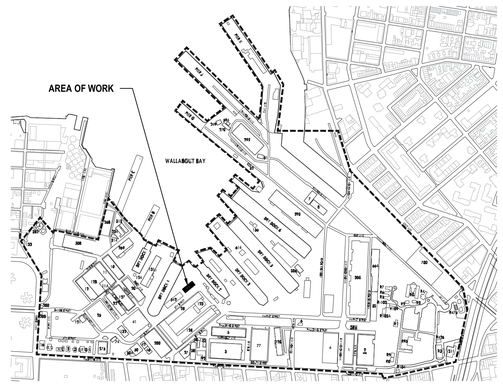
SCALE: 1 1/2"=1'-0"



J2 Door Jamb

Scale: 1 1/2" =1'-0"

H2M Ref # DJ1-001



SITE KEY PLAN

SCALE: N.T.S.

H2M architects + engineers

538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

KEVIN M. PAUL, R.A.
NY REGISTERED ARCHITECT Lic. No. 023976
EXP. DATE

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
LAM	LAM		

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

B N Y

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

STATUS

FINAL BID DOCUMENT

SHEET TITLE

Section, Details, & Door Schedule

DRAWING No.

A-400.00

SHEET No. 08 OF 24

X:\BNYD (Brooklyn Navy Yard)_4070\0BNYD1907A - 4388\01 - Mitigation\02-BIM-CAD\Civil\Architecture\A-400.00 (Hdg 62) Jorg Last Modified: Apr 29, 2026 - 2:27pm Plotted on: Aug 03, 2026 - 2:40pm By:lmonsiak

COMcheck Software Version 4.1.5.5

Envelope Compliance Certificate

Project Information

Energy Code: 2020 New York City Energy Conservation Code, Appendix CA (modified 90.1-2(...
Project Title:
Location: New York, New York
Climate Zone: 4a
Project Type: Addition
Performance Sim. Specs: EnergyPlus 8.1.0.009 (EPW: USA_NY_New.York-LaGuardia.AP.725030_TMY3 ...
Construction Site: Owner/Agent: Designer/Contractor:

Building Area

Building Area	Floor Area
1-Manufacturing Facility : Nonresidential	230

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U-Factor
Roof 1: Insulation Entirely Above Deck, [Bldg. Use 1 - Manufacturing Facility]	263	---	41.0	0.024	0.030
Floor 1: Slab-On-Grade:Unheated, Vertical 3 ft., [Bldg. Use 1 - Manufacturing Facility] (b)	63	---	15.0	0.480	0.520
EAST					
Exterior Wall 1: Concrete Block:8", Partially Grouted, Cells Empty, Furring: Metal, [Bldg. Use 1 - Manufacturing Facility]	136	1.2	26.2	0.034	0.099
Door 2: Insulated Metal, Non-Swinging, [Bldg. Use 1 - Manufacturing Facility]	40	---	---	0.230	
Exterior Wall 1A: Solid Concrete:8" Thickness, Medium Density, Furring: Metal, [Bldg. Use 1 - Manufacturing Facility]	139	0.6	26.2	0.035	0.310 0.099
Door 1: Uninsulated Double-Layer Metal, Swinging, [Bldg. Use 1 - Manufacturing Facility]	21	---	---	0.360	
SOUTH					0.320
Exterior Wall 2: Concrete Block:8", Partially Grouted, Cells Empty, Medium Density, Furring: Meta, [Bldg. Use 1 - Manufacturing Facility]	140	1.2	26.2	0.034	0.099
Exterior Wall 2A: Solid Concrete:8" Thickness, Medium Density, Furring: Metal, [Bldg. Use 1 - Manufacturing Facility]	147	1.2	26.2	0.034	0.099
WEST					
Exterior Wall 3: Concrete Block:8", Partially Grouted, Cells Empty, Medium Density, Furring: Meta, [Bldg. Use 1 - Manufacturing Facility]	136	1.2	26.2	0.034	0.099
Exterior Wall 3A: Solid Concrete:8" Thickness, Medium Density, Furring: Metal, [Bldg. Use 1 - Manufacturing Facility]	139	0.6	26.2	0.035	0.099

(a) Budget U-factors are used for software baseline calculations ONLY, and are not code requirements.
(b) Slab-On-Grade proposed and budget U-factors shown in table are F-factors.

Project Title: Report date: 01/29/25
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 1 of 10

COMcheck Software Version 4.1.5.5

Inspection Checklist

Energy Code: 2020 New York City Energy Conservation Code, Appendix CA

Requirements: 0.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen for each requirement, the user certifies that a code requirement will be met and how that is documented, or that an Exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
4.2.2, 5.4.3.1.1, 5.7 [PR1][1]	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
4.2.2, 8.4.1.1, 8.4.1.2, 8.7 [PR6][2]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the electrical systems and equipment and document where exceptions are claimed. Feeder connectors sized in accordance with approved plans and branch circuits sized for maximum drop of 3%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
8.4.5 [PR11][1]	Electrical meters for tenant spaces in covered buildings. Each covered tenant space in a new building shall be equipped with a separate meter or sub-meter to measure the electrical consumption of such space when let or sublet. See section details and Section 28-311.2 of the Administrative Code. As new covered tenant spaces are created, they shall be equipped with meters or sub-meters as provided in this section	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
I1 [PR12][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 3 of 10

Section # & Req.ID	Footing / Foundation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
4.2.4 [FO1][2]	Installed below-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____	R-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
4.2.4 [FO3][2]	Installed slab-on-grade insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____ ☐ Unheated ☐ Heated	R-____ ☐ Unheated ☐ Heated	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2 [FO4][2]	Slab edge insulation installed per manufacturer's instructions.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.5.3.5 [FO5][2]	Slab edge insulation depth/length.	____ft	____ft	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.7 [FO6][1]	Exterior insulation protected against damage, sunlight, moisture, wind, landscaping and equipment maintenance activities.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.7.3 [FO7][1]	Insulation in contact with the ground has <=0.3% water absorption rate per ASTM C272.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
6.4.4.1.5 [FO11][3]	Bottom surface of floor structures incorporating radiant heating insulated to >=R-3.5.	R-____	R-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 4 of 10

Section # & Req.ID	Framing / Rough-In Inspection	Plans Verified lue	Field Verified Value	Complies?	Comments/Assumptions
5.4.3.2 [FR1][3]	Factory-built and site-assembled fenestration and doors are labeled or certified as meeting air leakage requirements.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.5.4.3a [FR8][3]	Vertical fenestration U-Factor.	U-____	U-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.3b [FR9][3]	Skylight fenestration U-Factor.	U-____	U-____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.4.1 [FR10][2]	Vertical fenestration SHGC value.	SHGC:____	SHGC:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.5.4.4.2 [FR11][2]	Skylight SHGC value.	SHGC:____	SHGC:____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.2.1, 5.8.2.3, 5.8.2.4, 5.8.2.5 [FR12][2]	Fenestration products rated (U-factor, SHGC, and VT) in accordance with NFRC or energy code defaults are used.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.2.2 [FR13][2]	Fenestration and door products are labeled, or a signed and dated certificate listing the U-factor, SHGC, VT, and air leakage rate has been provided by the manufacturer.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.5.3.6 [FR14][2]	U-factor of opaque doors associated with the building thermal envelope meets requirements.	U-____ ☐ Swinging ☐ Nonswinging	U-____ ☐ Swinging ☐ Nonswinging	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.4.3.1 [FR15][2]	Continuous air barrier is wrapped, sealed, caulked, gasketed, and/or taped in an approved manner, except in semiheated spaces.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.4.4 [FR10][2]	Applications for construction document approval includes thermal bridge documentation inlcuding: 1) Clear field thermal bridges, 2) Point thermal bridges, 3) Linear thermal bridges. See section language for details.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 5 of 10

Envelope PASSES: Design 21% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2020 New York City Energy Conservation Code, Appendix CA (modified 90.1-2016) requirements in COMcheck Version 4.1.5.5 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10][2]	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
8.4.3 [EL11][2]	New buildings have electrical energy use measurement devices installed. Where tenant spaces exist, each tenant is monitored separately. In buildings with a digital control system the energy use is transmitted to to control system and displayed graphically.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 6 of 10

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
4.2.4 [IN2][1]	Installed roof insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports. For some ceiling systems, verification may need to occur during Framing Inspection.	R-____ ☐ Above deck ☐ Metal ☐ Attic	R-____ ☐ Above deck ☐ Metal ☐ Attic	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2, 5.8.1.3 [IN3][1]	Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the ceiling slope is <= 3:12.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
4.2.4 [IN6][1]	Installed above-grade wall insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____ ☐ Mass ☐ Metal ☐ Steel ☐ Wood	R-____ ☐ Mass ☐ Metal ☐ Steel ☐ Wood	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.2 [IN7][1]	Above-grade wall insulation installed per manufacturer's instructions.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
4.2.4 [IN8][2]	Installed floor insulation type and R-value consistent with insulation specifications reported in plans and COMcheck reports.	R-____ ☐ Mass ☐ Steel ☐ Wood	R-____ ☐ Mass ☐ Steel ☐ Wood	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Envelope Assemblies table for values.*
5.8.1.1 [IN10][2]	Building envelope insulation is labeled with R-value or insulation certificate has been provided listing R-value and other relevant data.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.9 [IN18][2]	Building envelope insulation extends over the full area of the component at the proposed rated R or U value.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.4 [IN11][2]	Eaves are baffled to deflect air to above the insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.5 [IN12][2]	Insulation is installed in substantial contact with the inside surface separating conditioned space from unconditional space.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.6 [IN13][2]	Recessed equipment installed in building envelope assemblies does not compress the adjacent insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.7.1 [IN15][2]	Attics and mechanical rooms have insulation protected where adjacent to attic or equipment access.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 7 of 10

Section # & Req.ID	Insulation Inspection	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
5.8.1.7.2 [IN16][2]	Foundation vents do not interfere with insulation.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.8.1.8 [IN17][2]	Insulation intended to meet the roof insulation requirements cannot be installed on top of a suspended ceiling. Mark this requirement compliant if insulation is installed accordingly.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 8 of 10

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
5.4.3.3 [FI1][2]	Weatherseals installed on all loading dock cargo doors in Climate Zones 4-8.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
5.7.5 [FI58][1]	Air barrier commissioning. Registered or approved agent provides evidence of air barrier commissioning including: 1) Construction documents that include documentation of the continuous air barrier components included in the design and a field inspection checklist that includes all requirements necessary for maintaining air barrier continuity and durability in accordance with Section 5.4.3.1; 2) Reports from field inspections during project construction showing compliance with continuous air barrier requirements. Air barrier continuity shall be determined by testing or inspecting each type of unique air barrier joint or seam in the building envelope for continuity and defects; 3) A final commissioning report indicating compliance with the continuous air barrier requirements shall be provided to the building owner and, upon request, to the code official.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Report date: 12/06/23
Data filename: X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\01-Reports\ComCheck.cck Page 9 of 10

"TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE NEW YORK CITY ENERGY CONSERVATION CODE." 2020

H2M architects + engineers
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Melville, NY 11747
631.756.8000 • www.h2m.com
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CONSULTANTS:

MARK	DATE	DESCRIPTION
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KEVIN M. PAUL, R.A. EXP. DATE
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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
LAM	LAM	KMP	

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

B N Y

63 Flushing Avenue, Suite 300 Brooklyn, NY 11205

CONTRACT

STATUS **FINAL BID DOCUMENT**

SHEET TITLE **COMCHECK**

DRAWING No. **EN-100.00**

SHEET No. 09 OF 24

X:\BNYD (Brooklyn Navy Yard) - 40700\BNYD1907A - 4388V1 - Mitigation\02-BIM-CADD\Civil\dwg\EN-100.00 (Hdg.ID2).dwg Last Modified: Apr 20, 2026 - 2:26pm Plotted on: Aug 01, 2026 - 2:41pm By lmocsik

DESIGN CRITERIA:

ALL DESIGN LOADS ARE IN ACCORDANCE WITH 2022 NYC BC IN CONJUNCTION WITH ASCE 7-16 (WIND)

1. DEAD LOADS
   - SECOND FLOOR TOTAL DEAD LOAD (NEW SLAB): 65 PSF
2. LIVE LOADS
   - MECHANICAL ROOM: 75 PSF
   - ROOF: 20 PSF
   - GREEN ROOF: 20 PSF
   - LATERAL PRESSURE ON INTERIOR WALLS: 5 PSF
3. SNOW LOADS

GROUND SNOW LOAD:	Pg	=	25 PSF
EXPOSURE FACTOR:	Ce	=	1.1
IMPORTANCE FACTOR:	Is	=	1.0
THERMAL FACTOR:	Ct	=	1.1
FLAT ROOF SNOW LOAD:	Pf	=	16.9 PSF
MINIMUM SNOW LOAD:	Pm	=	20 PSF
RAIN ON SNOW SURCHARGE:		=	0 PSF
TOTAL DESIGN SNOW LOAD W/O DRIFT: (NON-REDUCIBLE)		=	20 PSF
DRIFT SNOW LOAD		=	58.1 PSF

4. WIND LOADS
   - BASIC WIND SPEED: 115 MPH
   - EXPOSURE: C
   - IMPORTANCE FACTOR Iw = 1.00
   - INTERNAL PRESSURE COEFFICIENT: Gcp = ±0.55 (OPEN BUILDING)
   - "a" END ZONE WIDTH: 3 FT
   - NET UPLIFT: -37.56 PSF

		EXPOSURE B WIND LOADS		EXPOSURE ADJUSTMENT COEFFICIENT		IMPORTANCE FACTOR		ASD DESIGN WIND LOADS
MWFRS WALL (END ZONE)		31.3 PSF	x	1.0	x	1.0	=	31.3 PSF
MWFRS WALL (INT. ZONE)		20.8 PSF	x	1.0	x	1.0	=	20.8 PSF
MWFRS ROOF		16.2 PSF	x	1.0	x	1.0	=	16.2 PSF
COMPONENT & CLADDING	WALLS (END ZONE)	23.9 PSF	x	1.0	x	1.0	=	23.9 PSF
		-31.9 PSF	x	1.0	x	1.0	=	-31.9 PSF
	WALLS (INT. ZONE)	23.9 PSF	x	1.0	x	1.0	=	23.9 PSF
		-25.9 PSF	x	1.0	x	1.0	=	-25.9 PSF
	ROOF (END ZONE)	13.9 PSF	x	1.0	x	1.0	=	13.9 PSF
		-71.8 PSF	x	1.0	x	1.0	=	-71.8 PSF
	ROOF (INT. ZONE)	13.9 PSF	x	1.0	x	1.0	=	13.9 PSF
		-54.4 PSF	x	1.0	x	1.0	=	-54.4 PSF
	ROOF (CORNER ZONE)	13.9 PSF	x	1.0	x	1.0	=	13.9 PSF
		-97.8 PSF	x	1.0	x	1.0	=	-97.8 PSF

COMPONENT AND CLADDING VALUES LISTED ARE BASED ON 10 SQUARE FOOT "EFFECTIVE AREA" AS DEFINED BY SEI/ ASCE 7-16 STANDARD - MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES. ALL ITEMS SPECIFIED TO BE DESIGNED BY OTHERS SHALL BE DESIGNED TO WITHSTAND COMPONENT AND CLADDING LOADS UNLESS SPECIFICALLY NOTED OTHERWISE IN PLANS, SPECIFICATIONS OR BY RFI RESPONSE. WIND LOADS MAY BE REDUCED BASED ON INCREASED "EFFECTIVE AREA" WHEN CALCULATIONS ARE SUBMITTED AND REVIEWED BY ENGINEER PRIOR TO FINAL DESIGN SUBMISSION. SUBMITTAL SHALL INCLUDE EFFECTIVE AREA ASSUMPTIONS FOR EACH COMPONENT AND WIND LOAD CALCULATIONS USING PARAMETERS SPECIFIED HEREIN.

5. SEISMIC CRITERIA:

SITE CLASS:		E	
IMPORTANCE FACTOR, Ie =		1.0	
Ss =	0.281	S1 =	0.073
Fa =	2.42	Fv =	3.50
Sms =	0.680	Sm1 =	0.256
Sds =	0.453	Sd1 =	0.171

- SEISMIC DESIGN CATEGORY: C
- ANALYSIS METHOD: EQUIVALENT LATERAL FORCE PROCEDURE
- SEISMIC LATERAL FORCE RESISTING SYSTEM:
  - MASONRY SHEAR WALL
  - R =2.0 Ω = 1.5 Cd = 1.75
  - SEISMIC RESPONSE COEFFICIENT Cs = 0.1499
- TOTAL ULTIMATE BASE SHEAR: 6 KIPS

6. FLOOD LOADS
   - FLOOD LOADS BASED ON BUILDING CODE, ASCE 24, ASCE7, AND FEMA FIRMS AND PFIRMS IN EFFECT AT THIS SITE
   - FLOOD ZONE: COASTAL AE
   - BASE FLOOD ELEVATION (BFE): 12 FT
   - DESIGN FLOOD ELEVATION (DFE): 15.5 FT

   DESIGN FLOOD ELEVATION IS EQUAL TO BASE FLOOD ELEVATION + 1'-0" FREEBOARD + 2'-6" PROJECTED SEA LEVEL RISE

7. GEOTECHNICAL INFORMATION

   GEOTECHNICAL INFORMATION PROVIDED BY GEOTECHNICAL ENGINEERING REPORT BY MFS CONSULTING ENGINEERS, DATED 7 FEBRUARY 2020. REFER TO THIS REPORT FOR ADDITIONAL SOIL AND FOUNDATION DESIGN INFORMATION.

   SHALLOW FOUNDATIONS ARE NOT PERMITTED FOR NEW CONSTRUCTION. VALUES PROVIDED ARE FOR EVALUATION OF EXISTING STRUCTURE ONLY.
   - SOIL BEARING CAPACITY: 500 PSF (FOR EXISTING FOUNDATIONS ONLY)
   - FROST DEPTH: 4 FT
   - SUBGRADE MODULUS: 50 PCI
   - MAXIMUM SAFE EXCAVATION SLOPE: 1.5H : 1V

DESIGN CODES/REFERENCE FOR DESIGN AND DELEGATED DESIGN

1. AISI EDITION OF THE COLD-FORMED STEEL DESIGN MANUAL.
2. AWS - STRUCTURAL WELDING CODE - STEEL.
3. ACI 318 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
4. ANSI/AISC, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS.
5. STRUCTURAL WELDED WIRE REINFORCEMENT MANUAL OF STANDARD PRACTICE, WIRE REINFORCEMENT INSTITUTE.
6. ACI 530 BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES.
7. STRUCTURAL WELDED WIRE REINFORCEMENT MANUAL OF STANDARD PRACTICE, WIRE REINFORCEMENT INSTITUTE.

GENERAL NOTES:

1. SPECIFICATIONS ARE PART OF THE CONSTRUCTION DOCUMENTS AND MUST BE USED IN CONJUNCTION WITH THE DRAWINGS.
2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS BY MEASUREMENTS AT THE JOB SITE AND SHALL TAKE ANY AND ALL OTHER MEASUREMENTS NECESSARY TO VERIFY THE DRAWINGS AND TO PERFORM THE WORK PROPERLY. ANY DISCREPANCY BETWEEN THE DRAWINGS AND THE MEASURED DIMENSIONS OF THE EXISTING SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER. NO WORK SHALL PROCEED UNTIL SUCH DISCREPANCY HAS BEEN RECTIFIED INCLUDING BUT NOT LIMITED TO FABRICATION OF MATERIALS. SUCH DISCREPANCIES BETWEEN THE DRAWINGS AND THE MEASURED DIMENSIONS SHALL NOT BE THE REASONS FOR ANY EXTRA COST OR DELAY IN THE EXECUTION OF THE WORK AND THE WORK SHALL BE PERFORMED AT NO EXTRA COST TO THE OWNER.
3. ALL CONTRACTORS ARE REQUIRED TO VISIT THE SITE AND FULLY INFORM THEMSELVES AS TO THE EXISTING CONDITIONS AND LIMITATIONS PRIOR TO SUBMITTING THEIR PROPOSAL/BID. FAILURE TO VISIT THE SITE AND NOT FAMILIARIZING THEMSELVES WITH THE CONDITIONS AND LIMITATIONS WILL IN NO WAY RELIEVE THE SUCCESSFUL BIDDER FROM FURNISHING ANY MATERIALS OR PERFORMING ANY WORK THAT MAY BE REQUIRED TO COMPLETE THE WORK IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATIONS AT NO ADDITIONAL COST TO THE OWNER.
4. THE CONTRACT STRUCTURAL DOCUMENTS REPRESENT THE FINISHED STRUCTURE. THE CONTRACTOR ALONE IS RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND SAFETY OF STRUCTURE AND WORKMEN DURING THE ENTIRE CONSTRUCTION PERIOD, WHICH SHALL INCLUDE BUT NOT BE LIMITED TO DESIGN AND INSTALLATION OF BRACING, SHORING FOR CONSTRUCTION EQUIPMENT, SHORING FOR THE BUILDING, FORMS AND SCAFFOLDING. SHORING OF RETAINING WALLS AND OTHER TEMPORARY SUPPORTS AS REQUIRED. ANY DAMAGE TO THE STRUCTURE IF OCCURRED SHALL BE RECTIFIED TO THE ENTIRE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR SHALL SCHEDULE THE WORK IN CONSULTATION WITH THE OWNER AND IN SUCH A WAY AS TO MINIMIZE THE CONFLICT OF THE OPERATION OF THE BUILDING. COMPLY WITH APPLICABLE REQUIREMENTS OF OSHA AND OTHER GOVERNING BODIES HAVING JURISDICTION AT THE SITE.
5. IN CASE OF ANY DAMAGE TO THE CONSTRUCTION, THE CONTRACTOR SHALL REPAIR THE SAME TO THE SATISFACTION OF THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
6. THE CONTRACTOR SHALL INFORM THE ENGINEER OF ANY DEMOLITION, ALTERATIONS REQUIRED OR INTERFERENCES NOT SHOWN ON THE DEMOLITION DRAWINGS FOR RESOLUTION. THE CONTRACTOR SHALL ALLOW 7 WORKING DAYS FOR RESOLUTION OF THE CONDITION UNLESS ADDITIONAL TIME IS STATED TO BE REQUIRED BY THE ENGINEER.
7. TYPICAL DETAILS ON DRAWINGS APPLY TO SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SUCH DETAILS APPLY WHETHER OR NOT DETAILS ARE REFERENCED AT EACH LOCATION. NOTIFY ENGINEER OF CONFLICTS REGARDING APPLICABILITY OF TYPICAL DETAILS.
8. DO NOT LOAD THE FINISHED SLAB WITH ERECTION EQUIPMENT. DO NOT STACK CONSTRUCTION MATERIALS ON DECKS/SLABS. DO NOT CAUSE IMPACT LOADS TO DECK/SLAB DURING CONSTRUCTION.
9. VERIFY THE LOCATION OF CHASES, INSERTS, OPENINGS, SLEEVES, FINISHES, DEPRESSIONS, PADS, AND WALL OPENINGS.
10. PRINCIPAL OPENINGS THROUGH THE FRAMING AND SLABS ARE SHOWN ON DRAWINGS. COORDINATE WITH THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR ALL REQUIRED OPENINGS AND PROVIDE FOR REQUIRED OPENINGS WHETHER SHOWN ON THE STRUCTURAL DRAWINGS OR NOT. VERIFY SIZE AND LOCATION OF OPENINGS WITH MECHANICAL/ELECTRICAL TRADES. DEVIATIONS FROM THE OPENINGS SHOWN ON THE STRUCTURAL DRAWINGS MUST BE APPROVED PRIOR TO CONSTRUCTION/FABRICATION OF THE REQUIRED OPENINGS.
11. LOADINGS FOR MECHANICAL & ELECTRICAL EQUIPMENT ARE BASED ON THE UNITS SHOWN ON THE MECHANICAL & ELECTRICAL DRAWINGS. ANY CHANGES IN TYPE, SIZE OR NUMBER OF PIECES OF EQUIPMENT SHALL BE REPORTED TO THE ARCHITECT/ENGINEER FOR VERIFICATION OF THE ADEQUACY OF SUPPORTING MEMBERS PRIOR TO THE PLACEMENT OF SUCH EQUIPMENT.
12. SEE ARCHITECTURAL DRAWINGS FOR ELEVATIONS NOT SHOWN AND FOR EXACT LOCATIONS OF ALL SLAB DEPRESSIONS AND HOUSEKEEPING PADS. THE CONTRACTOR SHALL COMPARE THE STRUCTURAL SECTIONS WITH ARCHITECTURAL SECTIONS AND REPORT ANY DISCREPANCY TO THE ARCHITECT PRIOR TO FABRICATING OR INSTALLING STRUCTURAL MEMBERS.

EXCAVATION NOTES:

1. PROTECT ABOVE AND BELOW GRADE UTILITIES WHICH ARE TO REMAIN.
2. PROTECT PLANT LIFE, LAWNS AND OTHER FEATURES REMAINING AS A PORTION OF FINAL LANDSCAPING.
3. PROTECT BENCH MARKS, EXISTING STRUCTURES, FENCES, SIDEWALKS, PAVING AND CURBS FROM EXCAVATION EQUIPMENT AND VEHICULAR TRAFFIC.
4. GRADE TOP PERIMETER OF EXCAVATION TO PREVENT SURFACE WATER FROM DRAINING INTO EXCAVATION.
5. HAND TRIM EXCAVATION. REMOVE LOOSE MATTER.
6. REMOVE LUMPED SUB-SOIL, BOULDERS AND ROCK.
7. NOTIFY ENGINEER OF UNEXPECTED SUBSURFACE CONDITIONS AND DISCONTINUE AFFECTED WORK AREA UNTIL NOTIFIED TO RESUME WORK.
8. CORRECT UNAUTHORIZED EXCAVATION AT NO EXTRA COST TO OWNER IN ACCORDANCE WITH BACKFILLING NOTES.
9. STOCKPILE EXCAVATED MATERIAL IN AREA DESIGNATED ON SITE AND REMOVE EXCESS MATERIAL NOT BEING REUSED FROM SITE.
10. PROTECT EXCAVATIONS BY METHODS REQUIRED TO PREVENT CAVE-IN OR LOOSE SOIL FROM FALLING INTO EXCAVATION.
11. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING STUCTURES AND UTILITIES PRIOR TO EXCAVATION. CONTRACTOR SHALL ENSURE ALL SURROUNDING STRUCTURES ARE PROTECTED FROM THE EFFECTS OF ALL EXCAVATION.

FOUNDATION NOTES:

1. FOUNDATION DESIGN IS BASED UPON THE GEOTECHNICAL ENGINEERING REPORT BY MFS DATED 2/7/2020. COORDINATE STRUCTURAL PLANS AND DETAILS WITH REQUIREMENTS OF GEOTECHNICAL REPORT. THE FOUNDATIONS HAVE BEEN DESIGNED TO BE PILE SUPPORTED PER THE RECOMMENDATIONS OF THE REPORT.
2. REFER TO THE GEOTECHNICAL REPORT AND SPECIFICATIONS FOR GENERAL REQUIREMENTS OF EARTHWORK, OVER EXCAVATION, SUBGRADE PREPARATION, FILL AND COMPACTION, WATERPROOFING AND OTHER PERTINENT REQUIREMENTS AND INFORMATION. IF THERE IS A CONFLICT BETWEEN GEOTECHNICAL REPORT AND STRUCTURAL PLANS OR SPECIFICATIONS THEN THE MORE STRINGENT CRITERIA SHALL APPLY UNLESS OTHERWISE DIRECTED BY AN RFI.
3. PROTECT PIPES AND CONDUITS RUNNING THROUGH WALLS AND SLABS WITH 1/2 INCH EXPANSION JOINT MATERIAL. LOWER CONTINUOUS FOOTINGS AND GRADE BEAMS PERPENDICULAR TO PIPE RUNS TO ALLOW PIPES TO PASS ABOVE THE FOOTINGS. LOWER FOOTINGS AND GRADE BEAMS PARALLEL TO PIPE RUNS TO AVOID SURCHARGE ONTO ADJACENT TRENCH EXCAVATIONS.
4. MAINTAIN SPECIFIED SUBGRADE AND FILL MOISTURE CONTENT UNTIL FOUNDATIONS ARE PLACED.
5. ARRANGE FOR OWNER'S INDEPENDENT TESTING AGENCY TO MONITOR CUT AND FILL OPERATIONS AND PERFORM FIELD DENSITY AND MOISTURE CONTENT TESTS TO VERIFY COMPACTION AND APPROVE FOOTING SUBGRADES PRIOR TO PLACING CONCRETE.
6. DO NOT PLACE FOOTINGS OR SLABS AGAINST SUBGRADE CONTAINING FREE WATER, FROST, OR ICE.
7. MAINTAIN PROPER SITE DRAINAGE DURING CONSTRUCTION TO ENSURE SURFACE RUNOFF AWAY FROM STRUCTURES AND TO PREVENT PONDING OF SURFACE RUNOFF NEAR THE STRUCTURES.

BACKFILLING NOTES:

1. TYPE C SAND: NATURAL RIVER OR BANK SAND, WASHED, FREE OF SILT, CLAY, LOAM, FRIABLE OR SOLUBLE MATERIALS, OR ORGANIC MATTER, GRADED IN ACCORDANCE WITH ANSI/ASTM C136 WITHIN THE FOLLOWING LIMITS:

SIEVE SIZE :	PERCENT PASSING
NO. 4	100
NO.14	10-100
NO. 50	5-90
NO. 100	4-30
NO. 200	0-1

2. VERIFY EXISTING CONDITIONS AND SUBSTRATE.
3. VERIFY FILL MATERIALS TO BE REUSED ARE ACCEPTABLE. CONTRACTOR TO SUBMIT NYSDEC REQUEST TO IMPORT FILL FORM WITH EXCAVATION WORK PLAN 60 DAYS PRIOR TO STARTING WORK. FILL MATERIAL MUST COMPLY WITH SMP REQUIREMENTS AND DER-10 ANALYTICAL SPECIFICATIONS.
4. COMPACT SUBGRADE TO 95 PERCENT MAXIMUM DRY DENSITY IN ACCORDANCE WITH ANSI/ASTMD1557.
5. CUT OUT SOFT AREAS OF SUBGRADE NOT CAPABLE OF IN-SITU COMPACTIONS. BACKFILL WITH TYPE D FILL AND COMPACT TO DENSITY EQUAL TO OR GREATER THAN REQUIREMENTS FOR SUBSEQUENT BACKFILL MATERIAL.
6. BACKFILL AREAS TO CONTOURS AND ELEVATIONS WITH UNFROZEN MATERIALS.
7. SYSTEMATICALLY BACKFILL TO ALLOW MAXIMUM TIME FOR NATURAL SETTLEMENT. DO NOT BACKFILL OVER POROUS, WET, FROZEN OR SPONGY MATERIALS.
8. PLACE AND COMPACT MATERIALS IN CONTINUOUS LAYERS NOT EXCEEDING 6 INCHES COMPACTED DENSITY.
9. ALL BACKFILL MATERIALS SHALL BE COMPACTED TO 95 PERCENT MAXIMUM DRY DENSITY IN ACCORDANCE WITH ANSI/ASTM D1557. MAINTAIN OPTIMUM MOISTURE CONTENT TO ATTAIN REQUIRED DENSITY. STOCKPILE TO BE ON TOP OF POLY SHEETING AND THE BASE SHALL BE CONTAINED BY SILT FENCE OR SILT SOCK, AND REMAINED COVERED WITH POLY SHEETING WHEN NOT IN AN ACTIVE USE, OR SEEDED FOR VEGATION IF NOT USED BEYOND 14 CONSECUTIVE DAYS AS PER THE SMP REQUIREMENTS.
10. AT COMPLETIONS OF WALL CONSTRUCTIONS, BACKFILL SHALL BE PLACED LEVEL WITH FINAL TOP OF WALL ELEVATION. IF FINAL GRADING, PAVING, LANDSCAPING AND/OR STORM DRAINAGE INSTALLATION ADJACENT TO THE WALL IS NOT PLACED IMMEDIATELY AFTER WALL COMPLETION, TEMPORARY GRADING AND DRAINAGE SHALL BE PROVIDED TO ENSURE WATER RUNOFF IS NOT DIRECTED AT THE WALL OR ALLOWED TO COLLECT OR POND BEHIND THE WALL UNTIL FINAL CONSTRUCTION ADJACENT TO THE WALL IS COMPLETED.

CONCRETE NOTES:

1. PROVIDE BATCH MIXING, TRANSPORTATION, PLACING AND CURING OF CONCRETE IN ACCORDANCE WITH RECOMMENDATIONS OF ACI 301 AND ACI 318. USE TYPE II PORTLAND CEMENT UNLESS NOTED OTHERWISE. PROVIDE ADMIXTURES AND SPECIAL REQUIREMENTS AS SPECIFIED.
   - A. ALL CONCRETE SHALL BE NORMAL WEIGHT (145 PCF) CONCRETE f'c = 5,000 PSI AT 28 DAYS.
2. PROVIDE CONCRETE MIXES DESIGNED BY A QUALIFIED TESTING LABORATORY FOR REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER.
3. PROVIDE CONSTRUCTION AND CONTROL JOINTS AS REQUIRED BY A.C.I. CODE AND AS INDICATED ON DRAWINGS. SUBMIT PLAN TO ENGINEER INDICATING PROPOSED CONTROL AND EXPANSION JOINT LOCATIONS IN CONCRETE SLABS FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
4. WIRE BRUSH AND CLEAN CONSTRUCTION JOINTS PRIOR TO POURING NEW CONCRETE.
5. PROVIDE ADEQUATE STRUCTURAL FRAMING AS APPROVED BY STRUCTURAL ENGINEER FOR MECHANICAL OPENINGS THROUGH THE SLABS, WALLS AND FLOOR DECK.

MASONRY NOTES:

1. CONSTRUCT AUTOCLAVED AERATED CONCRETE (AAC) MASONRY IN ACCORDANCE WITH THE MASONRY SOCIETY TMS 402, LATEST EDITION, AND TMS 602, LATEST EDITION.
2. AAC BLOCKS SHALL BE AERCON STRENGTH CLASS AC4 MASONRY BLOCKS. AAC MASONRY LINTELS SHALL BE AERCON SOLID PREFABRICATED LINTELS, STRENGTH CLASS AC4. PROVIDE AERCON CORED BLOCKS AT ALL LOCATIONS WHERE VERTICAL REINFORCING IS SPECIFIED.
3. AAC HEAD JOINT AND BED JOINT MORTAR SHALL BE AERCON THIN BED MORTAR, OR EQUIVALENT THIN-BED MORTAR FOR AAC MASONRY MAUNFACTURED IN ACCORDANCE WITH ASTM C 1660-10. LEVELING BED MORTAR SHALL CONFORM TO ASTM C 270, TYPE M OR S.
4. PROVIDE GROUT CONFORMING TO THE REQUIREMENTS OF ASTM C476 COARSE GROUT, WITH A MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT 28 DAYS.
5. PROVIDE REINFORCING BARS CONFORMING TO ASTM A615, GRADE 60. ALL WELDED REINFORCING SHALL BE ASTM A706.
6. MASONRY SHALL COMPLY WITH THE TYPICAL DETAILS FOR AAC MASONRY WALL REINFORCING AND AAC MASONRY OPENING REINFORCING AS SHOWN ON STRUCTURAL DETAILS.
7. WHERE REINFORCING LAP REQUIREMENTS ARE NOT SPECIFICALLY SHOWN ON DRAWINGS TO MEET THE DESIGN INTENT, LAP IN ACCORDANCE WITH TMS 402.
8. MORTAR SHALL BE PLACED CONTINUOUSLY AT THE ELEVATION OF CONSTRUCTION AND SHALL NOT BE PERMITTED TO BE PUMPED OR PLACED FROM ABOVE.
9. MAXIMUM HEIGHT TO WHICH MASONRY SHALL BE LAID BEFORE GROUTING IS 5 FEET. MAXIMUM GROUT PLACEMENT HEIGHT IS 5 FEET. IF GROUT PLACEMENT HEIGHT EXCEEDS 5 FEET, PROVIDE CLEANOUT OPENINGS AT THE BOTTOM OF EACH PLACEMENT. CLEANOUT OPENINGS SHALL BE PROVIDED AT EACH CELL TO BE FILLED WITH GROUT.
10. REINFORCE MASONRY WHERE SHOWN ON STRUCTURAL DRAWINGS. TIE REINFORCING IN POSITION AND PLACE GROUT AROUND REINFORCING. DO NOT PUSH REINFORCING DOWN INTO PREVIOUSLY PLACED GROUT FILL. SET BOLTS SIMILARLY.
11. PROVIDE VERTICAL BARS, SIZE MATCHING WALL REINFORCING, AT ALL CORNERS, ENDS OF WALLS, EACH SIDE OF CONTROL JOINTS AND EACH SIDE OF WALL OPENINGS. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF CONTROL JOINTS.
12. ALL CORNERS AND INTERSECTIONS OF MASONRY WALLS SHALL BE CONSTRUCTED BY INTERLOCKING COURSE.
13. ALL LINTELS TO BEAR 8" MINIMUM EACH SIDE OF OPENING, UNLESS NOTED OTHERWISE.
14. AT EACH SIDE OF MASONRY OPENINGS, FILL ONE CELL WITH GROUT AND (1) #5 MIN. PER CELL VERTICALLY UNLESS NOTED OTHERWISE. AT CORNERS OF MASONRY WALLS, CORNER CELL IS TO BE FILLED WITH GROUT AND (1) #5 MIN. PER CELL FULL HEIGHT OF WALL UNLESS NOTED OTHERWISE.
15. MORTAR BED JOINTS SHALL NOT EXCEED 1/16" THICKNESS AND SHALL BE WITHIN AERCON TOLERANCES.
16. FIELD CUTTING AND DRILLING OF AAC LINTELS IS NOT PERMITTED EXCEPT AS SPECIFICALLY PERMITTED BY MANUFACTURER.
17. FIELD CUTTING OF AAC BLOCKS IS LIMITED TO SINGLE STRAIGHT CUTS TO FIT COURSING TO ARCHITECTURAL DIMENSIONS. NO CUT SHALL RESULT IN A PIECE OF BLOCK LESS THAN 3" IN ANY DIMENSION. NO DRILLING, CORING, OR OTHER FIELD CUTTING IS PERMITTED WITHOUT SPECIFIC PERMISSION FROM BLOCK MANUFACTURER.

METAL DECK:

1. PROVIDE DESIGN, FABRICATION, AND ERECTION OF METAL DECK CONFORMING TO THE STEEL DECK INSTITUTE'S "CODE OF RECOMMENDED STANDARD PRACTICE AND BASIC DESIGN SPECIFICATIONS".
2. FORM ROOF AND FLOOR DECK FROM STEEL SHEETS CONFORMING TO ASTM A 611 GRADE C AND D OR A 653 OR HIGHER SPECIFICATIONS WITH A MINIMUM YIELD STRENGTH OF 33 KSI.
3. ATTACH SHEETS TO STEEL SUPPORT MEMBERS AS INDICATED AND IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION. WHEN DECK IS SCHEDULED TO BE EXPOSED, DE-SLAG, CLEAN AND TOUCHED UP WELDS WITH A ZINC-RICH PRIMER.
4. LAP ROOF AND FLOOR DECK ENDS MINIMUM OF 2 INCHES. WHEN FASTENING DECK TO SUPPORT MEMBERS PROVIDE WELDING MATERIALS INSTALLATION PROCEDURES TO PREVENT BURNING OF HOLES IN DECK.
5. PROVIDE SIX INCH CLOSURE STRIP WHERE CHANGES IN DECK DIRECTION OCCUR. CLOSURE TO BE SAME GAGE AS DECK.
6. AT ENDS OF DECKS OR WHERE CHANGES OF DECK DIRECTION OCCUR, FASTEN TO SUPPORTS AT EACH FLUTE. PROVIDE ADEQUATE CLOSURES AND FASTENERS TO SIDES AT EIGHTEEN INCHES ON CENTER.
7. WHERE PARTIAL PANELS MAY BE REQUIRED TO COMPLETE DECK INSTALLATION AT PERIMETER OF STRUCTURE, PROVIDE WELDS IN EACH FLUTE TO STRUCTURAL MEMBERS. INSTALL DECK IN THREE CONTINUOUS SPAN LENGTHS.
8. AT PERIMETER OF DECK, SECURE DECK TO STRUCTURAL MEMBERS WITH SAME ATTACHMENT AND SPACING SUPPORT ATTACHMENT AS INDICATED ON PLANS.

STRUCTURAL STEEL NOTES:

1. DETAIL AND ERECT STRUCTURAL STEEL ELEMENTS IN ACCORDANCE WITH THE FOLLOWING:
   - A. AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS.
   - B. AISC MANUAL OF STEEL CONSTRUCTION.
   - C. AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES.
   - D. AWS STRUCTURAL WELDING CODE, D1.1.
2. PROVIDE STRUCTURAL STEEL OF THE FOLLOWING ASTM DESIGNATIONS UNLESS NOTED OTHERWISE:
   - A. STRUCTURAL STEEL WIDE FLANGE SHAPES: ASTM A 992, Fy = 50 KSI
   - B. EDGE ANGLES, BENT PLATES, HANGERS AND BRACES: ASTM A 36, Fy = 36 KSI
   - C. STRUCTURAL PIPE: ASTM A 53, GRADE B, TYPE E OR S, FY = 46 KSI
   - D. HOLLOW STRUCTURAL SHAPES: ASTM A 500, GRADE C, FY = 46 KSI
   - E. PLATES: ASTM A 36, FY = 36 KSI
3. CONNECTION MATERIALS:
   - A. BEAM-COLUMN STIFFENER PLATES AND DOUBLER PLATES TO MATCH THE GRADE STEEL OF STRUCTURAL ELEMENT.
   - B. HIGH STRENGTH BOLTS: ASTM A 325 OR A 490. SEE NOTE D.
   - C. HARDENED STEEL WASHERS: ASTM F 436
   - D. CONNECTION DESIGN SHALL BE CONSISTENT WITH BOLT SIZE AND GRADE THROUGHOUT JOB AT SIMILAR CONNECTIONS. ONLY ONE GRADE OF STEEL BOLT SHALL BE USED FOR ENTIRE CONSTRUCTION FOR EACH BOLT SIZE SPECIFIED AND INSTALLED.
4. WELD MINIMUM SIZE AND STRENGTH:
   - A. PROVIDE MINIMUM SIZE OF FILLET WELDS AS SPECIFIED IN TABLE J2.4 OF THE AISC MANUAL.
   - B. PROVIDE MINIMUM EFFECTIVE THROAT THICKNESS OF PARTIAL PENETRATION GROOVE WELDS AS SPECIFIED IN TABLE J2.3 OF THE AISC MANUAL.
   - C. DEVELOP THE FULL TENSILE STRENGTH OF THE MEMBER ELEMENT JOINED, ON ALL SHOP AND FIELD WELDS, UNLESS NOTED OTHERWISE ON THE DRAWINGS.
   - D. WHERE CONNECTIONS ARE NOTED ON DRAWINGS AS MOMENT CONNECTIONS, PROVIDE WELDS TO DEVELOP FULL FLEXURAL CAPACITY OF THE LESSER MEMBER.
   - E. PROVIDE ELECTRODES FOR FIELD OR SHOP WELDING THAT CONFORM TO ASTM A 233 (CLASS 70).
   - F. ALL WELDS ARE CONTINUOUS FOR THE FULL LENGTH OF THE CONNECTION UNLESS NOTED OTHERWISE ON DRAWINGS.
5. PROVIDE MINIMUM OF TWO BOLTS PER CONNECTION. PROVIDE MINIMUM BOLT DIAMETER OF 3/4 INCH.
6. PROVIDE BOLTS, NUTS AND WASHERS THAT ARE HOT DIP GALVANIZED ACCORDING TO ASTM A 153, CLASS C WHEN USED TO CONNECT STEEL ELEMENTS THAT ARE HOT DIP GALVANIZED AFTER FABRICATION.
7. SUBMIT CALCULATIONS FOR CONNECTION DESIGNS NOT FULLY DETAILED ON DRAWINGS. DESIGN CONNECTIONS UNDER SUPERVISION OF REGISTERED PROFESSIONAL ENGINEER, REGISTERED IN THE STATE WHERE PROJECT IS BEING CONSTRUCTED, EMPLOYED BY THE STEEL FABRICATOR. DESIGN CALCULATIONS TO BE SEALED BY FABRICATOR'S REGISTERED PROFESSIONAL ENGINEER. SHOP DRAWINGS SUBMITTED WITHOUT COMPLETE DESIGN CALCULATIONS WILL NOT BE REVIEWED.
8. PROVIDE SIMPLE SHEAR CONNECTIONS FOR STEEL CONNECTIONS NOT FULLY DETAILED BY UTILIZING HIGH STRENGTH BEARING BOLTS IN SINGLE OR DOUBLE SHEAR. PROVIDE DOUBLE ANGLE BOLTED CONNECTIONS WHERE POSSIBLE. UNLESS LARGER REACTION IS SHOWN ON DRAWINGS, CONNECTION DESIGNER SHALL DESIGN SHEAR CONNECTIONS TO RESIST THE REACTION RESULTING FROM THE MAXIMUM ALLOWABLE UNIFORM LOAD OF THE BEAM FOUND IN THE AISC SPECIFICATION BEING APPLIED ALONG ITS FULL LENGTH.
9. STEEL FABRICATION:
   - A. FABRICATE AND ASSEMBLE STRUCTURAL MEMBERS/ASSEMBLIES IN SHOP TO GREATEST EXTENT POSSIBLE.
   - B. SPLICING OF STRUCTURAL STEEL MEMBERS IS PROHIBITED WITHOUT PRIOR APPROVAL BY THE EOR.
   - C. FABRICATOR SHALL BE RESPONSIBLE FOR ALL ERRORS OF DETAILING ON THE SHOP DRAWINGS, ERRORS IN FABRICATION, AND THE CORRECT FITTING OF STRUCTURAL STEEL MEMBERS.
   - D. CONFORM TO THE AISC CODE OF STANDARD PRACTICE, FOR ERECTION TOLERANCES. FIELD MODIFICATION TO STRUCTURAL STEEL IS PROHIBITED WITHOUT PRIOR APPROVAL BY THE EOR.
   - E. CLEAN STEEL OF RUST, LOOSE MILL SCALE AND OTHER FOREIGN MATERIALS WHERE REQUIRED FOR FABRICATION, FITTING UP, OR WELDING.
   - F. DO NOT CUT STRUCTURAL STEEL MEMBERS FOR THE WORK OF OTHER TRADES WITHOUT PRIOR REVIEW AND APPROVAL OF THE ARCHITECT/ENGINEER.
   - G. SHOP PRIME ALL MEMBERS NOT SCHEDULED FOR GALVANIZING WITH RED OXIDE PRIMER UNLESS NOTED OTHERWISE. DO NOT PAINT AT LOCATIONS OF FIELD WELDS.
10. FURNISH STEEL SHOP DRAWINGS FOR ARCHITECT'S AND STRUCTURAL ENGINEER'S REVIEW PRIOR TO FABRICATION. INCLUDE WELDING PROCEDURES, TESTING PROGRAMS FOR WELDING AND HIGH STRENGTH BOLTING, COATING MATERIAL AND ERECTION SEQUENCE ON SHOP DRAWINGS. SHOP DRAWINGS SHALL NOT BE REPRODUCTIONS OF CONTRACT DOCUMENTS. SHOP DRAWINGS SHALL BE PREPARED UNDER THE SUPERVISION OF, AND SHALL BE SIGNED AND SEALED BY, A LICENSED PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF NEW YORK.
11. PROVIDE TEMPORARY SHORING OR BRACING DURING CONSTRUCTION PHASE PRIOR TO COMPLETING CONNECTIONS AND INSTALLATION OF FLOOR SLAB. TEMPORARY CONSTRUCTION BRACING OF THE STRUCTURAL STEEL FRAME IS THE RESPONSIBILIT

COLD FORMED STEEL NOTES:

1. PROVIDE ALL STUDS AND/OR JOISTS AND ACCESSORIES OF THE TYPE, SIZE, GAGE AND SPACING SHOWN ON THE DRAWINGS.
2. DESIGN ALL STRUCTURAL MEMBERS IN ACCORDANCE WITH AMERICAN IRON AND STEEL INSTITUTE (AISI) "SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS", LATEST EDITION.
3. FORM ALL FRAMING MEMBERS FROM CORROSION RESISTANT STEEL, CORRESPONDING TO THE REQUIREMENTS OF ASTM A653 AND THE FOLLOWING STRENGTH REQUIREMENTS:

FRAMING MEMBER	GA. THICKNESS	(MIL)	MINIMUM YIELD
STUDS, JOISTS	18	43	33 KSI
STUDS, JOISTS	16,14	54,68,	50 KSI
TRACKS, SOLID BLOCKING	16 MIN.	54	50 KSI

4. PLACE ALL COLD-FORMED STEEL STUD WALL BRIDGING HORIZONTALLY WITH A MAXIMUM VERTICAL SPACING OF FOUR FEET UNLESS NOTED OTHERWISE. AS AN OPTION, CONTINUOUS COLD-FORMED CHANNELS MAY BE POSITIONED THROUGH THE STUD PUNCH OUTS AS BRIDGING PROVIDED THE CHANNEL IS PROPERLY FASTENED TO EACH STUD.
5. INSTALL AXIALLY LOADED STUDS IN A MANNER WHICH WILL ASSURE THAT THEIR ENDS ARE POSITIONED AGAINST THE INSIDE OF RUNNER WEB PRIOR TO FASTENING.
6. FASTEN COMPONENTS WITH SELF-DRILLING SCREWS OR WELDING. PROVIDE SCREWS OF SUFFICIENT SIZE TO ENSURE THE STRENGTH OF THE CONNECTION. WIRE TYING OF COMPONENTS IS NOT PERMITTED. TOUCH UP ALL WELDS WITH A ZINC-RICH PAINT.
7. WELDING OF COLD-FORMED STUDS MAY BE PERFORMED USING A MINIMUM ONE-EIGHTH INCH AWS TYPE 6013 WELDING ROD.
8. SECURELY ANCHOR RUNNERS TO THE SUPPORTING STRUCTURE. PROVIDE COMPLETE, UNIFORM, AND LEVEL BEARING SUPPORT FOR THE BOTTOM RUNNER.
9. SECURELY ANCHOR ABUTTING LENGTHS OF RUNNER TO A COMMON STRUCTURAL ELEMENT, BUTT-WELDED OR SPLICED.
10. PLUMB, ALIGN, AND SECURELY ATTACH STUDS TO THE FLANGES OF BOTH UPPER AND LOWER RUNNERS. SPLICES IN STUDS ARE NOT PERMITTED.
11. PROVIDE HEADERS AND SUPPORTING STUDS FOR FRAMING OF WALL OPENINGS.

SPECIAL INSPECTION NOTES

SPECIAL INSPECTIONS SHALL MEET THE REQUIREMENTS OF NYC BC CHAPTER 17. SPECIAL INSPECTOR(S) SHALL BE RETAINED BY THE OWNER TO PERFORM THE REQUIRED SPECIAL INSPECTIONS. THE NAMES OF PERSONS OR FIRMS WHO ARE TO PERFORM THE SPECIAL INSPECTIONS SHALL BE FORWARDED TO THE BUILDING OFFICIAL FOR APPROVAL. THE SPECIAL INSPECTOR(S) SHALL COMPLETE AND SUBMIT ALL FORMS REQUIRED BY NEW YORK CITY.

1. THE SPECIAL INSPECTOR(S) SHALL:
   - A. OBSERVE THE WORK ASSIGNED FOR CONFORMANCE TO THE APPROVED DRAWINGS AND SPECIFICATIONS.
   - B. FURNISH INSPECTION REPORTS TO THE ENGINEER OF RECORD AND BUILDING DEPARTMENT. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION, THEN, IF NOT CORRECTED TO THE ENGINEER AND THE BUILDING DEPARTMENT.
   - C. SUBMIT TO THE ENGINEER OF RECORD AND THE BUILDING DEPARTMENT A SIGNED FINAL REPORT STATING THAT THE WORK WAS IN CONFORMANCE WITH THE APPROVED DRAWINGS AND SPECIFICATIONS AND THE APPLICABLE WORKMANSHIP PROVISIONS OF THE NYC BC.

INSPECTION REQUIREMENTS (2022 NYC CODE)

SPECIAL INSPECTIONS (NYC BUILDINGS TR1)

☒	STRUCTURAL STEEL - WELDING		BC 1705.2.1
☒	STRUCTURAL STEEL - DETAILS		BC 1705.2.2
☒	STRUCTURAL STEEL - HIGH STRENGTH BOLTING		BC 1705.2.3
☒	CONCRETE - CAST IN PLACE		BC 1705.3
☒	MASONRY		BC 1705.4
☒	SUBSURFACE INVESTIGATIONS (BORINGS/TEST PITS)	TR4	BC 1705.6.1
☒	SUBSURFACE CONDITIONS - FILL & IN PLACE DENSITY		BC 1705.6.2, BC 1705.6.3
☒	SUBGRADE INSPECTION		BC 1705.6.4
☒	EXCAVATIONS - SHEETING, SHORING AND BRACING		BC 1705.23.3
☒	UNDERPINNINGS		BC 1705.25.4, BC 1817
☒	HELICAL PILES		BC 1814.12
☒	CONCRETE DESIGN MIX	TR3	BC 1905.3
	CONCRETE SAMPLING AND TESTING	TR2	BC 1905.6
	POST INSTALLED ANCHORS		BC 1705.37

PROGRESS INSPECTIONS (NYC BUILDINGS TR1)

☒	PRELIMINARY	28-116.2.1, BC 110.2
☒	FOOTING AND FOUNDATION	BC 110.3.1
☒	LOWEST FLOOR ELEVATION	BC 110.3.2
☒	FINAL	28-116.2.4.2, BC 110.5, DIRECTIVE 14 OF 1975, & 1 RCNY § 101-10

SITE MANAGEMENT PLAN COMPLIANCE NOTES:

SMP1. CONSTRUCTION WORK AT THE BROOKLYN NAVY YARD INDUSTRIAL PARK IS REQUIRED TO COMPLY WITH THE SITE MANAGEMENT PLAN (SMP) PREPARED BY CORE ENVIRONMENTAL CONSULTANTS, INC, LATEST DATE: 10/18/2022. CORE IS BNYDC'S ENVIRONMENTAL CONSULTANT. AN ELECTRONIC COPY OF THE SMP WILL BE MADE AVAILABLE TO THE CONTRACTOR.

SMP2. THE CONTRACTOR WILL BE REQUIRED TO REVIEW AND CONFORM TO THE EXCAVATION WORK PLAN (EWP) INCLUDED IN APPENDIX E OF THE SMP. CONTRACTOR SHALL SIGN THE EXCAVATION WORK PLAN CERTIFICATION PROVIDED BY BNYDC.

SMP3. THE CONTRACTOR WILL BE REQUIRED TO FOLLOW THE HEALTH AND SAFETY PLAN (HASP) INCLUDED IN APPENDIX F OF THE SMP.

a. THE CONTRACTOR MUST DESIGNATE A SITE HEALTH AND SAFETY OFFICER (HSO).

SMP4. ALL PERSONNEL WHO WILL BE INVOLVED WITH EARTHWORK (EXCAVATION, TRENCHING, SAMPLING OR ANY ACTIVITY THAT RESULTS IN A COVER BREACH) ON SITE MUST HAVE COMPLETED THE APPROPRIATE 40-HOUR OSHA HAZWOPER SITE WORKER TRAINING. THE CONTRACTOR SHALL SUBMIT THESE CERTIFICATES TO BNYDC PRIOR TO WORK.

SMP5. THIS PROJECT CONSTITUTES A MAJOR COVER BREACH. PRIOR GROUND INTRUSIVE ACITVITIES A 60-DAY ADVANCE NOTICE SUBMISSION IS REQUIRED TO BE SUBMITTED TO NYSDEC. THE SUBMISSION INCLUDES A SITE SPECIFIC EXCAVATION WORK PLAN. CORE WILL BE RESPONSIBLE FOR SUBMITTING THE NOTIFICATION AND EWP. IN ORDER TO PREPARE THE EWP, THE CONTRACTOR SHALL SUBMIT THE FOLLOWING INFORMATION AND DELIVERABLES TO CORE AS SOON AS REASONABLY POSSIBLE FOR THE MAJOR COVER BREACH NOTIFICATION TO NYSDEC:

a. SCOPE OF WORK OF GROUND INTRUSIVE ACTIVITIES
   - a.a. EARTHWORK SCOPE OF WORK AND CONSTRUCTION PHASING
   - a.b. ESTIMATED VOLUME OF EXCAVATED MATERIAL
   - a.c. EXCAVATION LOCATIONS AND DIMENSIONS
   - a.d. SITE SECURITY DETAILS
   - a.e. PERSONNEL TRAINING REQUIREMENTS AND ASSOCIATED TRAINING CERTIFICATION

b. SCHEDULE

c. PROPOSED BACKFILL MATERIALS

d. PROPOSED DISPOSAL FACILITIES

e. DEWATERING INFORMATION

f. HAZWOPER CERTIFICATES

g. DETAILS OF COVER RESTORATION

SMP6. EXCAVATED SOILS WILL BE CONSIDERED APPROPRIATE FOR REUSE AS ON-SITE BACKFILL IF THE SOIL DOES NOT EXHIBIT OBVIOUS SIGNS OF IMPACTS, AS DETERMINED BY CORE.

SMP7. THE CONTRACTOR SHALL SUBMIT A REQUEST TO IMPORT FILL FORM TO CORE ENVIRONMENTAL PRIOR TO IMPORTING BACKFILL MATERIALS TO THE SITE. IMPORTED MATERIALS WILL BE TESTED AT A RATE CONSISTENT WITH TABLE 5.4(E)10 OF DER-10, INCLUDED IN THE APPENDIX E OF THE SMP.

SMP8. THE FOLLOWING MATERIAL MAY BE IMPORTED, WITHOUT CHEMICAL TESTING, TO BE USED AS BACKFILL BENEATH PAVEMENT, BUILDINGS OR AS PART OF THE FINAL SITE COVER, PROVIDED THAT IT CONTAINS LESS THAN 10% BY WEIGHT MATERIAL WHICH WOULD PASS THROUGH A SIZE 80 SIEVE AND CONSISTS OF:

a. GRAVEL, ROCK OR STONE, CONSISTING OF VIRGIN MATERIAL FROM A PERMITTED MINE OR QUARRY; OR

b. RECYCLED CONCRETE OR BRICK FROM A DEC REGISTERED CONSTRUCTION AND DEMOLITION DEBRIS PROCESSING FACILITY IF THE MATERIAL CONFORMS TO THE REQUIREMENTS OF SECTION 304 OF THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS CONSTRUCTION AND MATERIALS VOLUME 1 (2002).

c. ASTM #57, APPROVED SOURCE NYS 10-12R FROM NEW YORK STAND AND STONE

SMP9. AS PART OF THE BID, THE CONTRACTOR SHALL IDENTIFY A POTENTIAL DISPOSAL FACILITY IN THE EVENT THAT EXCAVATED SOIL IS DETERMINED TO BE INADEQUATE FOR ON-SITE RE-USE. THE CONTRACTOR SHALL ASSUME THAT ANY SOIL DEEMED TO BE INADEQUATE FOR ON-SITE RE-USE IS NON-HAZARDOUS. ALL EXCAVATED SOIL ON THE SITE TO BE CONSIDERED TO BE "CONTAMINATED NON-HAZARDOUS HISTORIC FILL" REGARDLESS IF THE ANALYTICAL REQUIREMENTS OF 6 NYCRR PART 37 FOR THE LOWEST USE CATEGORY. NO SOIL EXCAVATED FROM THE SITE CAN BE CONSIDERED FOR DISPOSAL AT A SOIL RECYCLING FACILITY AND IS SUBJECTED TO DEC APPROVAL. ANY PROPOSED DISPOSAL FACILITY SHALL BE PERMITTED TO ACCEPT PCB-IMPACTED SOIL.

SMP10. LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE SHALL BE INSPECTED DAILY FOR EVIDENCE OF OFF-SITE SOIL TRACKING. THE QEP WILL BE RESPONSIBLE FOR ENSURING THAT ALL EGRESS POINTS FOR TRUCK AND EQUIPMENT TRANSPORT FROM THE SITE ARE CLEAN OF DIRT AND OTHER MATERIALS DERIVED FROM THE SITE.

SMP11. ALL INTRUSIVE WORK IS SUBJECT TO THE SITE-SPECIFIC COMMUNITY AIR MONITORING PLAN (CAMP). AN ON-SITE QEP (CORE) WILL BE PRESENT DURING ALL INTRUSIVE ACTIVITIES AND WILL PERFORM CAMP MONITORING AS PART OF THIS PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING ANY DUST GENERATED AS PART OF THE WORK. THE CONTRACTOR SHALL APPLY DUST-CONTROL METHODS AT THE REQUEST OF THE QEP AND/OR BNY IN THE EVENT THAT DUST IS OBSERVED OR CAMP MONITORING INDICATES THAT DUST IS MIGRATING OUT OF THE WORK AREA. IF THE DUST SUPPRESSION METHODS PERFORMED BY THE CONTRACTOR AS DIRECTED BY THE QEP FAIL TO REDUCE THE DOWNWIND PARTICULATE MATTER CONCENTRATION FROM EXCEEDING 150µg/m3 MORE THE PARTICULATE MATTER CONCENTRATION BEING MEASURED UPWIND OF THE EXCAVATION FOR A DURATION EXTENDING BEYOND 15 MINUTES, THE WORK MUST HALT UNTIL ADDITIONAL DUST SUPPRESSION MEASURE ARE IMPLEMENTED. THE CONTRACTOR IS NOT RESPONSIBLE FOR PERFORMING ANY CAMP MONITORING.

SMP12. IN THE EVENT THAT INADEQUATE SOIL IS EXCAVATED AND MUST BE DISPOSED OF OFF-SITE, THE CONTRACTOR SHALL BE PREPARED TO STAGE THIS SOIL IN AN ON-SITE STAGING AREA. SOIL SHALL BE SEGREGATED INTO STOCKPILES BASED ON QEP SCREENING. SOIL STOCKPILES SHALL BE CONTINUOUSLY ENCIRCLED WITH A BERM AND/OR SILT FENCE. HAY BALES SHALL BE USED AS NEEDED NEAR CATCH BASINS, SURFACE WATERS, AND OTHER DISCHARGE POINTS. STOCKPILES SHALL BE KEPT COVERED AT ALL TIMES WITH APPROPRIATELY ANCHORED TARPS. STOCKPILES SHALL BE ROUTINELY INSPECTED AND DAMAGED TARP COVERS SHALL BE PROMPTLY REPLACED. IN THE EVENT THAT AN ON-SITE SOIL STAGING AREA IS NECESSARY THE BNY WILL AUTHORIZE CONSTRUCTION OF THIS STAGING AREA, IN WRITING, AND THE CONTRACTOR SHALL SUBMIT A COST TO CONSTRUCT THIS AREA AND STAGE THE SOIL FOR THE REVIEW AND APPROVAL BY THE BNY AND STAGED ON TOP OF POLYEURATHANE SHEETING SO THAT THE SOIL IS NOT IN CONTACT WITH THE SITEWIDE COVER.

SMP13. IN THE EVENT THAT INADEQUATE SOIL MUST BE DISPOSED OF OFF-SITE, THE CONTRACTOR SHALL ARRANGE FOR ALL SOILS TO BE PROPERLY TRANSPORTED OFF-SITE. ALL LOADED VEHICLES LEAVING THE SITE SHALL BE APPROPRIATELY LINED, TARPED, SECURELY COVERED, MANIFESTED, AND PLACARDED IN ACCORDANCE WITH APPROPRIATE FEDERAL, STATE (INCLUDING 6 NYCRR PART 360), LOCAL, AND NYSDOT REQUIREMENTS, AS WELL AS ANY OTHER APPLICABLE TRANSPORTATION REQUIREMENTS. AN ALTERNATE FACILITY SHOULD BE PROVIDED FOR SOIL THAT MAY POTENTIALLY BE HAZARDOUS OR CONTAIN PCB CONTAMINATION.

SMP14. ALL LIQUIDS TO BE REMOVED FROM THE SITE INCLUDING, BUT NOT LIMITED TO, EXCAVATION DEWATERING, DECONTAMINATION WATERS, AND GROUNDWATER MONITORING WELL PURGE AND DEVELOPMENT WATERS, WILL BE HANDLED, TRANSPORTED, AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAMPLING DEWATERING FLUIDS, DETERMINING THE LEVEL OF CONTAMINATION OF THE WATER, AND DETERMINING THE APPROPRIATE DISPOSAL METHOD. IN THE EVENT THAT DEWATERING FLUID IS DETERMINED TO BE CONTAMINATED AND SPECIAL OFF-SITE DISPOSAL IS REQUIRED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND PROVIDING THE BNYDC WITH DISPOSAL MANIFESTS FOR THIS WASTE STREAM. DEWATERING, PURGE, AND DEVELOPMENT FLUIDS WILL NOT BE RECHARGED BACK TO THE LAND SURFACE OR SUBSURFACE ON THE SITE AND WILL BE MANAGED OFF-SITE UNLESS PRIOR APPROVAL IS OBTAINED FROM NYSDEC AS WELL AS PER THE REQUIREMENTS OF THE SMP. ALL DEWATERING IS SUBJECT TO NYCDEP/NYSDEC REGULATIONS AND PERMITS. IF APPROVAL IS GIVEN TO DISCHARGE BACK INTO THE EXCAVATION UNDER A JURISDICTIONAL DETERMINATION (JD) FROM NYSDEC, THEN THE SPECIIC REQUIREMENTS OUTLINED IN THE JD ARE TO BE FOLLOWED.

SMP15. IF UNDERGROUND STORAGE TANKS (USTS) OR PREVIOUSLY UNIDENTIFIED SOURCES FOR IMPACTS TO SUBSURFACE MEDIA ARE FOUND DURING DEVELOPMENT-RELATED CONSTRUCTION, EXCAVATION ACTIVITIES SHALL BE SUSPENDED UNTIL SUFFICIENT EQUIPMENT IS MOBILIZED TO ADDRESS THE CONDITION.

SMP16. IF NUISANCE ODORS ARE IDENTIFIED AT THE SITE BOUNDARY, OR IF ODOR COMPLAINTS ARE RECEIVED AS A RESULT OF THE WORK BEING PERFORMED, WORK SHALL BE HALTED AND THE SOURCE OF ODORS SHALL BE IDENTIFIED AND CORRECTED. WORK SHALL NOT RESUME UNTIL ALL NUISANCE ODORS HAVE BEEN ABATED. NYSDEC AND THE NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) WILL BE NOTIFIED OF ALL ODOR EVENTS AND OF ANY OTHER COMPLAINTS ABOUT THE PROJECT. IMPLEMENTATION OF ALL ODOR CONTROLS, INCLUDING THE HALT OF WORK, IS THE RESPONSIBILITY OF THE QEP.

SMP17. AFTER THE COMPLETION OF SOIL REMOVAL AND ANY OTHER INTRUSIVE ACTIVITIES, THE SITE-WIDE COVER SHALL BE RESTORED IN A MANNER THAT COMPLIES WITH THE SMP. THE EXISTING SITE-WIDE COVER IS COMPRISED OF BUILDINGS, CONCRETE, AND ASPHALT PAVEMENT, AND MILLINGS. THE RESTORED SITE-WIDE COVERED SHALL BE COMPRISED OF AT LEAST 12 INCHES OF SOIL MEETING THE COMMERCIAL USE SCOS AS SET FORTH IN 6 NYCRR PART 375-6.7(B), A BUILDING, OR CONCRETE, ASPHALT, OR MILLINGS AT LEAST 6 INCHES IN THICKNESS.

SMP18. CONTRACTOR IS RESPONSIBLE FOR REVIEWING AND COMPLYING WITH SMP SPECIFICATIONS AND PLANS. NOTES SHOWN HERE HAVE BEEN PROVIDED BY ENVIRONMENTAL ENGINEER AND ARE FOR GUIDANCE PURPOSES ONLY.

SMP19. AS WELL AS PER THE REQUIREMENTS OF SMP. ALL DEWATERING IS SUBJECT TO NYCDEP/NYSDEC REGULATIONS AND PERMITS. IF APPROVAL IS GIVEN TO DISCHARGE BACK INTO THE EXCAVATION UNDER A JURSIDICTIONAL DETERMINATION (JD) FROM NYSDEC, THEN THE SPECIFIC REQUIREMENTS OUTLINED IN THE JD ARE TO BE FOLLOWED.

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CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

28/02/2027
EXP. DATE

SCOTT D. LEHN, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 087140

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY LICENSE PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
DJA	DJA	DJA	SDL

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

BNY

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

SHEET TITLE

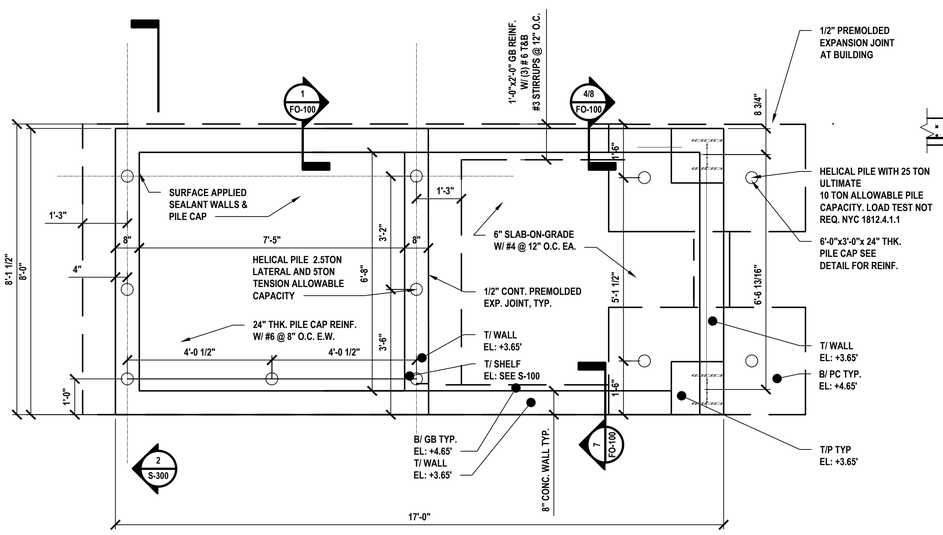
GENERAL NOTES

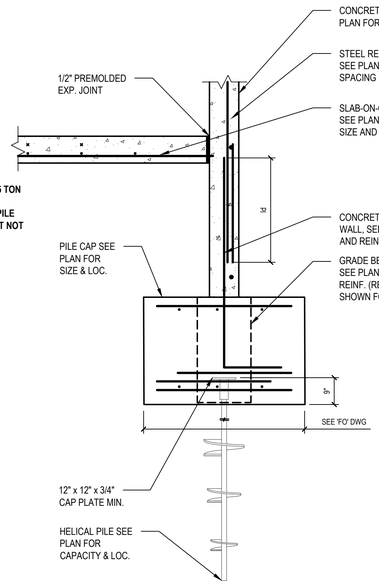
DRAWING No.

S-001.00

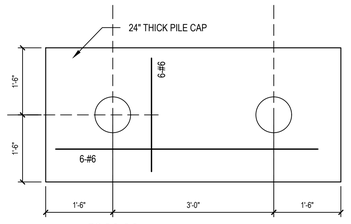
SHEET No. 11 OF 24

C:\Users\SKour\appdata\local\temp\AcPublish_44796\S-100 BLDG 62 Platform Plan.dwg Last Modified: Nov 14, 2025 - 4:18pm Plotted on: Aug 05, 2026 - 8:38am By skour



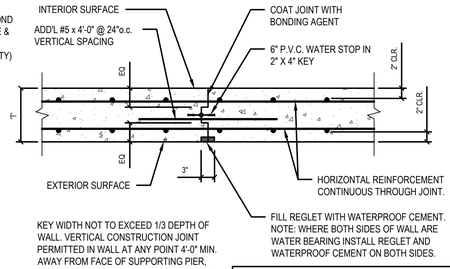


1 Typical Section Thru Pile Cap
SCALE: 1/4"=1'-0"



PC-6.0x3.0

2 Typical Pile Cap Detail
SCALE: 1/4"=1'-0"



KEY WIDTH NOT TO EXCEED 1/3 DEPTH OF WALL. VERTICAL CONSTRUCTION JOINT PERMITTED IN WALL AT ANY POINT 4'-0" MIN. AWAY FROM FACE OF SUPPORTING PIER, BUTTRESS AND/OR WALL OPENING PROVIDE ONE VERTICAL CONSTRUCTION JOINT FOR EVERY 40'-0" OF A STRAIGHT RUN OF WALL.

NOTE:
SUBMIT CONSTRUCTION JOINT LAYOUT FOR ALL CONCRETE STRUCTURES FOR ENGINEER'S REVIEW.

VERTICAL CONSTRUCTION JOINT IN WALL

3 Construction Joints w/ Waterstop
SCALE: NTS

HELICAL PILE NOTES:

1. ALL PILES SHALL BE PATENTED HELICAL PILES AND ACCESSORIES AS FURNISHED BY IDEAL FOUNDATION OR APPROVED EQUAL. HELICAL PILES SHOWN HEREIN SHALL BE DESIGNED BY A NYS REGISTERED DESIGN PROFESSIONAL.
2. HELICAL PILE LEAD SECTIONS SHALL BE MODEL 312 WITH A 3-1/2" X .3" ROUND SHAFT AT A MINIMUM. HELICES SHALL BE DESIGNED BY THE PILE MANUFACTURER AND CONFORM TO THE LOADS LISTED ON THESE PLANS. HELIX PILE EXTENSION MAY BE 5',7', OR 10' LONG DEPENDING ON VERTICAL CLEARANCE.
3. HELICAL PILES, EXTENSIONS AND ACCESSORIES SHALL BE HOT DIPPED GALVANIZED STEEL IN ACCORDANCE WITH ASTM A153.
4. ALL PILE INSTALLATION OPERATIONS SHALL BE SUPERVISED BY A N.Y.S. LICENSED ENGINEER COMMISSIONED BY THE PILE INSTALLER. THE INSPECTOR SHALL KEEP A COMPLETE RECORD OF THE PILE INSTALLATION OPERATION.
5. HELICAL PILES SHALL BE INSTALLED THROUGH ALL FILL, BOG, SILT ETC. AND TO PENETRATE A MINIMUM DEPTH OF 50' INTO GOOD GRANULAR BEARING MATERIAL.
6. HELICAL PILES SHALL BE INSTALLED AS SHOWN ON THE ENGINEER'S PLAN. ALL CHANGES IN PILE LOCATION MUST BE APPROVED BY THE DESIGN ENGINEER.
7. IF UNDERGROUND OBSTRUCTIONS ARE ENCOUNTERED DURING INSTALLATION, THE CONTRACTOR SHALL HAVE THE OPTION OF REMOVING THE OBSTRUCTION, IF POSSIBLE, OR RELOCATING THE PILE, WITH THE DESIGN ENGINEER'S APPROVAL. THE LATTER OPTION MAY REQUIRE THE RELOCATION OF ADJACENT PILES.
8. THE HELICAL PILE SHALL BE CONNECTED TO THE STRUCTURE USING A PTS APPROVED STEEL BRACKET OR CAP PLATE AS THE CASE MAY BE AS SHOWN ON DESIGN ENGINEERS PLAN. THESE CONNECTION DEVICES SHALL BE CAPABLE OF SAFELY TRANSFERRING THE STRUCTURAL LOADS TO THE HELICAL PILE.
9. WRITTEN INSTALLATION RECORDS SHALL BE OBTAINED FOR EACH HELICAL PILE. THESE RECORDS SHALL INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:
   - 9.1. PROJECT NAME AND/OR LOCATION.
   - 9.2. NAME OF CONTRACTORS FOREMAN OR REPRESENTATIVE WHO WITNESSED THE INSTALLATION.
   - 9.3. DATE AND TIME OF INSTALLATION.
   - 9.4. LOCATION AND REFERENCE NUMBER OF EACH PILE.
   - 9.5. DESCRIPTION OF LEAD SECTION AND EXTENSION INSTALLED.
   - 9.6. OVERALL DEPTH OF INSTALLATIONS REFERENCED FROM THE BOTTOM OF THE GRADE BEAM OR PILE CAP.
   - 9.7. TORQUE READING FOR THE LAST THREE FEET OF INSTALLATION IF PRACTICAL. IN LIEU OF THIS REQUIREMENT, THE TERMINAL TORQUE SHALL BE RECORDED AS A MINIMUM.
   - 9.8. ANY OTHER RELEVANT INFORMATION RELATING TO THE INSTALLATION.
10. THE INSTALLER'S N.Y.S. LICENSED PROFESSIONAL ENGINEER MUST CERTIFY THE PILE INSTALLATION RECORD.
11. PRIOR TO THE INSTALLATION OF THE NEW HELICAL PILES, CONTRACTOR SHALL PERFORM EXISTING CONDITIONS SURVEY TO DOCUMENT EXISTING CRACKS IN FLOORING, FOUNDATION, BRICK FACADE, ETC. AND IDENTIFY ANY POTENTIAL IMPACTS.

NOTE: SEE 'A' DWGS FOR FLOOD VENT LOCATIONS

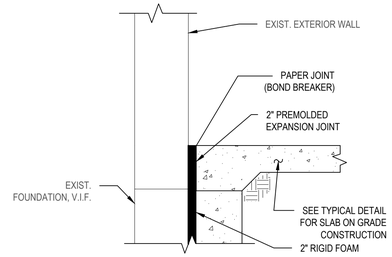
Foundation Plan
SCALE: 1/4"=1'-0"

LEGEND:

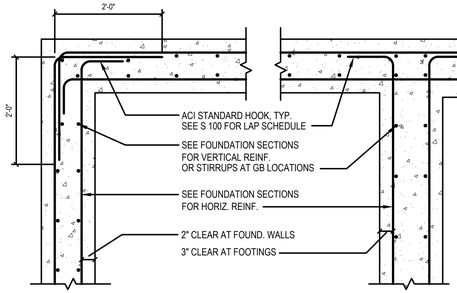
B/PC	=	BOTTOM OF PILE CAP
B/GB	=	BOTTOM OF GRADE BEAM
T/WALL	=	TOP OF WALL
H.P.	=	HIGH POINT (OF SLAB)
L.P.	=	LOW POINT (OF SLAB)
⟿	=	SLAB PITCH DIRECTION
E.J.	=	EXPANSION JOINT
C.J.	=	CONTROL JOINT

FOUNDATION PLAN NOTES:

1. LOWEST ADJACENT GRADE SHALL BE TAKEN AS 0'-0" AND SERVE AS THE FOUNDATION DATUM
2. ○ INDICATES 10 TON COMPRESSION (ALLOWABLE) & 2 TON LATERAL (ALLOWABLE) HELICAL PILE. APPLY FACTOR OF SAFETY OF 2.5 FOR ULTIMATE CAPACITY. SEE ADDITIONAL PILE NOTES.
3. 8" WIDE FOUNDATION WALLS TO BE REINFORCED WITH #6 BARS AT 12" O.C. VERTICAL AND #4 AT 12" O.C. HORIZONTAL.
4. ALL EXCAVATED EARTH SHALL BE REPLACED WITH CONTROLLED FILL AS PER THE SPECIFICATIONS.
5. CONTRACTOR SHALL COORDINATE SIZES AND LOCATIONS OF ALL REQUIRED PIPING AND CONDUIT PENETRATION WALL WITH ALL OTHER WORK.
6. BACKFILLING NOTE: CONTRACTOR SHALL NOT BACKFILL BEHIND RETAINING WALLS UNTIL INTERIOR BASEMENT SLAB IS IN PLACE AND CURED FOR A MINIMUM OF FOURTEEN (14) DAYS. ALL BACKFILL SHALL BE WELL GRADED GRANULAR MATERIAL COMPACTED TO 95% MAX. DRY DENSITY AT 0° LIFTS AND AT OPTIMUM MOISTURE CONTENT TO UNDERSIDE OF TOP SOIL LIMITS OF FILL TO BE REMOVED AND REPLACED, AND OTHER CONSIDERATIONS REQUIRED BY CONTRACTOR. AND HAS ATTAINED 4,000 PSI OF CONCRETE COMPRESSIVE STRENGTH.
7. REMOVE EXIST. FOUNDATION AS NECESSARY TO INSTALL PILE CAPS AND GRADE BEAMS SHOWN HEREIN.
8. REFER TO GEOTECHNICAL REPORT FOR MINIMUM PILE DEPTH AND INSTALLATION PROCEDURES.



4 TYP. Bond Breaker Detail at Existing Foundation
SCALE: NTS



NOTE 'A':
DIMENSION 'A' EQUALS 36 BAR DIA. OR HOOK

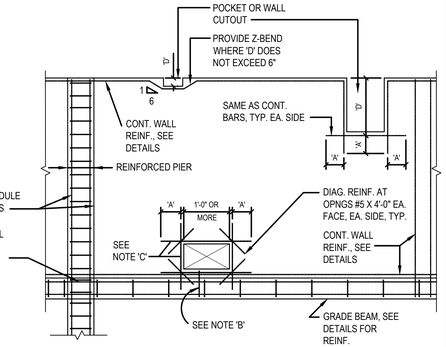
NOTE 'B':
WHERE EDGE OF OPNG. IS 2'-0" OR LESS FROM TOP OR BOTTOM OF WALL, PROVIDE #3 TIES @ 12" O.C.

NOTE 'C':
PROVIDE HORIZONTAL AND VERTICAL REINF. AT ALL SIDES OF OPENINGS TO MATCH WALL CONT. HORIZ. AND VERT. REINF.

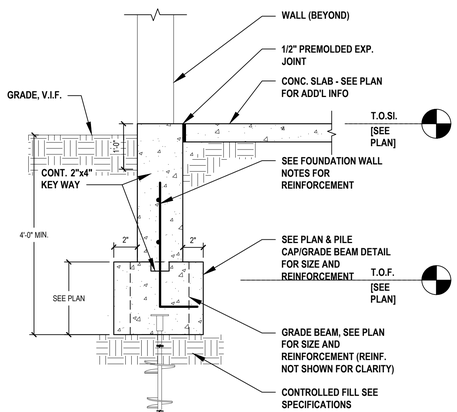
NOTE 'D':
FOR DEPTH OF BEAM OR COLUMN POCKETS, SEE PLAN OR SCHEDULES

NOTE: FOR GRADE BEAM CONDITIONS VERTICAL BARS I.E. STIRRUPS ARE TO BE PLACED ON THE OUTSIDE OF TRANSVERSE REINFORCEMENT.

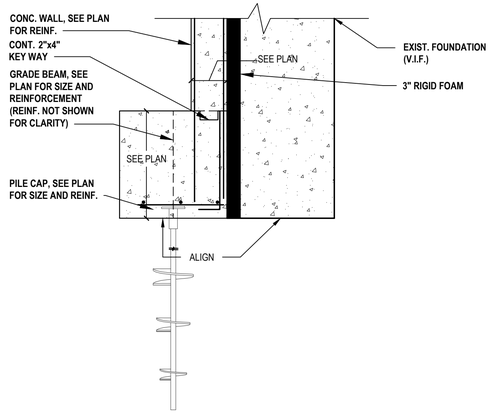
5 Wall and Grade Beam Horizontal Reinforcement Detail
SCALE: NTS



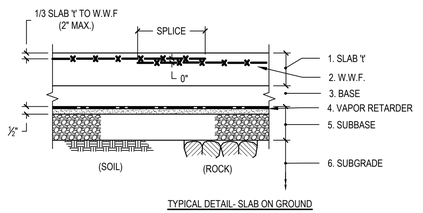
6 Typical Elevation of Reinforcement Layout at Various Conditions
SCALE: NTS



7 Haunched Slab at Perimeter Wall
SCALE: NTS



8 Prop. Pile Cap at Existing Foundation
SCALE: NTS



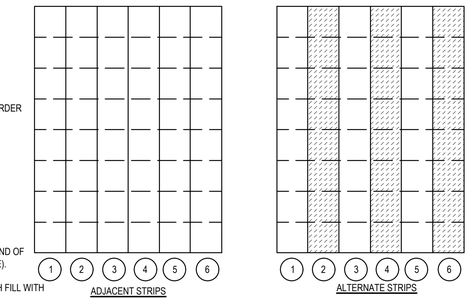
TYPICAL DETAIL- SLAB ON GROUND

NOTE:

1. BASE =6" LAYER OF PROCESSED AGGREGATE, SIZE NO. 10 PER ASTM D448. (SAND OF UNIFORM PARTICLE SIZE OR CONCRETE FINE AGGREGATE IS NOT ACCEPTABLE).
2. VAPOR RETARDER (VAPOR "BARRIER"): 10 MILS THICK POLYETHYLENE.
3. SUBBASE: 4" LAYER OVER SOIL, COMPACTABLE GRANULAR FILL. COVER ROUGH FILL WITH ½" OF BASE AGGREGATE AND COMPACT IT ONTO SUBBASE.
4. SUBGRADE: COMPACTED FILL, BACKFILL OR UNDISTURBED SOIL, OR LEVELED ROCK SURFACE.

SLAB ON GROUND NOTES:

1. SLAB ON GROUND SHALL BE PLACED IN STRIPS, AS SHOWN IN "SUGGESTED SEQUENCE OF CASTING STRIPS".
2. CONTROL JOINTS SHALL BE SAWCUT AS SOON CONCRETE IS HARD ENOUGH NOT TO BE TORN OR DAMAGED BY THE BLADE, AND BEFORE THE CONCRETE STARTS TO COOL. TYPICALLY JOINTS SHOULD BE CUT 4 TO 12 HOURS AFTER THE SLAB HAS BEEN FINISHED, DEPENDING UPON WEATHER AND JOB CONDITIONS.
3. SPACING OF SAWCUT CONTROL JOINTS (IN FEET) TO BE APPROXIMATELY THREE TIMES THE SLAB THICKNESS IN INCHES, WITH A MAXIMUM OF TWENTY (20) FEET.
4. A MAXIMUM RATIO OF 1.5 SHALL BE MAINTAINED BETWEEN LONG AND SHORT DIMENSIONS OF PANELS FORMED BY CONSTRUCTION AND CONTROL JOINTS.



SUGGESTED SEQUENCE OF CASTING STRIPS

LEGEND:

- STRIPS CAST FIRST
- INFILL STRIPS
- FORMED JOINTS
- SAWCUT JOINTS

9 Typical Slab on Grade Detail
SCALE: NTS

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
TZY/DJA	DJA	DJA	SDL

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

SHEET TITLE

FOUNDATION PLAN

DRAWING No.

FO-100.00

SHEET No. 12 OF 24

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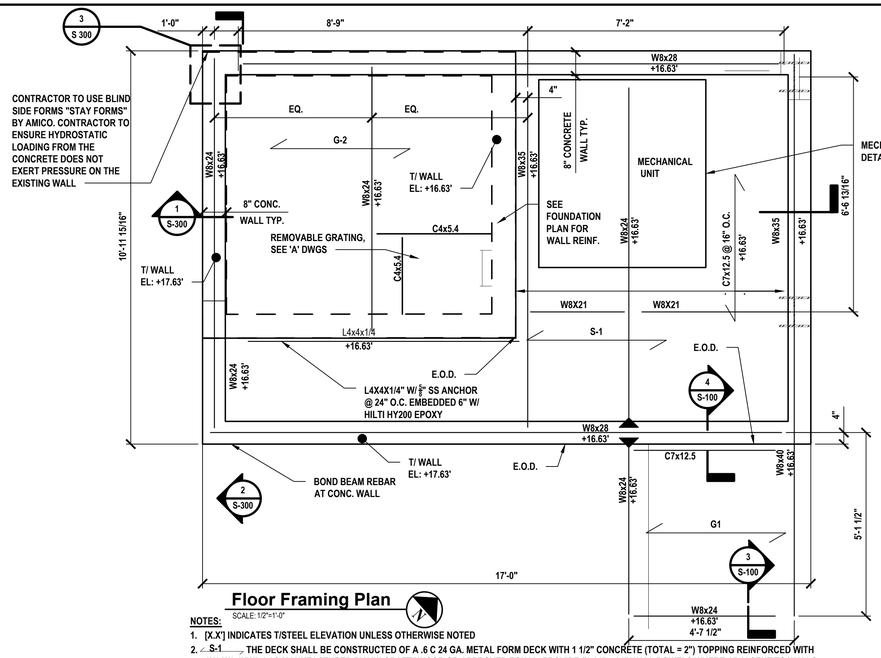
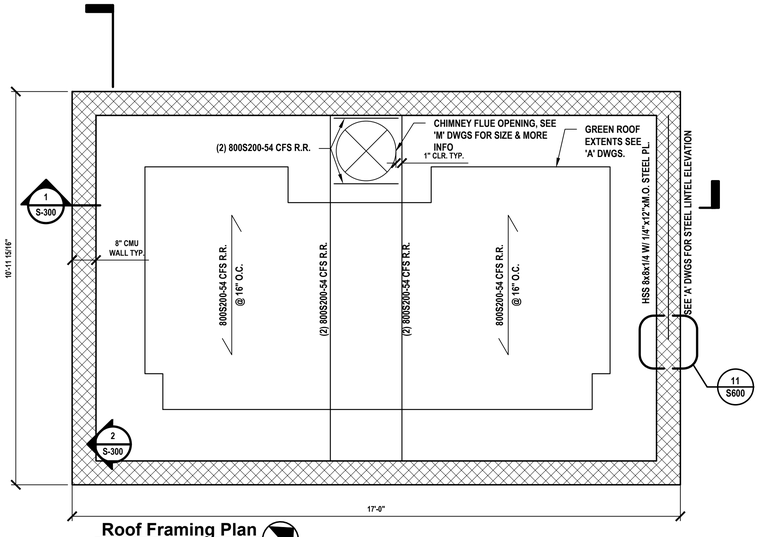


Floor Framing Plan

SCALE: 1/2"=1'-0"

NOTES:

1. (X.XC) INDICATES T/STEEL ELEVATION UNLESS OTHERWISE NOTED
2. S-1 THE DECK SHALL BE CONSTRUCTED OF A .6 C 24 GA. METAL FORM DECK WITH 1 1/2" CONCRETE (TOTAL = 2") TOPPING REINFORCED WITH 6X6-W2.1XW2.1 AS MANUFACTURED BY VULCRAFT NUCOR OR APPROVED EQUAL. PROVIDE #3 24" x 24" WALL DOWELS WHERE ADJACENT TO WALLS
3. ALL STEEL MEMBERS SHALL BE GALVANIZED G90.
4. ALL DIMENSIONS TO BE VERIFIED IN FIELD PRIOR TO FABRICATION.
5. SCOPE DOES NOT COVER ANY EXISTING STRUCTURE OUTSIDE PROPOSED ELECTRICAL ROOM AND THE STRUCTURAL ELEMENTS DIRECTLY SUPPORTING IT. NO WARRANTY IS MADE FOR THE CONDITION OR CAPACITY OF THE EXISTING BUILDING OUTSIDE THE AREA OF WORK.
6. ALL EXISTING SPRINKLERS, EQUIPMENT, AND OTHER PLUMBING, WIRING, AND UTILITIES TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.
7. SEE 'A' DWGS FOR RAILING & STAIR DETAILS.
8. PROVIDE BEAM POCKET FOR ALL STRUCTURAL STEEL CHANNELS TYP.
9. SEE PARTIAL MASONRY PLAN FOR REINFORCEMENT LAYOUT.
10. G-1 INDICATES 2" STAINLESS STEEL GRATING.
11. G-2 INDICATES 2" STAINLESS STEEL REMOVABLE GRATING.



Roof Framing Plan

SCALE: 1/2"=1'-0"

NOTES:

1. TAPERED ROOF INSULATION, SEE 'A' DWGS. FOR ELEVATION. DECK SHALL BE CONSTRUCTED OF 18 GAUGE 1.5B VULCRAFT ROOF DECKING OR APPROVED EQUAL.
2. T/STEEL JOIST ELEVATION SHALL BE +27.00' UNLESS OTHERWISE NOTED.
3. ALL DIMENSIONS TO BE VERIFIED IN FIELD PRIOR TO FABRICATION.
4. SCOPE DOES NOT COVER ANY EXISTING STRUCTURE OUTSIDE PROPOSED ELECTRICAL ROOM AND THE STRUCTURAL ELEMENTS DIRECTLY SUPPORTING IT. NO WARRANTY IS MADE FOR THE CONDITION OR CAPACITY OF THE EXISTING BUILDING OUTSIDE THE AREA OF WORK.
5. ALL EXISTING SPRINKLERS, EQUIPMENT, AND OTHER PLUMBING, WIRING, AND UTILITIES TO BE PROTECTED DURING DEMOLITION AND CONSTRUCTION.

TENSION DEVELOPMENT LENGTH (Ld) (Inches)

BAR SIZE	Fy = 60,000 PSI CONCRETE: 5000 PSI
#3	14
#4	17
#5	22
#6	26
#7	38
#8	43
#9	51
#10	54
#11	60

TENSION DEVELOPMENT LENGTH (Ld) FOR TOP BAR (Inches)

BAR SIZE	Fy = 60,000 PSI CONCRETE: 5000 PSI
#3	17
#4	23
#5	28
#6	34
#7	49
#8	56
#9	63
#10	70
#11	77

TENSION LAP SPLICE LENGTH (CLASS B MIN.) (Inches)

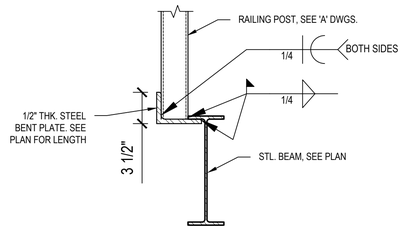
BAR SIZE	Fy = 60,000 PSI CONCRETE: 5000 PSI
#3	17
#4	22
#5	27
#6	33
#7	47
#8	54
#9	60
#10	68
#11	74

TENSION LAP SPLICE LENGTH FOR TOP BAR (CLASS B MIN.) (Inches)

BAR SIZE	Fy = 60,000 PSI CONCRETE: 5000 PSI
#3	22
#4	28
#5	35
#6	43
#7	61
#8	70
#9	78
#10	87
#11	95

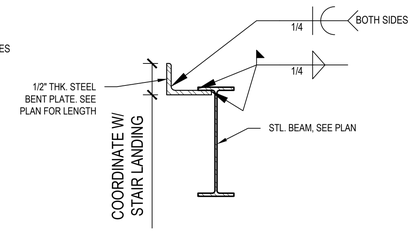
NOTES:

1. REINFORCEMENT IS UNCOATED, WITH Fy=60,000 PSI.
2. CONCRETE IS NORMAL WEIGHT (122-150#/C.F).
3. FOR "TOP" BAR SPLICE LENGTH ("TOP" IS DEFINED BY ACI 318 AS HAVING MORE THAN 12 INCHES OF FRESH CONCRETE CAST BELOW THE BAR), TABULATED LENGTHS HAVE BEEN MULTIPLIED BY 1.3.
4. LENGTHS TABULATED MUST BE MULTIPLIED BY THE FOLLOWING MODIFICATION FACTORS:
   A. LIGHTWEIGHT CONCRETE 1.3
   B. EPOXY-COATED BARS:
      a. BARS WITH COVER <3db, OR WITH CLEAR SPACING <6db ..1.5 FOR BOTTOM & VERTICAL BARS, 1.3 FOR 'TOP' BARS *
      b. ALL OTHER CONDITIONS 1.2
   * FOR EPOXY-COATED 'TOP' BARS THE MAXIMUM FOR COMBINED FACTORS= 1.7
5. WHERE TENSION DEVELOPMENT LENGTH (Ld) IS REQUIRED ON PLANS OR IN DETAILS, SEE TENSION DEVELOPMENT LENGTH TABLES.
6. CLASS A LAP SPLICE LENGTHS ARE EQUAL TO TENSION DEVELOPMENT LENGTHS. SEE TABLES FOR TENSION DEVELOPMENT LENGTHS (Ld). APPLY APPROPRIATE MODIFICATION FACTORS TO CLASS A SPLICE LENGTHS.



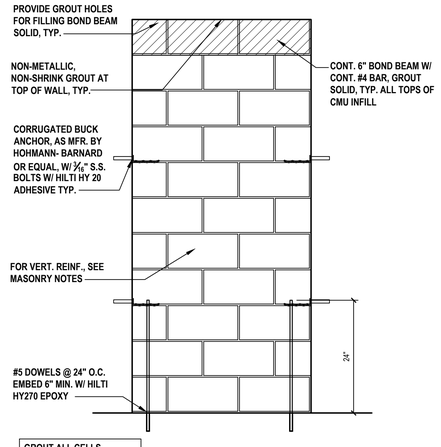
3 Typical Railing Attachment

SCALE: NTS



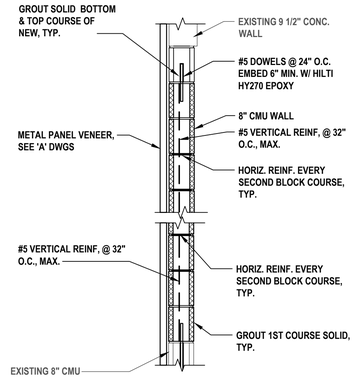
4 Bent Plate at Stair Landing

SCALE: NTS



5 Typical Masonry Infill Elevation

NTS



6 Typical Masonry Infill Section

NTS

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR DETERMINING ALL EXISTING BUILDING DIMENSIONS NOT SHOWN.
2. CONTRACTOR IS RESPONSIBLE FOR ALL SHORING AND BRACING OF EXISTING STRUCTURE DURING CONSTRUCTION.
3. CONTRACTOR IS RESPONSIBLE FOR REMOVING AND STORING PARTS OF EXISTING STRUCTURE TO BE REUSED IN SUCH MANNER THAT NO DAMAGE IS DONE TO THESE MEMBERS.
4. ALL ELEVATIONS REFERENCE NAVD 88 DATUM.
5. ALL EXISTING STRUCTURE, FINISHES, PLUMBING, WIRING, DUCTS, EQUIPMENT, AND OTHER UTILITIES TO REMAIN TO BE PROTECTED DURING CONSTRUCTION. REFER TO ARCH'L AND DEMOLITION DRAWINGS FOR AREAS TO BE REMOVED.
6. WORK DRAWINGS IN COORDINATION WITH ARCHITECTURAL DRAWINGS. REFER TO ARCHITECTURAL DRAWINGS FOR FLASHING, WATERPROOFING, AND VENEER INFORMATION.
7. EXISTING STRUCTURAL MEMBERS TO BE REUSED ARE TO BE INSPECTED FOR CONDITION, AND IF FOUND SUITABLE, ARE TO BE CLEANED AND PAINTED PER ARCH'L SPECIFICATIONS PRIOR TO REINSTALLATION. REFER TO DEMOLITION DRAWINGS FOR MEMBERS TO BE REMOVED FOR LATER REINSTALLATION. ANY MEMBERS MARKED TO BE REUSED FOUND TO BE NOT-SUITABLE FOR REUSE OR IN QUESTIONABLE CONDITION ARE TO BE REPORTED TO H2M FOR FURTHER INSTRUCTION.
8. ALL EXISTING STEEL COATINGS WITHIN THE AREA OF WORK SHALL BE TESTED FOR THE PRESENCE OF LEAD.
9. IF LEAD IS FOUND, CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE OSHA STANDARD FOR LEAD IN CONSTRUCTION, 29 CFR 1926.62, INCLUDING ALL NECESSARY PROTECTIONS AND PROCEDURES.
10. SPOT REMOVALS OF LEAD CONTAINING PAINT AND PREPARATION OF EXISTING STEEL SURFACES IN AREAS OF WORK SHALL BE DONE IN ACCORDANCE WITH SSPC CONTAINMENT CLASSES 3C OR 3P.
11. ALL CONTRACTORS PERFORMING WORK THAT INVOLVES EXPOSURE TO LEAD CONTAINING MATERIALS OR LEAD WASTE SHALL HAVE PROPER LEAD AWARENESS TRAINING.

MASONRY NOTES:

1. ⊠ INDICATES PROPOSED CMU, SHALL BE REINFORCED WITH VERT. #5 @ 32" O.C., HORIZ. & LADDER RENF. @ 16" O.C. REINFORCEMENT SHALL BE CARRIED TO THE TOP AND BOTTOM OF EACH MASONRY WALL INDICATED.
2. FIRST TWO CELLS ADJACENT TO MASONRY OPENINGS SHALL CONTAIN (1) #5 VERTICAL BAR PER CELL U.O.N.. AT ALL MASONRY CORNERS, PROVIDE (1) #5 VERTICAL BAR AT ALL CORNER MASONRY CONDITIONS AND ONE ADJACENT CELL TO EACH SIDE OF THE CORNER (3 TOTAL).
3. FILL ALL MASONRY CELLS CONTAINING REINFORCEMENT SOLID WITH GROUT, TYP.
4. REFER TO 'A' DWGS. AND SPECS FOR ADDITIONAL REQUIREMENTS NOT OUTLINED HERE, INCLUDING HORIZONTAL REINFORCEMENT AND BRICK TIES.
5. ALL VERTICAL REINFORCEMENT INTERRUPTED BY STRUCTURAL STEEL SHALL BE WELDED TO TOP OF STEEL MEMBERS, TYP.
6. COORDINATE PLACEMENT OF VERTICAL WALL DOWELS EMBEDDED INTO FOUNDATION WALL WITH CELLS OF MASONRY WALL. DOWEL SPACING TO MATCH SPACING OF VERTICAL REINFORCEMENT IN WALLS, TYP.

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PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300 Brooklyn, NY 11205

CONTRACT

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STATUS

FINAL BID DOCUMENT

SHEET TITLE

BOILER PLATFORM FRAMING PLAN

DRAWING No.

S-100.00

SHEET No.

13 OF 24

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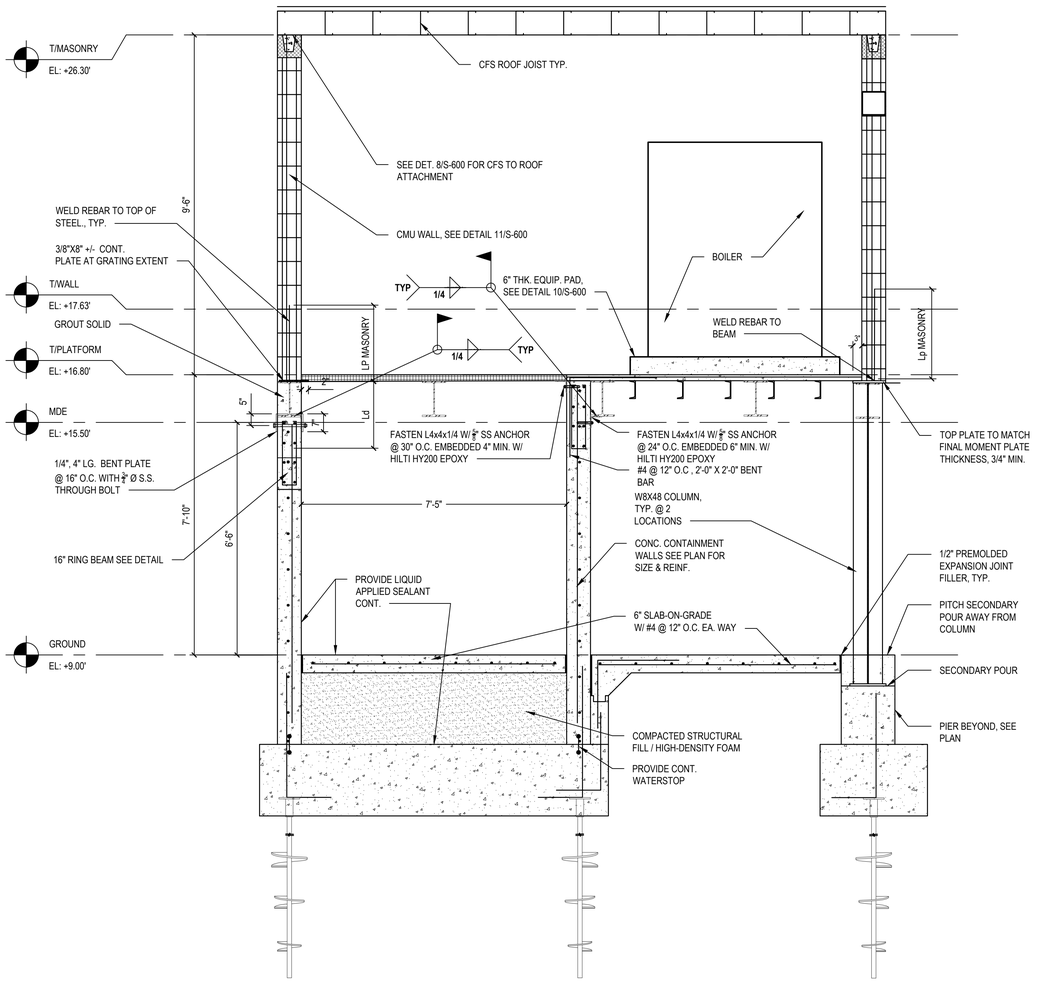
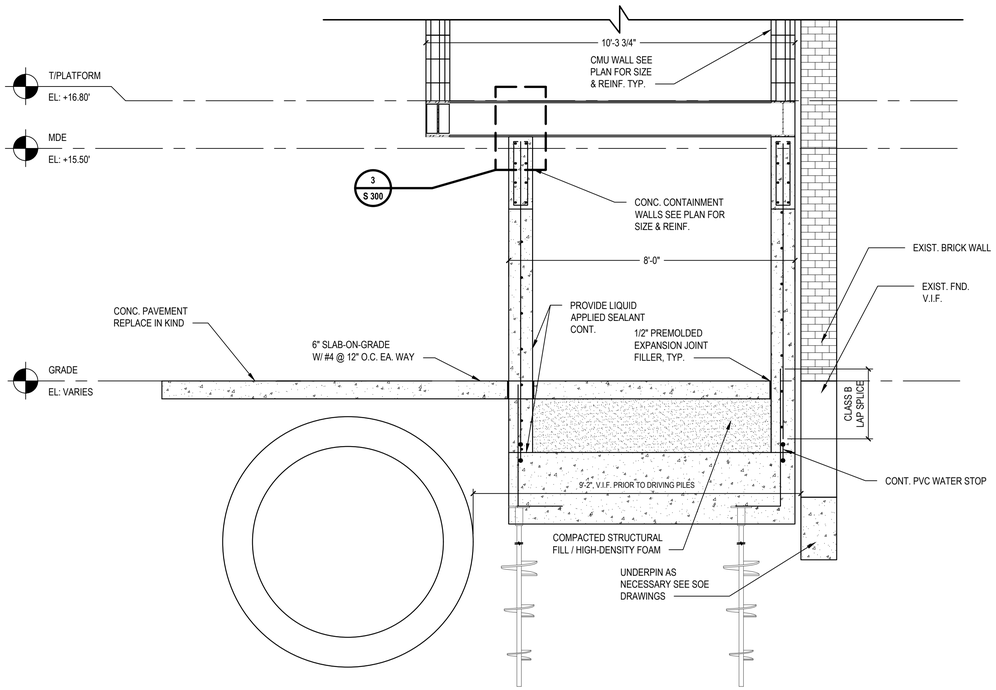


NOTES:
SEE S 100 FOR REBAR DEVELOPMENTS IN CONCRETE AND S 600 FOR REBAR DEVELOPMENTS IN MASONRY

1 **Section Thru Platform**
SCALE: 1/2"=1'-0"



NOTES:
SEE S 100 FOR REBAR DEVELOPMENTS IN CONCRETE AND S 600 FOR REBAR DEVELOPMENTS IN MASONRY

2 **Section Thru Platform**
SCALE: 1/2"=1'-0"

LOOSE LINTEL SCHEDULE

MARK	No. AND SIZE	MIN. BEARING EACH END	COMMENTS	DETAIL
LL-1	(2) L3-1/2x3-1/2x1/4" W/ 1/4"x12"xM.O. STEEL PLATE	8"	NOTES 1-5	

LOOSE LINTEL NOTES:

1. ALL EXTERIOR LINTELS SHALL HAVE SHOP APPLIED HOT DIPPED GALVANIZED COATING. (U.O.N.)
2. LINTEL LENGTHS SHALL BE THE MASONRY OPENING PLUS 1'-4" TO ALLOW FOR 8" BEARING ON SOLID GROUTED MASONRY AT EACH END.
3. WELD VERTICAL REINFORCEMENT INTERRUPTED BY MASONRY OPENINGS TO TOP OF STEEL LINTELS.
4. VERTICAL LEGS OF DOUBLE ANGLES SHALL BE WELDED TOGETHER.
5. SEE 'A' DWGS. FOR LINTEL LOCATIONS & ELEVATIONS.

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STATUS
FINAL BID DOCUMENT

SHEET TITLE
BOILER PLATFORM SECTIONS

DRAWING No.
S-300.00

SHEET No.
14 OF 24

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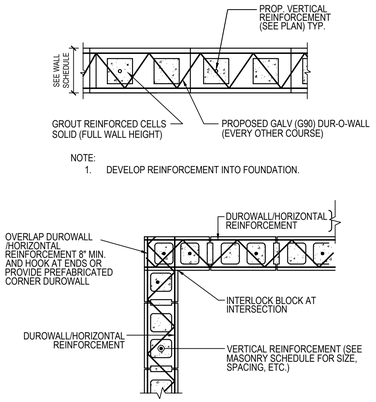
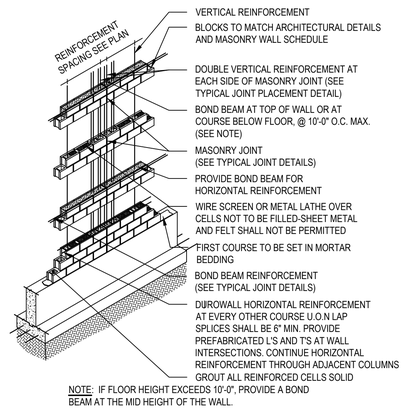
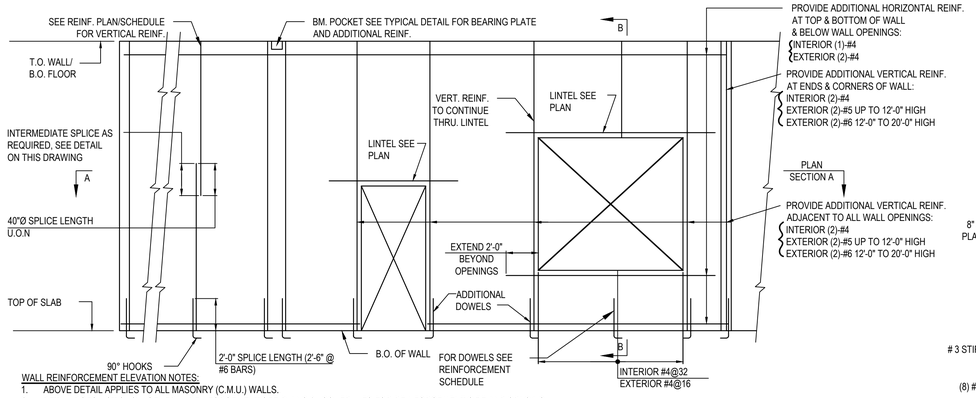


1 Typical CMU Reinforcement Detail
SCALE: NTS



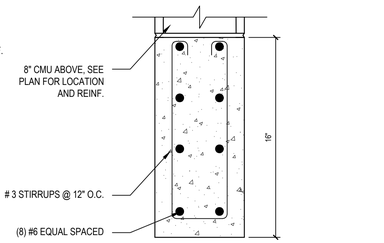
NOTE: IF FLOOR HEIGHT EXCEEDS 10'-0", PROVIDE A BOND BEAM AT THE MID HEIGHT OF THE WALL.

2 Typical CMU Bond Beam Placement Detail
SCALE: NTS



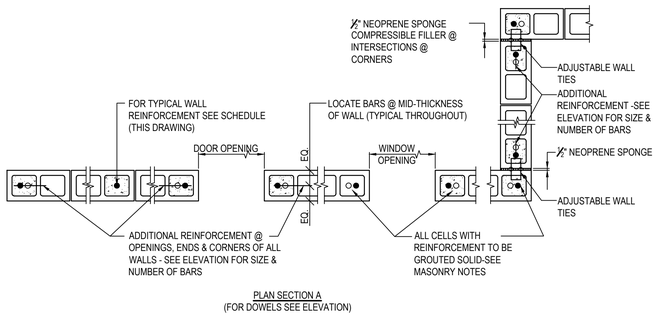
WALL REINFORCEMENT ELEVATION NOTES:
1. ABOVE DETAIL APPLIES TO ALL MASONRY (C.M.U.) WALLS.
2. DETAIL DOES NOT SHOW GENERAL REINFORCEMENT SEE PLANS & SCHEDULES FOR REINFORCEMENT SIZE AND SPACING.
3. DETAIL DOES NOT SHOW BOND BEAM, DUROWALL, ETC. FOR CLARITY.
4. FOR MULTIWYTHE EXTERIOR WALLS ABOVE DETAIL APPLIES TO C.M.U. BACKUP WALL ONLY. SEE ARCH DWGS FOR ADDITIONAL INFORMATION.
5. FOR C.M.U. MASONRY NOTES SEE S-001.

3 Typical CMU Elevation Detail
SCALE: NTS



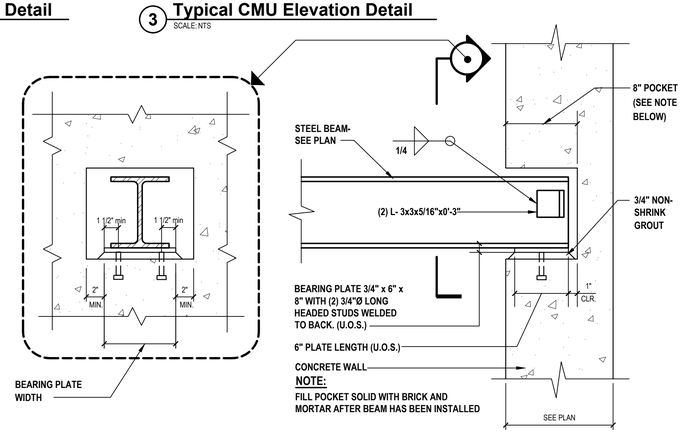
NOTES:
1. SEE SECTIONS FOR ELEVATIONS OF THIS BEAM SHALL CONTINUE AROUND PERIMETER OF CONCRETE WALLS

4 Typical 16" Ring Beam Detail
SCALE: NTS

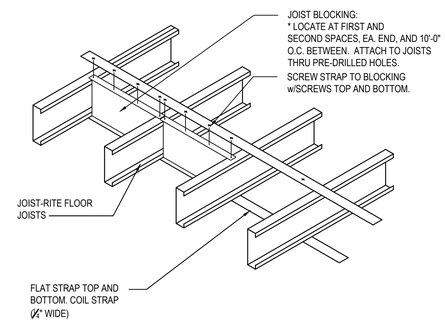


PLAN SECTION A
(FOR DOWELS SEE ELEVATION)

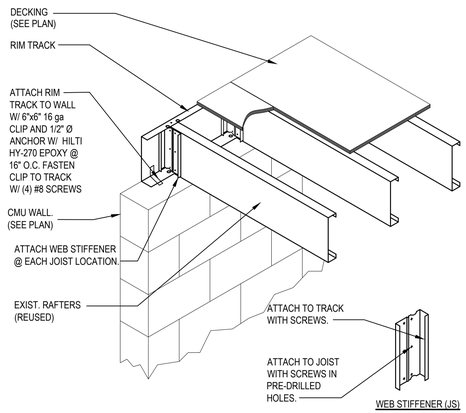
5 Typical Wall Reinforcement
SCALE: NTS



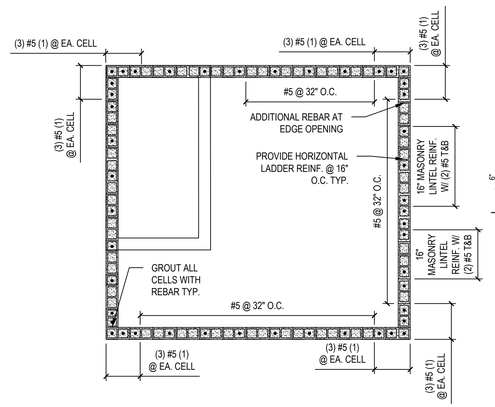
6 Beam Pocket at Concrete Wall
NTS



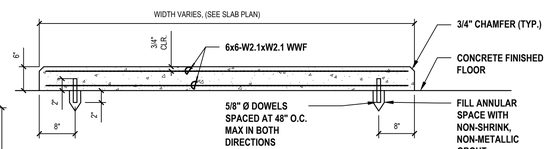
7 Typical CFS Bracing Detail
SCALE: NTS



8 Typical CFS to CMU Wall Roof Detail
SCALE: NTS



9 Masonry Partial Plan Reinf. Detail
SCALE: 1/4"=1'-0"

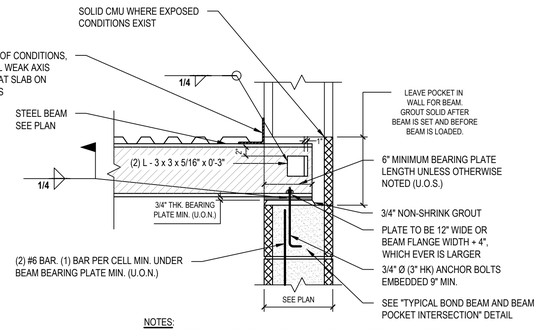


10 House Keeping Pad
SCALE: NTS

MASONRY DEVELOPMENT LENGTH (Ld)

BAR SIZE	Fy = 60,000 PSI F'm = 1500 PSI
#3	9
#4	12
#5	16
#6	29
#7	39
#8	59
#9	74
#10	91
#11	111

NOTES:
1. **REINFORCEMENT IS UNCOATED, WITH Fy= 60,000 PSI.**
2. **NET COMPRESSIVE STRENGTH OF F'M = 1500 PSI.**
3. **TABULATED LENGTHS HAVE USED "9db" FOR THE SMALLEST "K" VALUE IN DEVELOPMENT LENGTH BARS.**
4. **FACTORS APPLIED TO LENGTHS ABOVE ARE:**
   - **A. NO. 3 THROUGH NO. 5 BARS = 1.0**
   - **B. NO. 6 THROUGH NO. 7 BARS = 1.3**
   - **C. NO. 8. THROUGH NO. 11 BARS = 1.5**
5. **LENGTHS TABULATED MUST BE MULTIPLIED BY THE FOLLOWING MODIFICATION FACTORS:**
   - **A. EPOXY-COATED BARS SHALL BE TAKEN AS 150 PERCENT OF LENGTH DETERMINED**



NOTES:
FILL HOLLOWS (IN EXIST. CMU) UNDER BEARING PLATE SOLID WITH MORTAR (2 COURSES HIGH x 16" IN LENGTH) BEFORE PLACING BEARING PLATE.

11 Beam Bearing on CMU Wall
SCALE: NTS

H 2 M architects + engineers
538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
631.756.8000 • www.h2m.com
NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

28/02/2027
EXP. DATE

SCOTT D. LEHN, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 087145

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY LICENSE PROFESSIONAL IS A LLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
DJA	DJA	DJA	SDL

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

BNY

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT
ALL CONTRACTS

STATUS
FINAL BID DOCUMENT

SHEET TITLE
DETAILS

DRAWING No.
S-600.00

SHEET No.
15 OF 24

C:\Users\SKaur\appdata\local\temp\AcPublish_44756\S-100 BLDG 62 Platform Plan.dwg Last Modified: Nov 14, 2023 - 4:18pm Plotted on: Aug 05, 2026 - 8:33am By skaur

SPECIAL INSPECTION REQUIREMENTS

SPECIAL INSPECTION CATEGORIES

☐	STRUCTURAL STEEL - WELDING	BC	1704.3.1
☐	STRUCTURAL STEEL - DETAILS	BC	1704.3.2
☐	STRUCTURAL STEEL - HIGH STRENGTH BOLTING	BC	1704.3.3
☐	STRUCTURAL COLD - FORMED STEEL	BC	1704.3.4
☐	CONCRETE - CAST-IN-PLACE	BC	1704.4
☐	CONCRETE - PRECAST	BC	1704.4
☐	CONCRETE - PRESTRESSED	BC	1704.4
☐	MASONRY	BC	1704.5
☐	WOOD - INSTALLATION OF HIGH-LOAD DIAPHRAGMS	BC	1704.6.1
☐	WOOD - INSTALLATION OF METAL-PLATE-CONNECTED TRUSSES	BC	1704.6.2
☐	WOOD - INSTALLATION OF PREFABRICATED I-JOISTS	BC	1704.6.3
☐	SUBGRADE INSPECTION	BC	1704.7.1
☐	SUBSURFACE CONDITIONS - FILL PLACEMENT AND IN-PLACE DENSITY	BC	1704.7.2
		BC	1704.7.3
☐	SUBSURFACE INVESTIGATIONS (BORINGS/TEST PITS) TR4	BC	1704.7.4
☐	DEEP FOUNDATION ELEMENTS TR5	BC	1704.8
☐	HELICAL PILES (BB # 2014-020) TR5H	BC	1704.8.5
☐	VERTICAL MASONRY FOUNDATION ELEMENTS	BC	1704.9
☐	WALL PANELS, CURTAIN WALLS, AND VENEERS	BC	1704.10
☐	SPRAYED FIRE-RESISTANT MATERIALS	BC	1704.11
☐	MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS	BC	1704.12
☐	EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)	BC	1704.13
☐	ALTERNATIVE MATERIALS - OTCR BUILDINGS BULLETIN #_____	BC	1704.14
☐	SMOKE CONTROL SYSTEMS	BC	1704.15
■	MECHANICAL SYSTEMS	BC	1704.16
☐	FUEL-OIL STORAGE AND FUEL-OIL PIPING SYSTEMS	BC	1704.17
☐	HIGH-PRESSURE STEAM PIPING (WELDING)	BC	1704.18
☐	HIGH TEMPERATURE HOT WATER PIPING (WELDING)	BC	1704.18
☐	HIGH-PRESSURE FUEL-GAS PIPING (WELDING)	BC	1704.19
☐	STRUCTURAL STABILITY - EXISTING BUILDINGS	BC	1704.20.1
☐	EXCAVATIONS - SHEETING, SHORING, AND BRACING	BC	1704.20.2
☐	UNDERPINNING	BC	1704.20.3
		BC	1814
☐	MECHANICAL DEMOLITION	BC	1704.20.4
☐	RAISING AND MOVING OF A BUILDING	BC	1704.20.5
☐	SOIL PERCOLATION TEST - PRIVATE ON-SITE STORM WATER DRAINAGE DISPOSAL SYSTEMS, AND DETENTION FACILITIES	BC	1704.21.1.2
☐	PRIVATE ON-SITE STORM WATER DRAINAGE DISPOSAL SYSTEMS, AND DETENTION FACILITIES INSTALLATION	BC	1704.21.2
☐	INDIVIDUAL ON-SITE PRIVATE SEWAGE DISPOSAL SYSTEMS INSTALLATION	BC	1704.22
☐	SOIL PERCOLATION TEST - INDIVIDUAL ON-SITE PRIVATE SEWAGE DISPOSAL SYSTEMS	BC	1704.22
☐	SPRINKLER SYSTEMS	BC	1704.23
☐	STANDPIPE SYSTEMS	BC	1704.24
■	HEATING SYSTEMS	BC	1704.25
■	CHIMNEYS	BC	1704.26
☐	FIRE-RESISTANT PENETRATIONS AND JOINTS	BC	1704.27
☐	ALUMINUM WELDING	BC	1704.28
■	FLOOD ZONE COMPLIANCE (ATTACH FEMA ELEVATION/DRY FLOODPROOFING CERTIFICATE WHERE APPLICABLE)	BC	1704.29
		BC	G105
☐	LUMINOUS EGRESS PATH MARKINGS TR7	BC	1704.30
		BC	1024.8
☐	EMERGENCY AND STANDBY POWER SYSTEMS (GENERATORS)	BC	1704.31
☐	POST-INSTALLED ANCHORS (BB# 2014-018, 2014-019)	BC	1704.32
☐	SEISMIC ISOLATION SYSTEMS	BC	1707.8
☐	CONCRETE DESIGN MIX TR3	BC	1905.3
		BC	1913.5
☐	CONCRETE SAMPLING AND TESTING TR2	BC	1905.6
		BC	1913.10
■	FLOOD ZONE COMPLIANCE	BC	G105.3

PROGRESS INSPECTION CATEGORIES

☐	PRELIMINARY		28-116.2.1
		BC	110.2
☐	FOOTING AND FOUNDATION	BC	110.3.1
☐	LOWEST FLOOR ELEVATION	BC	110.3.2
☐	STRUCTURAL WOOD FRAME	BC	110.3.3
■	ENERGY CODE COMPLIANCE INSPECTIONS TR8	BC	110.3.5
■	FIRE-RESISTANT RATED CONSTRUCTION	BC	110.3.4
☐	PUBLIC ASSEMBLY EMERGENCY LIGHTING		28-116.2.2
■	FINAL		28-116.2.4.2
		BC	110.5
			DIRECTIVE 14 OF 1975, AND 1RCNY 101-10

ENERGY CODE PROGRESS INSPECTION

☐	PROTECTION OF EXPOSED FOUNDATION INSULATION	(IA1), (IIA1)
☐	INSULATION PLACEMENT AND R VALUES	(IA2), (IIA2)
☐	FENESTRATION AND DOOR U-FACTOR AND PRODUCT RATING	(IA3), (IIA3)
☐	FENESTRATION AIR LEAKAGE	(IA4), (IIA4)
☐	FENESTRATION AREAS	(IA5), (IIA5)
☐	AIR BARRIER - VISUAL INSPECTION	(IA6), (IIA6)
☐	AIR BARRIER - TESTING	(IA7), (IIA7)
☐	AIR BARRIER CONTINUITY PLAN TESTING/INSPECTION	(IIA8)
☐	VESTIBULES	(IIA9)
☐	FIREPLACES	(IB1), (IIB1)
■	SHUTOFF DAMPERS	(IB2), (IIB2)
■	HVAC AND SERVICE WATER HEATING EQUIPMENT	(IB3), (IIB3)
■	HVAC AND SERVICE WATER HEATING SYSTEM CONTROLS	(IB4), (IIB4)
■	HVAC INSULATION AND SEALING	(IB5), (IIB5)
☐	DUCT LEAKAGE TESTING, INSULATION AND DESIGN	(IB6), (IIB6)
☐	ELECTRICAL ENERGY CONSUMPTION	(IC1), (IIC1)
☐	LIGHTING IN DWELLING UNITS	(IIC2)
☐	INTERIOR LIGHTING POWER	(IC2), (IIC3)
☐	EXTERIOR LIGHTING POWER	(IIC4)
☐	LIGHTING CONTROLS	(IIC5)
☐	ELECTRICAL MOTORS AND ELEVATORS	(IIC6)
■	MAINTENANCE INFORMATION	(ID1), (IID1)
☐	PERMANENT CERTIFICATE	(ID2)
☐	SOLAR READY REQUIREMENTS	(ID3)

SPECIAL INSPECTIONS:

SPECIAL INSPECTIONS REQUIRED IN ACCORDANCE WITH CHAPTER 17 AND THE APPLICABLE SECTION OF THE NYC CONSTRUCTION CODE ARE LISTED IN THE FOLLOWING TABLES.

THE CONTRACTOR MUST NOTIFY THE ARCHITECT OR ENGINEER FOR SPECIAL INSPECTIONS AT LEAST 72 HOURS BEFORE THE SPECIFIC WORK COMMENCES.

IN ACCORDANCE WITH SECTION BC 109.9, THE CONSTRUCTION SHALL BE CORRECTED WHERE AN INSPECTION OR TEST FAILS.

IN ACCORDANCE WITH ARTICLE 116 OF TITLE 28 AND SECTION BC 109, CONSTRUCTION SHALL BE SCHEDULED SUCH THAT REQUIRED CONSTRUCTION NOT BE COVERED OR ENCLOSED UNTIL THE REQUIRED PROGRESS INSPECTIONS ARE COMPLETED OR THE PROGRESS INSPECTOR INDICATES THAT SUCH COVERING OR ENCLOSURE MAY PROCEED AT EACH STAGE OF CONSTRUCTION, AS APPLICABLE.

THE OWNER SHALL BE RESPONSIBLE FOR THE FOLLOWING SPECIAL INSPECTIONS

NOTES:

1. ENERGY ANALYSIS OF CONSTRUCTED CONDITIONS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 28-104.3 OF THE ADMINISTRATIVE CODE. IF CONSTRUCTED WORK DIFFERS FROM THE LAST-APPROVED FULL ENERGY ANALYSIS, AN AS-BUILT ENERGY ANALYSIS SHALL BE SUBMITTED AS A POST-APPROVAL AMENDMENT, LISTING THE ACTUAL VALUES USED IN THE BUILDING FOR ANN APPLICABLE ENERGY CODE-REGULATED ITEMS DEMONSTRATING THAT THE BUILDING COMPLIES WITH THE ENERGY CODE. SUCH ENERGY ANALYSIS SHALL BE SIGNED BY A REGISTERED DESIGN PROFESSIONAL, WHO SHALL CERTIFY THAT TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF THE BUILDING BUILT COMPLIES WITH THE ENERGY CODE; WHERE NO TRADE-OFFS HAVE BEEN USED AMONG DISCIPLINES, MORE THAN ONE REGISTERED DESIGN PROFESSIONAL MAY SIGN AND SEAL THE ENERGY ANALYSIS; THE ENERGY ANALYSIS SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO SIGN-OFF OR ISSUANCE OF THE CERTIFICATE OF OCCUPANCY.

SYSTEM COMMISSIONING NOTES:

1. COMMISSION ALL NEW BUILDING MECHANICAL SYSTEMS IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2020 NEW YORK CITY ENERGY CONSERVATION CODE (ECC) SECTION C408. COMMISSIONING SHALL BE PERFORMED BY AN APPROVED THIRD PARTY COMMISSIONING AGENCY HIRED BY THE NEW YORK CITY HOUSING AUTHORITY OR THE ASSIGNED CONSTRUCTION MANAGER. REFER TO SPECIFICATION SECTIONS 019113 - GENERAL COMMISSIONING REQUIREMENTS AND 230800 - COMMISSIONING OF MECHANICAL SYSTEMS FOR MORE INFORMATION.
2. PROVIDE DRAWINGS, OPERATION & MAINTENANCE (O&M) MANUALS, AND SYSTEM BALANCING REPORTS TO BUILDING OWNER OR OWNER'S AUTHORIZED AGENT WITHIN 90 DAYS OF THE DATE OF RECEIPT OF THE CERTIFICATE OF OCCUPANCY OR LETTER OF COMPLETION IN ACCORDANCE WITH THE 2016 NEW YORK CITY ECC SECTION C408.2.5.
3. PROVIDE FINAL COMMISSIONING REPORT TO THE BUILDING OWNER OR OWNER'S AUTHORIZED AGENT IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2016 NYC ECC SECTION C408.2.5.4.

NYCECC CODE:

"TO THE BEST OF MY KNOWLEDGE, BELIEF AND PROFESSIONAL JUDGMENT, THESE PLANS AND SPECIFICATIONS ARE IN COMPLIANCE WITH THE NEW YORK CITY ENERGY CONSERVATION CONSTRUCTION CODE" - 2020 CHAPTER C4

2020 NYCECC TABULAR ANALYSIS (COMMERCIAL HVAC)

NYCECC CITATION	PROVISION	ITEM DESCRIPTION	PROPOSED DESIGN VALUE	CODE DESCRIPTIVE VALUE (ECC)	SUPPORTING DOCUMENTATION
C402.1.3	U-factor alternative	Roof Walls (above grade) Slab on grade	R-42ci R-17.5ci R-15 for 24" below	R-33ci R-11.2ci R-15 for 24" below	See Architectural and Structural drawings
C403.1.1	Calculation of heating and cooling loads (mandatory)	Load calculations for HVAC systems	Design loads are determined in accordance with the procedures described in the ANSI/ASHRAE/ACCA Standard183.	Determined in accordance with ANSI/ASHRAE/ACCA Standard 183 HVAC Systems and Equipment Handbook	Carrier HAP load calculations and ASHRAE 183 procedural compliance certificate
C403.3.1	Equipment sizing.	HVAC systems sizing based on load calculations	Specified equipment sized within load calculation limits	Heating and cooling equipment shall not exceed calculated loads	Signed and sealed statement from Engineer certifying compliance with Energy Code, see H0.0
C403.3.2 (5)	Minimum efficiency requirements: gas and oil fired boilers.	Gas fired, low pressure steam, 1680MBH input boiler, B-1.	80%Eff.	79%Eff.	Boiler schedule, drawing M-100.00.
C403.7.7	Shutoff Dampers.	Motorized combustion air intake damper.	Class I motorized damper with a maximum air leakage rate of 4CFM/ft2 of damper surface area at 1.0 inch water gauge.	Each outdoor supply air and exhaust air ducts shall be provided with motorized dampers to shut off or open as required by this section. Class I motorized damper with a maximum air leakage rate of 4cfm/ft^2 of damper surface area at 1.0 inch water gauge. Gravity nonmotorized dampers air leakage rate 20cfm/ft^2 where 24" minimum in either dimension and 40cfm/ft^2 where 24" maximum in either dimension with air leakage of 1.0 inch water gauge.	See drawing M-100.00.
C403.11.3	Minimum Piping Insulation Thickness.	Steam heating system piping insulation.	3" insulation provided for all pipes 1-1/2" and larger carrying steam.	Must be thermally insulated in accordance with Table C403.11.3	See pipe insulation schedule on sheet M-100.00.
C403.2.10.1	Protection of piping insulation.	Piping located outdoors.	All outdoor is protected using aluminum or stainless steel insulation jackets.	All piping insulation is protected from damage, including that due to sunlight, moisture, equipment maintenance and wind. Adhesive tape is not permitted.	See spec section 230700-3.03.
C408.2	Mechanical systems commissioning and completion requirements.	Commissioning	Total building heating capacity = 1,680,000 BTU/h Commissioning is required for this project per requirements	Mechanical systems shall be commissioned and completed in accordance with Section C408	See commissioning notes on mechanical drawing M000.00 and specification section 230800 - commissioning of mechanical systems.
C403.2.4.1	Thermostatic controls.	Thermostats/humidistats for mechanical zones	One thermostat is provided for each zone	Minimum one thermostat/humidistat required per zone	Thermostats shown on sheets M-100.00. Boiler provided with outside air temp reset.
C403.3.4 TABLE C403.3.4	Boiler turndown.	Turndown ratio of proposed boiler.	2:1 Turndown ratio	Boilers systems with design input greater than 1,000,000BTU/hr shall comply with the turndown ratio of 3:1 specified in Table C403.3.4	Boiler schedule, M-100.00.

INTERIOR LIGHTING CONTROLS NARRATIVE

ROOM	ROOM TYPE	TYPE OF CONTROLS	INTENT OF CONTROLS	NYC ECC
Boiler Room First Floor	Electrical/Mechanical	Manual ON/OFF	Note 1	C405.2.1
Boiler Room Second Floor	Electrical/Mechanical Room	Manual ON/OFF	Note 1	C405.2.1

KEY NOTE:

1. AREAS DESIGNATED AS EMERGENCY AREA, THAT ARE REQUIRED TO BE CONTINUOUSLY ILLUMINATED.
2. LIGHTING CONTROLS EXEMPT AS PER C405.2.
3. AUTOMATICALLY TURNS ON WHEN OCCUPANTS ENTER SPACE, TURNS OFF 8-30 MINUTES OF OCCUPANTS LEAVING SPACE (SELF ADJUSTS), AND MANUAL OVERRIDE.

APPLICATION NUMBER: B00933910-S2

RELATED APPLICATIONS:

1. ARCHITECTURAL: B00933910-I1
2. STRUCTURAL: B00933910-S1
3. BOILER: B00933910-S3
4. PLUMBING: B00933910-S4

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Melville, NY 11747
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NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	10-06-23	ISSUED FOR FILING
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

4/30/2025
EXP. DATE
JOHN M. LAHEY, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 101303
"IN ACCORDANCE WITH ARTICLE 7 SEC. 68 OF THE RULES OF THE CITY OF NEW YORK, IT IS UNLAWFUL FOR ANY PERSON TO ALTER THIS DOCUMENT IN ANY WAY UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL. IF ALTERED, THE ALTERING PROFESSIONAL SHALL STAMP THE DOCUMENT AND ADD THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE, THE DATE OF ALTERATION AND A SPECIFIC DESCRIPTION OF THE ALTERATION."

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
PDL	TVD		

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT
Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

B N Y

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

STATUS
FINAL BID DOCUMENT

SHEET TITLE
ENERGY ANALYSIS AND SPECIAL INSPECTIONS BLDG 62

DRAWING No.
EN-100.00

SHEET No.
16 OF 24

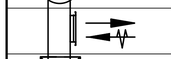
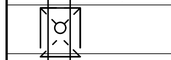
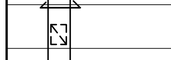
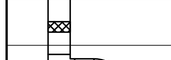
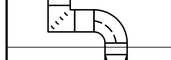
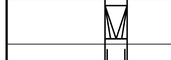
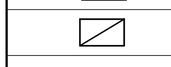
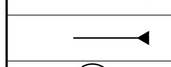
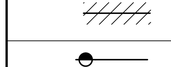
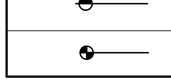
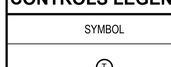
X:\BUBNY\ (Brooklyn Navy Yard) - 407\00BNY01907 - A38 - Restoration - Boilers - Bldg 62-23A\00_BIM-CAD\Con-tech\mac\Energy\En-100.00 ENERGY ANALYSIS AND SPECIAL INSPECTIONS BLDG 62.dwg Last Modified: Sep 16, 2025 - 10:21am Plotted on: Aug 05, 2026 - 9:28am By cdelgatto

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
BCU	BUILDING CONTROL UNIT
BTU	BRITISH THERMAL UNIT
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
COMM.	COMMUNICATION
CV	CONTROL VALVE
(D)	DEMOLISH
DB	DRY BULB
DCV	DEMAND CONTROLLED VENTILATION
DEG. F	DEGREES FAHRENHEIT
DIA	DIAMETER
DX	DIRECT EXPANSION
'E'	ELECTRICAL CONTRACTOR
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EER	ENERGY EFFICIENCY RATING
ESP	EXTERNAL STATIC PRESSURE
FAI	FRESH AIR INTAKE
FD	FLOOR DRAIN
FLA	FULL LOAD AMPS
FT. H20	FEET OF WATER
'G'	GENERAL CONSTRUCTION CONTRACTOR
GPM	GALLONS PER MINUTE
GPH	GALLONS PER HOUR
H	HEIGHT
'H'	HVAC CONTRACTOR
HP	HORSEPOWER
IN.	INCHES
IN. W.C. (W.G.)	INCHES WATER COLUMN (WATER GAUGE)
KW	KILOWATTS
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LCD	LIQUID CRYSTAL DISPLAY
LDB	LEAVING DRY BULB TEMPERATURE
LWB	LEAVING WET BULB TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
M	METER
MAX	MAXIMUM
MBH	1,000 BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MIN	MINIMUM
MNF	MANUFACTURER
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NPT	NATIONAL PIPE THREAD
NTS	NOT TO SCALE
OAI	OUTDOOR AIR INTAKE
OD	OUTER DIAMETER
OED	OPEN ENDED DUCT
'P'	PLUMBING CONTRACTOR
PD	PRESSURE DROP
PSIG	LBS / SQUARE INCH (GAUGE PRESSURE)
RD	ROOF DRAIN
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
SAT	SUPPLY AIR TEMPERATURE
SEER	SEASONAL ENERGY EFFICIENCY RATING
TEMP	TEMPERATURE
TG	TRANSFER GRILLE
TYP	TYPICAL
VFD	VARIABLE FREQUENCY DRIVE
W	WIDTH
WB	WET BULB
WMS	WIRE MESH SCREEN
PC	PUMPED CONDENSATE

APPLICATION NUMBER
B00933910-S2

DUCTWORK LEGEND

SYMBOL	ABBREV	DESCRIPTION
		DUCTWORK BRANCH CONNECTION
	VD	VOLUME DAMPER
	CD	ROUND FACE SUPPLY DIFFUSER
	SEE AIR DEVICE SCHEDULE	SIDEWALL SUPPLY, RETURN OR EXHAUST GRILLE/REGISTER
	SEE AIR DEVICE SCHEDULE	SQUARE FACE SUPPLY DIFFUSER
	SEE AIR DEVICE SCHEDULE	BOTTOM RETURN OR EXHAUST GRILLE/REGISTER
	FC	FLEXIBLE CONNECTION
		TURNING VANES
		RECTANGULAR TO ROUND TRANSITION
	AL	ACOUSTICAL LINING
		END CAP
	SEE AIR DEVICE SCHEDULE	SUPPLY DIFFUSER WITH DIRECTIONAL FLOW (SOLID HATCH INDICATES BLANK OFF PANEL)
		SUPPLY DUCT DROP (TURN DOWN)
		RETURN/EXHAUST DUCT DROP (TURN DOWN)
		SUPPLY DUCT RISE
		RETURN/EXHAUST DUCT RISE
	DSD	DUCT SMOKE DETECTOR
	MD	MOTORIZED DAMPER WITH ACTUATOR
	AD	ACCESS DOOR
	FD/AD	FIRE DAMPER WITH ACCESS DOOR
	FSD/AD	FIRE SMOKE DAMPER WITH ACCESS DOOR
		FAN
		WORK TO BE REMOVED
		POINT OF DISCONNECTION FROM EXISTING
		POINT OF CONNECTION TO EXISTING

CONTROLS LEGEND

SYMBOL	ABBREV	DESCRIPTION
		THERMOSTAT

Sheet List Table

Sheet Number	Sheet Title
EN-100.00	ENERGY ANALYSIS AND SPECIAL INSPECTIONS BLDG 62
M-001.00	HVAC GENERAL NOTES, LEGENDS, SYMBOLS, AND ABBREVIATIONS
M-100.00	BOILER DEMOLITION, NEW WORK PLAN AND SCHEDULES
M-200.00	HVAC DETAILS

PIPING LEGEND

SYMBOL	ABBREV	DESCRIPTION
		NEW WORK
		PIPING DOWN/ PIPING UP
		BALL VALVE WITH HOSE END CONNECTION
	TH	THERMOMETER
	U	UNION
	FPC	FLEXIBLE PIPE CONNECTION
		DIRECTION OF FLOW
	PSR	PRESSURE SAFETY AND RELIEF VALVE
	PRV	PRESSURE REDUCING VALVE
	BV	BALL VALVE
	BA	BALANCING VALVE
	BFV	BUTTERFLY VALVE
		TEMPERATURE SENSOR WITH THERMOWELL
	GA	GATE VALVE
	GB	GLOBE VALVE
	AV	AUTOMATIC AIR VENT
	CV	2-WAY ELECTRONIC CONTROL VALVE
	CV	3-WAY ELECTRONIC CONTROL VALVE
	CV	2-WAY PNEUMATIC CONTROL VALVE
	CV	3-WAY PNEUMATIC CONTROL VALVE
	STR	STRAINER WITH BLOW OFF VALVE WITH HOSE END CONNECTION
	FD	FLOOR DRAIN
		AIR SEPARATOR
		STEAM TRAPS (INDICATE TYPE)
	CH	CHECK VALVE
	PG	PRESSURE GAUGE WITH GAUGE COCK
	RED	REDUCER
	CO	CLEANOUT END CAP
		PIPE GUIDE
		PIPE ANCHOR
		CAPPED PIPE
		PUMP
		WORK TO BE REMOVED
		POINT OF DISCONNECTION FROM EXISTING
		POINT OF CONNECTION TO EXISTING
	TDV	TRIPLE DUTY VALVE

PIPNG SYMBOLS & ABBREVIATIONS

SYMBOL	DESCRIPTION
LPS	LOW PRESSURE STEAM SUPPLY
LPR	LOW PRESSURE STEAM RETURN
PC	PUMPED CONDENSATE
G	NATURAL GAS

GENERAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
2. THE CONTRACTOR, BY PRESENTING THEIR BID FOR THE WORK, REPRESENTS THAT HE/SHE HAS INSPECTED THE SITE AND IS COMPLETELY FAMILIAR WITH THE SCOPE OF WORK AND ALL FIELD CONDITIONS RELATED TO, AND AFFECTING THE WORK AND ITS PERFORMANCE. EXCEPTIONS AFFECTING THE WORK AND ITS PERFORMANCE, OR CONFLICTS BETWEEN FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT PRIOR TO THE SUBMISSION OF BIDS.
3. PERFORM ALL WORK IN ACCORDANCE WITH THE PLUMBING CODE, FIRE CODE, MECHANICAL CODE, ENERGY CONSERVATION CONSTRUCTION CODE, AND FUEL GAS CODE OF NEW YORK CITY AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.
4. COMPLY WITH THE NATIONAL ELECTRIC CODE AND THE REQUIREMENTS OF DIVISION 26 FOR ALL ELECTRICAL INSTALLATIONS.
5. FIRE STOP ALL OPENINGS IN FIRE RATED CONSTRUCTION FOR PIPING, DUCTWORK, CONDUIT, ETC. PROVIDE FIRE DAMPERS AND ACCESS DOORS IN ALL OPENINGS IN FIRE RATED FLOORS, PARTITIONS, AND WALLS FOR DUCTWORK AS PER THE MECHANICAL CODE OF NEW YORK STATE. (SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF FIRE RATED CONSTRUCTION.)
6. DO NOT SCALE DRAWINGS. DRAWINGS FOR HVAC WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE. COORDINATE CONTRACT DOCUMENTS, PROJECT REQUIREMENTS, WORK OF OTHERS, AND EQUIPMENT AND MATERIALS PURCHASED WITH FIELD DIMENSIONS. INSTALL ALL EQUIPMENT AS PER MANUFACTURER'S REQUIREMENTS TO PROVIDE PROPER CLEARANCE FOR INSTALLATION, OPERATION, AND MAINTENANCE. CONTRACTOR'S INTENDED MEANS AND METHODS OF INSTALLATION AND CONTRACTOR'S FABRICATED ITEMS SHALL ENSURE A PROPER "FIT" AND INSTALLATION. BRING ANY CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER DURING THE SUBMITTAL PHASE FOR RESOLUTION PRIOR TO PURCHASING ANY EQUIPMENT.
7. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS. WHERE HEADROOM AND SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY THE ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH INSTALLATION. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE FROM FINISHED FLOOR TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
8. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION. MAKE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK. OBTAIN THE APPROVAL OF THE ARCHITECT/ENGINEER FOR MODIFICATIONS.
9. PROVIDE PRODUCTS OF ONE MANUFACTURER WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF MATERIAL OR EQUIPMENT IS REQUIRED.
10. INSTALL ALL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS. REFER TO DETAILS FOR ADDITIONAL PIPING AND EQUIPMENT INSTALLATION REQUIREMENTS.
11. LOCATE ALL TEMPERATURE, PRESSURE, AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH STRAIGHT SECTION OF PIPE OR DUCT UP- AND DOWNSTREAM AS RECOMMENDED BY THE MANUFACTURER TO ENSURE MANUFACTURER CERTIFIED ACCURACY.
12. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL PIPING AND DUCT TRANSITIONS REQUIRED FOR FINAL CONNECTIONS TO EQUIPMENT.
13. COORDINATE LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS WITH ALL OTHER TRADES. COORDINATE ALL PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURE WITH GENERAL CONSTRUCTION WORK.
14. COORDINATE INSTALLATION OF SUPPLY AND RETURN GRILLES WITH INSTALLATION OF FINISHED CEILINGS.
15. COMPLETE ALL PRESSURE TESTS BEFORE ANY MECHANICAL EQUIPMENT, DUCTWORK, OR PIPING INSULATION IS APPLIED.
16. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). PERFORM ALL TESTING, ADJUSTING, AND BALANCING IN ACCORDANCE WITH THE SPECIFICATIONS.
17. MAKE ALL ATTACHMENTS TO JOISTS, TRUSSES, OR JOIST GIRDERS AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. THE USE OF C-CLAMPS IS NOT PERMITTED.
18. PROVIDE CONCRETE PADS A MINIMUM OF 6 INCHES HIGH FOR ALL FLOOR MOUNTED EQUIPMENT. EXTEND PAD 4 INCHES BEYOND THE EQUIPMENT ON ALL SIDES.
19. PROVIDE TRAPPED DRAIN PIPING FROM DRAIN PANS OF ALL COOLING COILS, FANS, AND OTHER ACTIVE DRAINS EXPOSED TO SYSTEM AIR STREAM. PROVIDE TRAP AT CONNECTION, WATER SEAL DEPTH 1 INCH GREATER THAN UNIT OPERATING PRESSURE. DIRECT DRAINS TO NEAREST FLOOR DRAIN, MOP SINK, OR OTHER LOCATION APPROVED BY THE ARCHITECT/ENGINEER.
20. INSTALL PIPING, DUCTWORK, AND CONDUIT CONCEALED IN AREAS HAVING HUNG CEILINGS AND/OR FURRED SPACES UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

WORK IN EXISTING AREAS

1. EXISTING CONDITIONS, INCLUDING EQUIPMENT, DUCT AND PIPE SIZES AND LOCATIONS, INDICATED ON THE DRAWINGS ARE DIAGRAMMATIC. CONFIRM ALL EXISTING CONDITIONS PRIOR TO PROCEEDING WITH THE WORK.
2. CUT AND ROUGH PATCH EXISTING CONSTRUCTION AS REQUIRED FOR THE PERFORMANCE OF THE WORK. FINISH PATCHING AND FLASHING REQUIREMENTS ARE SHOWN ON THE ARCHITECTURAL DRAWINGS. PERFORM ALL CUTTING AND PATCHING WORK IN A MANNER SUCH THAT ANY EXISTING WARRANTEES/GUARANTEES ARE NOT VOIDED. USE QUALIFIED PERSONNEL IN PERFORMANCE OF THE WORK.

CONTRACT 'H' SCOPE NOTES

1. PROVIDE ALL LOUVERS FOR INSTALLATION BY CONTRACT 'G'. SUBMIT LOUVER COLOR AND CONFIGURATION TO THE ARCHITECT/ENGINEER FOR APPROVAL.
2. FURNISH AND INSTALL ALL NECESSARY CONTROL WIRING, CONDUIT, AND ACCESSORIES AS REQUIRED TO PROVIDE FULLY FUNCTIONING SYSTEMS AND SEQUENCES OF OPERATION.
3. FURNISH ALL SLEEVES FOR PIPE AND CONDUIT FLOOR, WALL, PARTITION, AND ROOF PENETRATIONS FOR INSTALLATION BY CONTRACT 'G'.
4. PERFORM ALL CUTTING AND ROUGH PATCHING AS REQUIRED IN THE EXECUTION OF THE WORK. FINISH PATCHING AND FLASHING IS PART OF CONTRACT 'G'.

LEGENDS/ABBREVIATIONS NOTES

1. ABBREVIATIONS AND SYMBOLS ON THIS SHEET DO NOT DEFINE THE SCOPE OF WORK.

SCOPE OF WORK:

1. **REMOVAL OF EXISTING LOW PRESSURE STEAM BOILER, GAS FIRED BURNER AND ASSOCIATED PIPING.**
2. **REMOVAL OF EXISTING, DUPLEX BOILER FEED TANK AND 55 GAL. CHEMICAL TREATMENT TANK.**
3. **INSTALLATION OF NEW LOW PRESSURE STEAM BOILER, BOILER FEED TANK, AND ASSOCIATED PIPING, ON RAISED STEEL PLATFORM.**

ENERGY CODE STATEMENT
TO THE BEST OF MY KNOWLEDGE, BELIEF, AND PROFESSIONAL JUDGEMENT, THE DRAWINGS AND SPECIFICATIONS WHICH COMPRISE THE CONSTRUCTION DOCUMENTS FOR THIS PROJECT ARE IN COMPLIANCE WITH THE LATEST EDITION OF THE NEW YORK CITY ENERGY CONSERVATION CODE.

PROJECT SHALL BE SUBJECT TO COMMISIIONG REQUIREMENTS OF THE ECCNYS / ICC (SECTION 408) - REFER TO PROJECT SPECIFICATION 230800 FOR ADDITIONAL INFORMATION, TYP.

A COMMISSIONING PLAN SHALL BE DEVELOPED BY A REGISTERED DESIGN PROFESSIONAL OR APPROVED AGENCY AND SHALL INCLUDE THE FOLLOWING ITEMS:

1. A NARRATIVE DESCRIPTION OF THE ACTIVITIES THAT WILL BE ACCOMPLISHED DURING EACH PHASE OF COMMISSIONING, INCLUDING THE PERSONNEL INTENDED TO ACCOMPLISH EACH OF THE ACTIVITIES.
2. A LISTING OF THE SPECIFIC EQUIPMENT, APPLIANCES OR SYSTEMS TO BE TESTED AND A DESCRIPTION OF THE TESTS TO BE PERFORMED.
3. FUNCTIONS TO BE TESTED INCLUDING, BUT NOT LIMITED TO, CALIBRATIONS AND ECONOMIZER CONTROLS.
4. CONDITIONS UNDER WHICH THE TEST WILL BE PERFORMED. TESTING SHALL AFFIRM WINTER AND SUMMER DESIGN CONDITIONS AND FULL OUTSIDE AIR CONDITIONS.
5. MEASURABLE CRITERIA FOR PERFORMANCE.

SERVICE EQUIPMENT PERMIT
CONTRACTOR TO OBTAIN SERVICE EQUIPMENT PERMIT PER NYC ADMINISTRATIVE CODE 28-105.2.

APPLICATION NUMBER: B00933910-S2

RELATED APPLICATIONS:

1. ARCHITECTURAL: B00933910-I1
2. STRUCTURAL: B00933910-S1
3. BOILER: B00933910-S3
4. PLUMBING: B00933910-S4

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CONSULTANTS:

MARK	DATE	DESCRIPTION
	10-06-23	ISSUED FOR FILING
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

JOHN M. LAHEY, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 101303
4/30/2025 EXP. DATE
"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NYS EDUCATION LAW, ALTERATION OF THIS DOCUMENT EXCEPT BY LICENSE PROFESSIONAL IS ILLEGAL"

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
MJV	KCM	JML	*

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT
Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

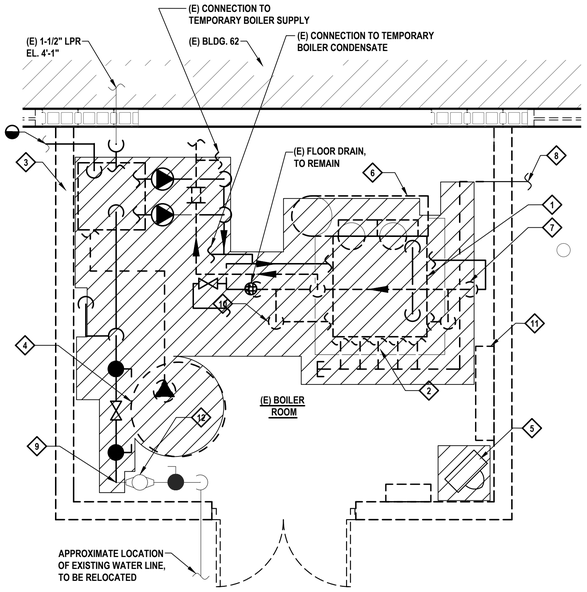
CONTRACT

STATUS
FINAL BID DOCUMENT

SHEET TITLE
HVAC GENERAL NOTES, LEGENDS, SYMBOLS, AND ABBREVIATIONS

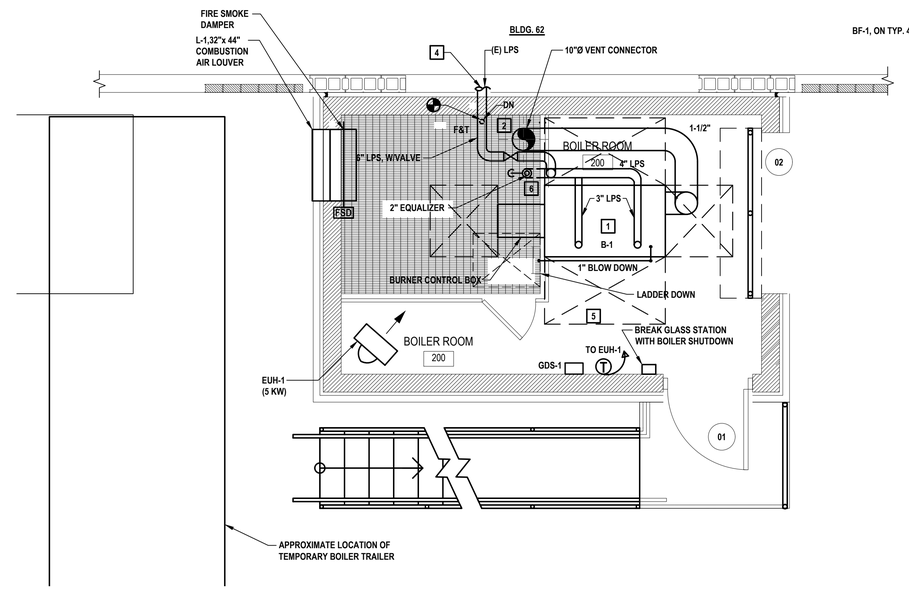
DRAWING No.	SHEET No.
M-001.00	17 OF 24

X:\BNY\D (Brooklyn Navy Yard)\...\1907 - 4388 - Restoration - Boilers - Bldg 62\...\M-001.00 HVAC GENERAL NOTES, LEGENDS, SYMBOLS, AND ABBREVIATIONS.dwg Last Modified: Apr 15, 2026 - 3:10pm Plotted on: Jul 31, 2026 - 1:57pm By mvittorio



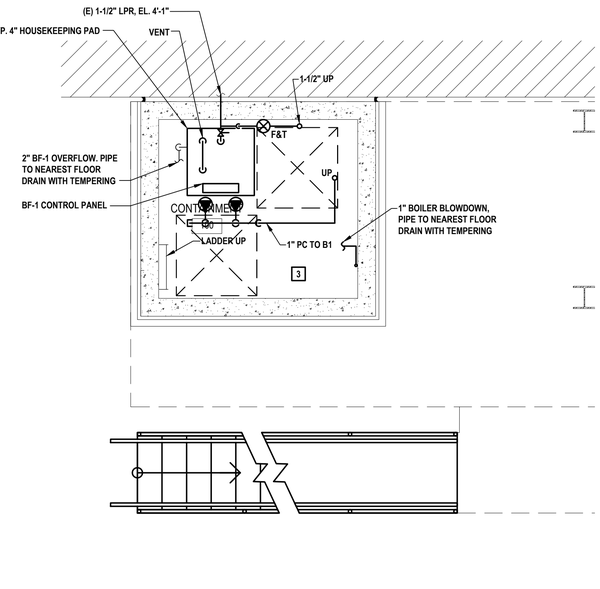
Boiler Room Demolition Plan

SCALE: 1/4"=1'-0"



Boiler Room Platform New Work Plan

SCALE: 3/8"=1'-0"



Boiler Room Ground Floor New Work Plan

SCALE: 3/8"=1'-0"

STEAM BOILERS

EQUIPMENT NO.	LOCATION	AREA SERVED	GROSS INPUT (MBH)	GROSS OUTPUT (MBH)	BOILER TURNDOWN RATIO	THERMAL EFFICIENCY	MINIMUM THERMAL EFFICIENCY	PERFORMANCE/ CONSTRUCTION REQUIREMENTS		BOILER FLUE COLLAR CONNECTION (IN)	BOILER VENT SIZE (IN)	BOILER HP	BASIS OF DESIGN INFORMATION				NOTES
						GAS (%)	GAS (%)	STEAM DATA					MANUFACTURER	MODEL NO.	NOMINAL OPERATING WEIGHT (LBS.)	NOMINAL DIMENSIONS L x W x H	
								FLOW (LBS./HR.))	OPERATING PRESS. (PSIG)								
B1	BOILER ROOM	BUILDING 62	1559	1262	3:1	83	80	1300	9	10	10	37.7	PEERLESS	CC-09	4150	75" X 32" X 52"	1-9

NOTES:
1. MANUAL RESET HIGH LIMIT CONTROL.
2. HONEYWELL OPERATING CONTROLS
3. FLEX-SEAL GASKETS.
4. FACTORY ASSEMBLED GAS TRAIN PER ANSI Z21.13
5. PROBE TYPE DUAL LWCO WITH MANUAL RESET.
6. GAUGE GLASS AND FITTINGS.
7. PRESSURE GAUGE.
8. 15PSI PRESSURE SAFETY RELIEF VALVE.
9. REQUIRED GAS PRESSURE RANGE SHALL BE A MINIMUM OF 5" W.C. AND A MAXIMUM OF 14" W.C.
10. PROVIDE OUTSIDE AIR RESET

GAS DETECTION SYSTEM

EQMT. NO.	LOCATION	SYSTEM SERVED	BASIS OF DESIGN INFORMATION				NOTES
			MNF	MODEL NO.	NOMINAL DIMENSIONS W" x H" x D"	VOLTAGE / PHASE	
GDS-1	BOILER ROOM	BOILER	REVERE CONTROL SYSTEMS	LSP-12	24"X24"X 8"	120 / 1	ALL

NOTES:
1. NEMA 4X ENCLOSURE
2. DETECT CH4, CO, REFRIGERANT (R-410A), NATURAL GAS
3. INTEGRATE BREAK GLASS STATIONS AT ALL EGRESS DOORS
4. PROGRAMMABLE ALARM LEVELS
5. AUDIBLE ALARM WITH SILENCE FEATURE
6. BUILT IN TROUBLE ALARM
7. RED STROBE WARNING LIGHT

MINIMUM PIPE INSULATION THICKNESS (CLIMATE ZONE 4) [REF. 2020 NEW YORK CITY ENERGY CONSERVATION CODE]

ITEM		PROPOSED DESIGN VALUE	CODE PRESCRIBED VALUE	NOTES
PIPE INSULATION FOR 141-200°F FLUID OPERATING TEMPERATURE RANGE AND USAGE	<1" NOMINAL PIPE SIZE	1.5" PIPE INSULATION THICKNESS	TABLE C403.11.3 1.5" MIN. PIPE INSULATION THICKNESS	3
	1 TO <1-1/2" PIPE SIZE	1.5" PIPE INSULATION THICKNESS	TABLE C403.11.3 1.5" MIN. PIPE INSULATION THICKNESS	
	1-1/2 TO < 4" PIPE SIZE	2.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 2.0" MIN. PIPE INSULATION THICKNESS	
	4" TO <8" PIPE SIZE	2.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 2.0" MIN. PIPE INSULATION THICKNESS	
	≥ 8" PIPE SIZE	2.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 2.0" MIN. PIPE INSULATION THICKNESS	
PIPE INSULATION FOR 201-250°F FLUID OPERATING TEMPERATURE RANGE AND USAGE	<1" NOMINAL PIPE SIZE	2.5" PIPE INSULATION THICKNESS	TABLE C403.11.3 2.5" MIN. PIPE INSULATION THICKNESS	4
	1 TO <1-1/2" PIPE SIZE	2.5" PIPE INSULATION THICKNESS	TABLE C403.11.3 2.5" MIN. PIPE INSULATION THICKNESS	
	1-1/2 TO < 4" PIPE SIZE	3.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 3.0" MIN. PIPE INSULATION THICKNESS	
	4" TO <8" PIPE SIZE	3.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 3.0" MIN. PIPE INSULATION THICKNESS	
	≥ 8" PIPE SIZE	3.0" PIPE INSULATION THICKNESS	TABLE C403.11.3 3.0" MIN. PIPE INSULATION THICKNESS	

BOILER FEED SYSTEM

EQUIPMENT NO.	LOCATION	SYSTEM SERVED	PERFORMANCE/CONSTRUCTION REQUIREMENTS					CUSTOM RECEIVER				BASIS OF DESIGN		
			TYPE	GPM	HEAD (FT)	MOTOR HP	MOTOR SPEED (RPM)	TANK CAPACITY GALLONS	HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)	MANUFACTURER/ MODEL	ELECTRICAL DATA	REMARKS
													VOLT/PH/HZ	
BF-1	BOILER ROOM	STEAM CONDENSATE	DUPLEX	5	25	1/2	3500	155.8	40	30	30	FABTEK	208/1/60	1-9

REMARKS:
1. BASIS OF DESIGN: FABTEK OR APPROVED EQUAL
2. PROVIDE LEAD/STANDBY CONTROL PANEL.
3. PROVIDE CUSTOM SIZE 304 SS RECEIVER
4. VERTICAL FLANGE MOUNTED CENTRIFUGAL PUMPS
5. HEAVY DUTY SS TANK SADDLES
6. SIGHT GAUGE VALVE ASSEMBLY
7. TEFC MOTOR ENCLOSURES
8. STAINLESS STEEL PUMP SUCTION ISOLATION VALVES
9. UL NO. NOT AVAILABLE

APPLICATION NUMBER: B00933910-S2

RELATED APPLICATIONS:

1.	ARCHITECTURAL:	B00933910-I1
2.	STRUCTURAL:	B00933910-S1
3.	BOILER:	B00933910-S3
4.	PLUMBING:	B00933910-S4

LOUVERS

EQUIP. NO.	LOCATION	SYSTEM SERVED	PERFORMANCE/CONSTRUCTION REQUIREMENTS					BASIS OF DESIGN INFORMATION		REMARKS
			AIR FLOW RATE (CFM)	MAX. PD (IN. W.C.)	FREE AREA (SQ. FT.)	OVERALL NOMINAL SIZE W X H	SERVICE	MNF	MODEL NO.	
L-1	BOILER ROOM	B-1	565	.02	4.0	32" x 44"	VENTILATION	GREENHECK	EHH-401	1,2,3

NOTES:
1. PROVIDE BIRD SCREEN
2. ALUMINUM CONSTRUCTION
3. COLOR TO BE CHOSEN BY ARCHITECT/OWNER.

ELECTRIC UNIT HEATERS

EQUIP. NO.	LOCATION	TOTAL CAPACITY (MBH)	HEATING COIL DATA			BASIS OF DESIGN INFORMATION				NOTES
			ELECTRIC DATA			MNF	MODEL NO.	NOMINAL DIMENSIONS L x W x H	NOMINAL OPERATING WEIGHT (LBS.)	
			VOLTS/ PHASE	TOTAL KW	AMPS					
EUH-1	BOILER ROOM	17.0	208 / 1	5	24.0	QMARK	MUH05-81	7.5"X14"X16"	27	1-3

NOTES:
1. LOW VOLTAGE CONTROL TRANSFORMER PROVIDED BY MANUFACTURER.
2. LOW VOLTAGE THERMOSTAT.
3. CEILING MOUNTED WITH MOUNTING BRACKET PROVIDED BY MANUFACTURER.

NEW WORK KEY NOTES:

1. CONTRACTOR TO INSTALL CAST IRON, STEAM SECTIONAL BOILER,
2. 10"Ø CHIMNEY FLUE TO TERMINATE AT LEAST 3'-0" ABOVE EXISTING PARAPET WITH LISTED VENT CAP
3. EXISTING RPZ, AND WATER METER TO BE RELOCATED TO THE MEZZANINE ABOVE, AS SHOWN.
4. CONNECT 6" LPS TO EXISTING BUILDING 6" LPS STEAM DISTRIBUTION SYSTEM.
5. OBTAIN CERTIFICATE OF COMPLIANCE PRIOR TO SIGN-OFF BASED ON BC 110.6 AND EQUIPMENT CAPACITY.
6. PROVIDE HARTFOOD LOOP

REQUIRED COMBUSTION AIR

TOTAL BOILER INPUT : 1559 MBH
*PROVIDE COMBUSTION AIR USING ONE(1) FIXED OPENING IN ACCORDANCE WITH 2022 NYC FUEL GAS CODE SECTION 304.6.2.

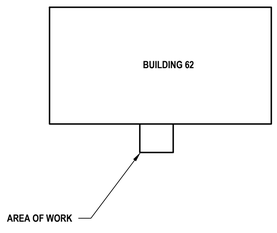
FREE AREA REQUIRED FOR COMBUSTION AIR BY CODE:
1 SQ. IN. / 3,000 BTU/HR (3 MBH)

ACTUAL FREE AREA COMBUSTION AIR REQUIRED:
1559 MBH / 3 MBH / SQ. IN. = 520 SQ. IN.

ACTUAL FREE AREA PROVIDED:
4FT (4FT x 144=576 SQ.IN.)
TOTAL EXISTING FREE AREA PROVIDED = 576 SQ. IN. > 520 SQ. IN. (OK)

DEMOLITION KEY WORK NOTES:

1. LOW PRESSURE STEAM BOILER TO BE REMOVED.
2. GAS-FIRED BURNER AND ASSOCIATED PIPING TO BE REMOVED.
3. DUPLEX BOILER FEED PUMP TO BE REMOVED.
4. 55 GAL. CHEMICAL TREATMENT TANK TO BE REMOVED.
5. ELECTRIC UNIT HEATER TO BE REMOVED.
6. 18" BREECHING TO BE REMOVED COMPLETELY.
7. 5" LOW PRESSURE STEAM HEADER TO BE REMOVED.
8. 2" NATURAL GAS PIPING TO BE REMOVED BACK TO EXISTING METER.
9. 1-1/4" MAKE-UP WATER PIPING TO BE REMOVED BACK TO WATER METER.
10. 2" FEEDWATER PIPING TO BE REMOVED.
11. ACTUATORS ON EXISTING FRESH AIR DAMPERS TO BE REMOVED.
12. WATER METER TO BE REMOVED AND SAFE GUARDED FOR RE-INSTALLATION.



BOILER PERMITTING NOTES:

CONTRACTOR SHALL TAKE OVER RENTAL OF TEMPORARY BOILER CURRENTLY ON SITE FROM MOBILE STEAM.

CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITTING FOR THE TEMPORARY BOILER INCLUDING MOBILE BOILER PERMIT AND TEMPORARY FUEL OIL TANK PERMIT.

ALL PERMITTING FOR THE TEMPORARY BOILER TO BE PERFORMED BY MOBILE STEAM AS A SERVICE TO THE CONTRACTOR.

RELOCATE TEMPORARY BOILER CONNECTIONS AS NEEDED FOR PHASING. CONTRACTOR RESPONSIBLE TO COORDINATE TEMPORARY BOILER FEED WATER.

CONTRACTOR RESPONSIBLE FOR DELIVERY AND PAYMENT OF #2 FUEL OIL TO SERVE THE TEMPORARY BOILER FOR THE DURATION OF THE CONTRACT.

TEMPORARY BOILER NOTES:

50 HP STEAM BOILER

#2 FUEL OIL, 550 GALLON TANK

15 PSI MAX PRESSURE

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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
MJV	KCM	JML	*
PROJECT No.:	DATE:	SCALE:	
BNYD1907	APRIL 2026	AS SHOWN	

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300 Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

SHEET TITLE

BOILER DEMOLITION, NEW WORK PLAN, AND SCHEDULES

DRAWING No.

M-100.00

SHEET No. 18 OF 24

X:\BKNYD\Brooklyn Navy Yard\...\4378 - Restoration - Boilers - Bldg 62-2\ACD\BIM\CADD\Construction\M-100.00 BOILER DEMOLITION, NEW WORK PLAN AND SCHEDULES.dwg Last Modified: Apr 15, 2026, 3:10pm Plotted on: Jul 31, 2026, 1:58pm By mvillano

" VIBRATION ISOLATION / SEISMIC & WIND RESTRAINTS SCHEDULE [2020 New York State Building Code, SDC = C, RISK CAT = IV"]

UNIT TAG	EQUIPMENT TYPE	"LOCATION (FL LEVEL)"	MOUNTING METHOD	BASE TYPE	MANUF	ISOLATOR TYPE	NOM. DEFL., IN.	RESTRAINT REQ'D	SEISMIC COMPONENT IMPORTANCE FACTOR, Ip	NOTES (1,2, TYP.)
BL-1, 2	BOILER	MECH ROOM	FLOOR	---	VIBRO-ACOUSTICS	NP	0.18	SEIS	1.5	4,5
HVAC PIPING (>2" NOMINAL DIAMETER)	PIPING	VARIOUS	SUSPENDED	---	VIBRO-ACOUSTICS			SEIS	1.5	

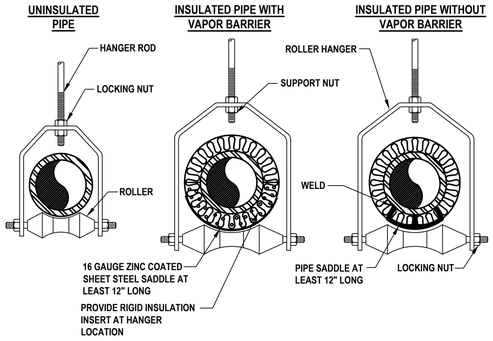
NOTES:

1. PROVIDE FLEXIBLE PIPING CONNECTORS
2. PROVIDE TYPE SHR OR SFS ISOLATORS ON ADJACENT PIPING/DUCTWORK.

BASE TYPE:

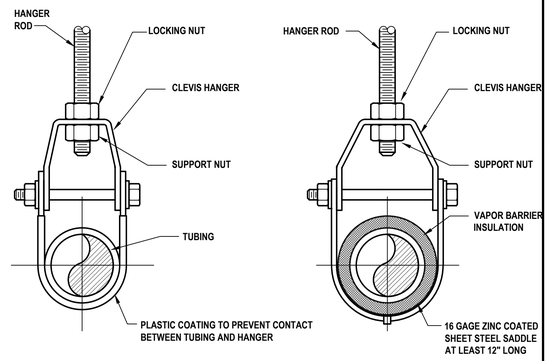
ISOLATOR TYPE:

SHR - SPRING + RUBBER HANGER



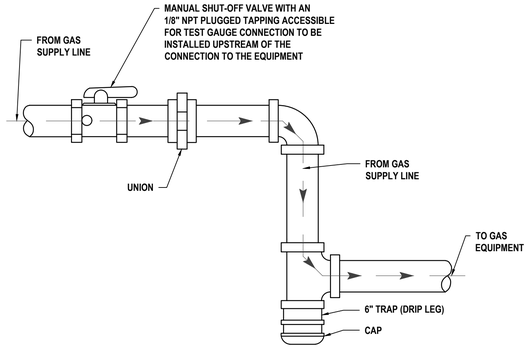
1 TYPICAL ROLLER HANGER SUPPORTS

SCALE: NTS



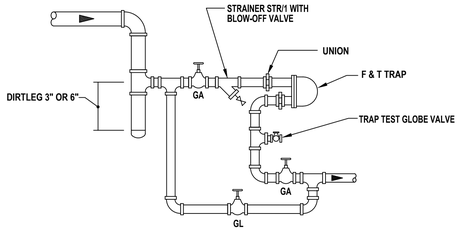
2 COPPER TUBING HANGER DETAILS

SCALE: NTS



3 TYPICAL GAS CONNECTION DETAIL

SCALE: NTS

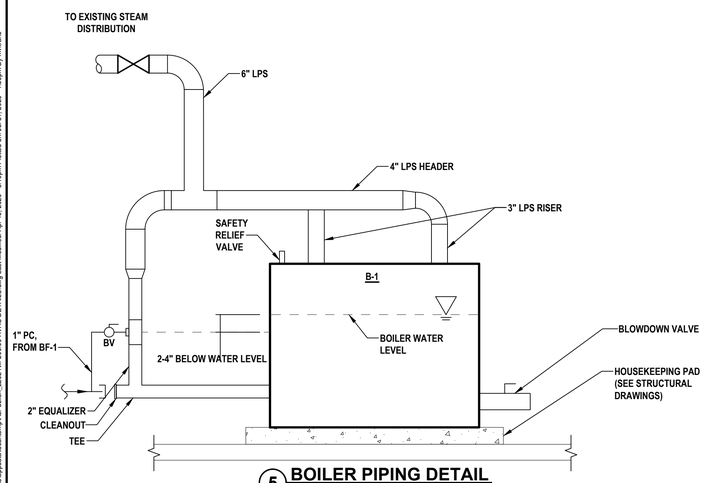


NOTES:

1. THIS TRAP ASSEMBLY SHALL ALSO BE USED FOR END OF MAIN & RISER DRIP ASSEMBLIES.

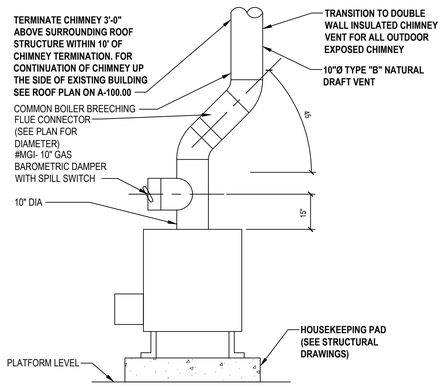
4 STEAM TRAP ASSEMBLY DETAIL-LOW PRESSURE

SCALE: NTS



5 BOILER PIPING DETAIL

SCALE: NTS

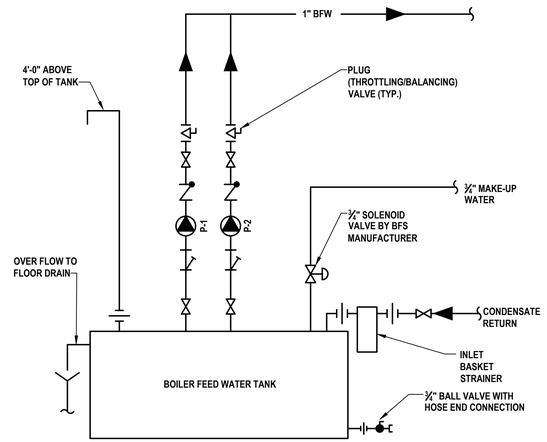


NOTES:

1. THE 6" WIDE DRAWBAND MUST BE INSTALLED ABOVE THE 9" DIA. TEE AND BAROMETRIC DAMPER WITH A 4" GAP BETWEEN THE TEE AND FLUE CONNECTOR. THIS IS REQUIRED FOR FUTURE ACCESS TO CLEAN BOILER FIRE TUBES FROM TOP OF BOILERS.

6 TYPICAL BOILER VENT CONNECTOR

SCALE: NTS



7 BOILER FEED WATER DIAGRAM

SCALE: NTS

APPLICATION NUMBER: B00933910-S2

RELATED APPLICATIONS:

1. ARCHITECTURAL: B00933910-I1
2. STRUCTURAL: B00933910-S1
3. BOILER: B00933910-S3
4. PLUMBING: B00933910-S4

H2M architects + engineers

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Melville, NY 11747
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NY Architecture & Landscape Architecture: No Certificate Required
NY Engineering Certificate of Authorization No. 0018178

CONSULTANTS:

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	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

4/30/2025
EXP. DATE

JOHN M. LAHEY, P.E.
NY PROFESSIONAL ENGINEER Lic. No. 101303

"IN ACCORDANCE WITH ARTICLE 145, SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, ALTERATION OF THIS PLAN SET EXCEPT BY A LICENSE PROFESSIONAL ENGINEER IS ILLEGAL."

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
MJV	KCM	JML	

PROJECT No.:	DATE:	SCALE:
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SHEET TITLE

HVAC DETAILS

DRAWING No.

M-200.00

SHEET No. 19 OF 24

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ELECTRICAL LEGENDS

SYMBOL	DESCRIPTION	COMMENTS
S_3	THREE - WAY SWITCH	46" AFF TO CL UON
S_4	FOUR - WAY SWITCH	46" AFF TO CL UON
S_4	ILLUMINATED SWITCH	46" AFF TO CL UON
S^A	SINGLE POLE SWITCH; "A" INDICATES SWITCH CONTROL	46" AFF TO CL UON
S_D	SINGLE POLE DIMMER SWITCH	46" AFF TO CL UON
S_{3D}	THREE - WAY DIMMER SWITCH	46" AFF TO CL UON
S_K	SINGLE POLE KEYED SWITCH	46" AFF TO CL UON
S_{K3}	KEYED THREE - WAY SWITCH	46" AFF TO CL UON
S_{K4}	KEYED FOUR - WAY SWITCH	46" AFF TO CL UON
S_P	SWITCH AND PILOT LIGHT	
S_T	SWITCH WITH THERMAL OVERLOAD PROTECTION (CONTRACTOR SHALL COORDINATE VOLTAGE AND PHASE WITH EQUIPMENT)	
$S_{OS/VS}$	OCCUPANCY/VACANCY SENSOR WITH MANUAL OVERRIDE, WALL MOUNT	
TC	TIME CLOCK	
E,G	EMERGENCY SHUT OFF SWITCH; 'E' INDICATES ELECTRICAL; 'G' INDICATES GAS	
	2 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING	
	3 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN OR BELOW SLAB	
PP1-35	HOME RUN TO PANEL U.O.N. ASSUME 2 #12 AWG + #12 AWG GND IN 3/4" E.C. CONCEALED IN WALL OR CEILING 'PP1-35' DENOTES PANEL NAME LP1 AND CIRCUIT NO. 35	
	SIMPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
	DUPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
	QUAD RECEPTACLE, DOUBLE DUPLEX RECEPTACLE: 120V, 20A. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
C	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "C" INDICATES CEILING MOUNT.	FLUSH
	DUPLEX RECEPTACLE: 120V, 20A; FLOOR MOUNTED.	FLUSH
	QUAD RECEPTACLE: 120V, 20A; FLOOR MOUNTED.	
D/T	DUPLEX RECEPTACLE AND DATA JACK: 120V, 20A; FLOOR MOUNTED.	
D/T	DATA JACK; FLOOR MOUNTED.	
IG	ISOLATED GROUND DUPLEX RECEPTACLE. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
GFI	DUPLEX RECEPTACLE: 120V, 20A; WITH GROUND FAULT INDICATOR. COORDINATE MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR TO CLEAR BASEBOARDS.	FLUSH
UC	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "UC" INDICATES UNDER COUNTER	AS PER ENGINEER
CT	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "CT" INDICATES COUNTER TOP.	AS PER ENGINEER
WP	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "WP" INDICATED WEATHER PROOF.	AS PER ENGINEER
USB	DUPLEX RECEPTACLE: 120V, 20A; SUBSCRIPT "USB" INDICATES INTEGRAL USB.	FLUSH
40 240	SPECIAL PURPOSE OUTLET: 240V, 40A. VERIFY NEMA CONFIGURATION WITH EQUIPMENT MANUFACTURER.	AS PER ENGINEER
TL	TWISTED LOCK RECEPTACLE: 125V, 20A, 3 WIRE; UNLESS OTHERWISE NOTED.	AS PER ENGINEER
	SURFACE RACEWAY WITH 2 GROUNDED AND ISOLATED TYPE DUPLEX RECEPTACLES AND 1 DATA OUTLET PER POSITION, 18" AFF UNLESS OTHERWISE NOTED.	
S1	MAGNETIC STARTER "S1"; SEE STARTER SCHEDULE	
DS1	DISCONNECTION SWITCH "DS1"; SEE DISCONNECT SWITCH SCHEDULE.	
J	JUNCTION BOX.	
J 4X	NEMA 4X STAINLESS STEEL JUNCTION BOX WITH GASKET COVER.	
J S	JUNCTION BOX RECESSED IN WALL WITH BLANK COVER. PROVIDE 3/4" E.C. AND DRAG LINE TO ABOVE FINISHED CEILING. MOUNT 18" AFF, UNLESS OTHERWISE NOTED.	
J M	FOR MONITOR, JUNCTION BOX RECESSED IN WALL WITH BLANK COVER. PROVIDE 3/4" E.C. AND DRAG LINE TO ABOVE FINISHED CEILING.	
J HD	FOR HAND DRYER, JUNCTION BOX RECESSED IN WALL WITH BLANK COVER. PROVIDE 3/4" E.C. AND DRAG LINE TO ABOVE FINISHED CEILING. COORDINATE MOUNTING HEIGHT WITH ARCHITECT.	
T T1	TRANSFORMER "T1"; SEE TRANSFORMER SCHEDULE.	
P1	ELECTRICAL PANEL "P1", RECESSED; SEE PANEL SCHEDULE.	
P1	ELECTRICAL PANEL "P1", SURFACE MOUNT; SEE PANEL SCHEDULE.	
	CONDUIT GOING UP.	
	CONDUIT GOING DOWN.	
T	TELEPHONE. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
TV	CABLE TELEVISION. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
D	DATA. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
D/T	COMBINED DATA AND TV. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	
S	SECURITY CAMERA. PROVIDE 3/4" E.C. WITH DRAG LINE TO AFC AND EMPTY J. BOX RECESSED IN WALL WITH BLANK COVER.	

ABBREVIATION	DESCRIPTION	COMMENTS
AFF	ABOVE FINISHED FLOOR	
AFC	ABOVE FINISHED CEILING	
AFCI	ARC FAULT CIRCUIT INTERRUPTER	
AFG	ABOVE FINISHED GRADE	
AHJ	AUTHORITY HAVING JURISDICTION	
AMP, A	AMPERE	
ATS	AUTOMATIC TRANSFER SWITCH; SEE TRANSFER SWITCH SCHEDULE	
AWG	AMERICAN WIRE GAUGE	
BFC	BELOW FINISHED CEILING	
CL	CENTERLINE	
CT	COUNTER TOP	
EC	ELECTRICAL CONDUIT	
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	
GFI	GROUND FAULT INDICATOR	
GND	GROUND	
CON ED	CONSOLIDATED EDISON, INC. (LOCAL ELECTRIC UTILITY)	
MCB	MAIN CIRCUIT BREAKER	
MLO	MAIN LUGS ONLY	
NTS	NOT TO SCALE	
TYP	TYPICAL	
UON	UNLESS OTHERWISE NOTED	
UC	UNDER COUNTER	
V	VOLT	
VAC	VOLTS ALTERNATING CURRENT	
VDC	VOLTS DIRECT CURRENT	
X-FMR	TRANSFORMER	
WP	WEATHERPROOF	

SINGLE LINE DIAGRAM LEGEND

SYMBOL	DESCRIPTION	COMMENTS
T	LINE VOLTAGE THERMOSTAT, 120V, 10A.	
100AF 100AT	CIRCUIT BREAKER WITH TRIP AND POLES AS NOTED; 100 AMP FRAME, 100 AMP TRIP.	
ATS1	TRANSFER SWITCH 'TS1'; SEE TRANSFER SWITCH SCHEDULE.	
M.C.B 100A/3P PANEL "P1"	DISTRIBUTION PANEL P1 WITH 30A, 2 POLE M.C.B.; SEE DISTRIBUTION PANEL SCHEDULE.	
100AS	UNFUSED DISCONNECT SWITCH DS1, 100 AMP; SEE DISCONNECT SWITCH SCHEDULE.	
DS1 100AS 100AF	FUSED DISCONNECT SWITCH 'DS#', FUSED AT 100 AMP SIZE, 100 AMP FUSED, 3 POLES; SEE DISCONNECT SWITCH SCHEDULE.	
G	GENERATOR SET 'G'	
M	ELECTRIC METER AND METER PAN AS PER PSEG REQUIREMENTS.	
5HP	MOTOR, NUMBER INDICATES HORSEPOWER.	
CTS	CURRENT TRANSFORMERS.	
PTS	VOLTAGE TRANSFORMERS.	
UPS	UNINTERRUPTIBLE POWER SUPPLY	
120/208V 277/480 T2	TRANSFORMER 'T2' WITH SIZE, PRIMARY AND SECONDARY VOLTAGES AS NOTED.	
100AF 100AT	RACK OUT CIRCUIT BREAKER	
RVRM 10	REDUCED VOLTAGE SOLID STATE RAMPING MODULE, SIZED FOR 10 H.P.	
RVSS 150	REDUCED VOLTAGE SOLID STATE STARTER, SIZED FOR 150 H.P.	
VFD 25	VARIABLE FREQUENCY DRIVE, RATED FOR 25 H.P.	
FVNR 6	FULL VOLTAGE NON-REVERSING STARTER, NEMA SIZE 6	
FVR 5	FULL VOLTAGE REVERSING STARTER, NEMA SIZE 5	
JJS	FAST ACTING SOLID STATE FUSES AS PER MANUFACTURER.	
	MULTIPLE BRANCH CIRCUITS AS REQUIRED.	
	CONTROL CIRCUIT; MIN 2 #12 AWG IN 3/4" E.C.	

SYMBOLS LEGEND

100	ROOM DESIGNATION
1 A2.2	BUILDING SECTION CUT
1 A2.2	WALL SECTION CUT
1 A2.2	DETAIL KEY
1 A2.2	ELEVATION KEY
H	COLUMN GRID
	ELEVATION LINE
1 Title SCALE:	DRAWING TITLE
4 3 5 A2.2 1 2	INTERIOR ELEVATION REFERENCE
# #	SEE NOTE # ON DWG #

GENERAL NOTES

1. ALL POWER, LIGHTING, AND CONTROLS CONDUITS ARE SHOWN DIAGRAMMATICALLY EXACT RUNS SHALL BE DETERMINED BY THE ELECTRICAL CONTRACTOR IN THE FIELD, EXCEPT WHERE SPECIFICALLY DIMENSIONED ON PLANS.
2. ALL EXPOSED CONDUIT SHALL BE RUN PARALLEL TO BUILDING WALLS AND BEAMS EXCEPT WHERE OTHERWISE SHOWN ON PLANS.
3. EXPOSED CONDUIT SHALL BE SUPPORTED FROM WALLS AND/OR CEILING BY APPROVED HANGERS OF ANGLE OR CHANNEL CONSTRUCTION.
4. EXPANSION FITTINGS OF THE APPROVED TYPE SHALL BE FURNISHED AND INSTALLED WHERE CONDUITS EXPOSED OR CONCEALED PASS THROUGH STRUCTURAL JOINTS.
5. EXACT CONDUIT STUB-UP LOCATIONS ARE TO BE DETERMINED BY THE ELECTRICAL CONTRACTOR BASED ON THE CERTIFIED MANUFACTURER'S DRAWINGS OF THE RESPECTIVE EQUIPMENT. CONDUITS FOR THE EQUIPMENT SHALL BE INSTALLED BASED ON THE REQUIREMENTS OF THE ACTUAL EQUIPMENT FURNISHED.
6. ALL PANELBOARD CIRCUIT BREAKERS SHALL BE RATED AT 20 AMPS UNLESS NOTED OTHERWISE
7. ALL SINGLE PHASE POWER AND LIGHTING CONDUITS SHALL BE 3/4" WITH 3 # 12 (1-HOT, 1-NEUTRAL, 1-GROUND) AWG. UNLESS NOTED OTHERWISE.
8. FOR CONTRACT CABLE AND CONDUIT SCHEDULE , REFFER TO CONTRACT SPECIFICATIONS. WHERE CABLE AND CONDUIT IS NOT SHOWN ON THE CONTRACT DRAWINGS, THE CABLE AND CONDUIT SHALL BE FURNISHED AND INSTALLED AS PER THE CABLE AND CONDUIT SCHEDULE.
9. ALL ELECTRICAL WORK SHALL CONFORM TO THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRIC CODE FOR THE AUTHORITY HAVING JURISDICTION INCLUDING ANY AMENDMENTS, AS WELL AS THE OTHER APPLICABLE FEDERAL STATE AND LOCAL LAWS AND/OR ORDINANCES.
10. ALL EXTERIOR ENCLOSURES SHALL BE TYPE NEMA 4X STAINLESS STEEL UNLESS OTHERWISE NOTED. ALL INTERIOR ENCLOSURES SHALL BE NEMA 1 GALVANIZED STEEL UNLESS OTHERWISE NOTED. ALL EQUIPMENT IN ELECTRICAL ROOMS SHALL BE NEMA TYPE 12 UNLESS OTHERWISE NOTED.
11. ALL COMPONENTS OF THE ELECTRICAL SYSTEM SHALL BE PROPERLY GROUNDED IN ACCORDANCE WITH NEC AND MANUFACTURERS RECOMMENDATION
12. CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRICAL EQUIPMENT REQUIRED TO PROVIDE A COMPLETED SYSTEM IN WORKING ORDER.
13. CONTRACTOR SHALL FURNISH AND INSTALL ALL ELECTRIC WIRE AND CABLE FOR ALL ELECTRICAL EQUIPMENT AND ALL INTERCONNECTING WIRES FOR COMPONENTS PROVIDED UNDER ALL SECTIONS OF THIS CONTRACT. ALL WIRING AND CABLING FOR THIS PROJECT SHALL BE COPPER.
14. ALL SWITCHES, CIRCUIT BREAKERS AND SUBSTATION CUBICLES SHALL BE IDENTIFIED VIA NAMEPLATE.
15. REFER TO THE HVAC DRAWINGS FOR HVAC EQUIPMENT LOCATIONS.
16. THE SYMBOLS AND ABBREVIATIONS LISTED REPRESENT A COMPREHENSIVE STANDARD GUIDE INTENDED FOR GENERAL USE ON THE BROOKLYN NAVY YARD PROJECT. THEREFORE, NOT ALL OF THE SYMBOLS AND ABBREVIATIONS CONTAINED IN THIS LIST ARE NECESSARILY USED FOR THIS PARTICULAR CONTRACT.
17. ALL GROUND CONDUCTORS STUBBED UP SHALL BE INSTALLED IN PVC SCHEDULE 80 CONDUIT & BE BONDED TO THE GROUND CONDUCTOR. (UNLESS OTHERWISE NOTED)
18. CROSS OFF LINE ⫽ INDICATES DEMOLITION AND REMOVAL. (UNLESS OTHERWISE NOTED)
19. WHEREVER THE INSTALLATION OF ELECTRICAL EQUIPMENT AS SHOWN ON THE DRAWINGS IS IMPRACTICAL DUE TO LOCAL INTERFERENCE OR OTHER REASONS THE CONTRACTOR SHALL INSTALL THE EQUIPMENT AT NEW LOCATIONS AS DIRECTED BY THE ENGINEER, AT NO EXTRA COST.
20. ALL EQUIPMENT SHALL BE WIRED IN ACCORDANCE WITH THE CABLE AND CONDUIT SCHEDULE (SPECIFICATION SECTION 260553). IN GENERAL, THE CABLE AND CONDUIT SCHEDULES DO NOT INDICATE LIGHTING AND RECEPTACLE CIRCUITS, AS WELL AS SOME OF THE OTHER CABLE AND CONDUIT TO BE PROVIDED UNDER THIS CONTRACT. THE CONTRACTOR IS ADVISED TO REFER TO BOTH THE SPECIFICATIONS AND DRAWINGS FOR THE FULL EXTENT OF THE CABLE AND CONDUIT REQUIREMENTS.
21. FOR ALL EQUIPMENT SCHEDULED TO BE REFED AS PART OF THIS PROJECT CONTRACTOR SHALL TEST OPERATION PRIOR TO DE-ENERGIZATION/RE-ENERGIZATION IN PRESENCE OF ENGINEER.

H2M architects + engineers
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Melville, NY 11747
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CONSULTANTS:

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DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
CJD/CJS	CJD	-	-

PROJECT No.:	DATE:	SCALE:
BNYD 1907	APRIL 2026	

CLIENT
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B N Y

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CONTRACT
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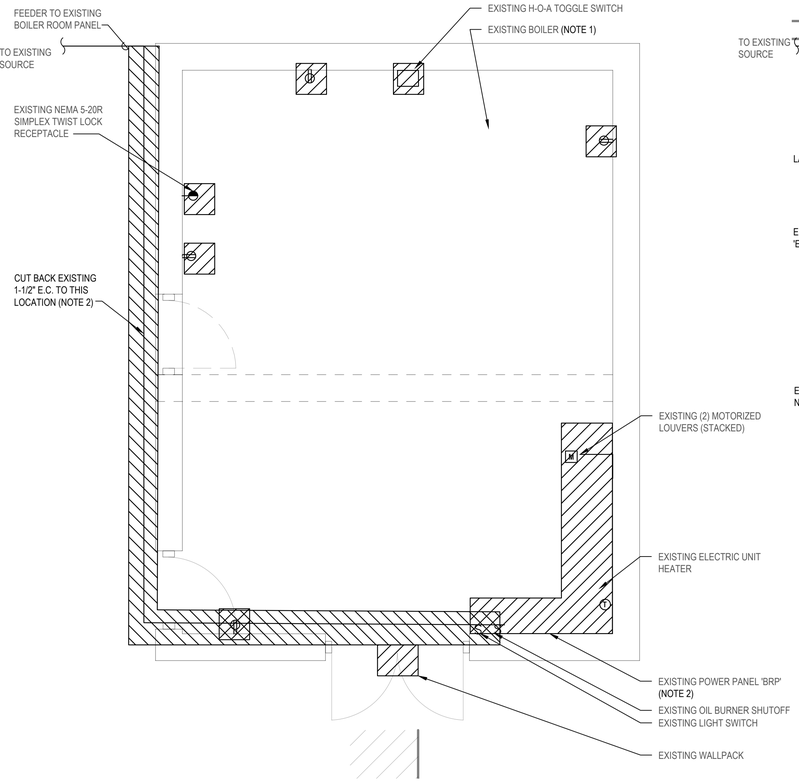
SHEET TITLE
ELECTRICAL LEGENDS

DRAWING No.
E-000.00

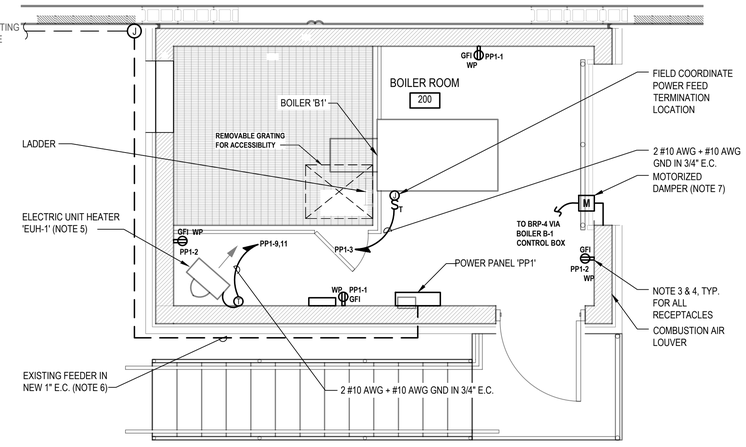
SHEET No.
20 OF 24

X:\BNYD (Brooklyn Navy Yard)\ - 407\09BNYD1907A - 438\Y1 - Mitigation\02-BIM-CADD\Cnx-docs\elec\E-000.00 - Electrical Legends.dwg Last Modified: Apr 15, 2026 - 2:32pm Plotted on: Aug 04, 2026 - 4:52pm By cdelgatto



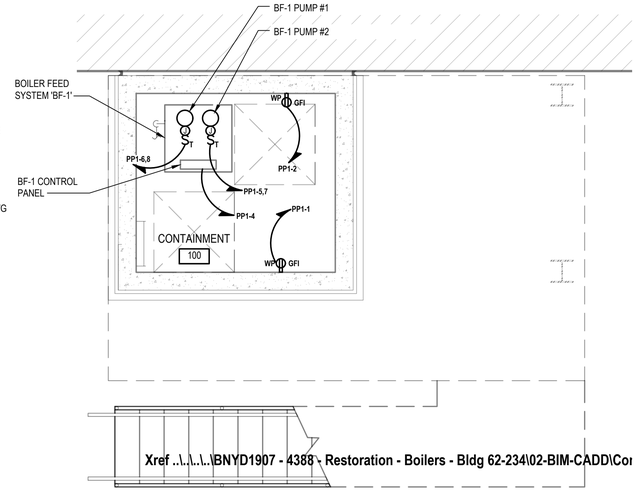
1 Electrical Building 62 Boiler Room Demolition Plan

SCALE:3/8"=1'-0"



2 Electrical Building 62 Platform Power Plan

SCALE:3/8"=1'-0"



3 Electrical Building 62 First Floor Power Plan

SCALE:3/8"=1'-0"

DEMOLITION GENERAL NOTES:

G1. REMOVE AND DISPOSE OF INCLUDES REMOVAL OF ITEM IDENTIFIED INCLUDING ALL CONDUITS, WIRES, AND CABLES, BACK TO SOURCE UNLESS OTHERWISE NOTED.

G2. CONTRACTOR SHALL BE REQUIRED TO MAINTAIN CIRCUIT CONTINUITY FOR ALL EXISTING DEVICES ON A CIRCUIT WHEN THE DRAWINGS CALL FOR REMOVAL AND/OR DISPOSAL OF A DEVICE ON THAT CIRCUIT.

G3. ALL CONDUITS SPECIFIED TO BE REMOVED SHALL BE CUT FLUSH WITH THE SURFACE AND SURFACE SHALL BE PATCHED UNLESS OTHERWISE NOTED. SURFACE SHALL BE PRIMED AND PAINTED TO MATCH EXISTING.

NOTES:

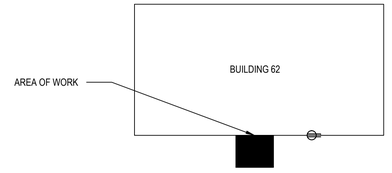
1. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL WIRE AND CONDUIT ASSOCIATED WITH THE EXISTING BOILER SYSTEM BACK TO SOURCE.
2. CONTRACTOR SHALL DISCONNECT AND SAFE OFF THE LOAD SIDE FEEDERS ASSOCIATED WITH EXISTING PANEL 'BRP' AND PULL BACK TO INDICATED LOCATION FOR RE-USE. CONTRACTOR SHALL ALSO REMOVE AND DISPOSE OF THE EXISTING CONDUIT UP TO THE INDICATED LOCATION.
3. CONTRACTOR SHALL PROVIDE ALL WEATHER-PROOF IN-USE COVERS FOR ALL RECEPTACLES LOCATED IN THE BOILER ROOM.
4. ALL RECEPTACLES INDICATED TO BE ON THE SAME CIRCUIT AS "GFCI" RECEPTACLES SHALL BE CONNECTED TO LOAD SIDE OF "GFCI" RECEPTACLE, THAT ALL RECEPTACLES ON CIRCUIT ARE PROVIDED WITH GFCI PROTECTION.
5. CONTRACTOR SHALL FIELD INSTALL DISCONNECT SWITCH PROVIDED BY MANUFACTURER. CONTRACTOR IS RESPONSIBLE FOR INSTALLING AND INTEGRATING WITH UNIT IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
6. CONTRACTOR SHALL RE-USE AND RE-ROUTE EXISTING 4 #3 AWG +#8 AWG GND IN NEW 1" E.C. ALONG THE CEILING OF THE FIRST FLOOR AND STUB UP TO THE BOTTOM OF THE NEW BOILER ROOM PANELBOARD 'PP1'.
7. CONTRACTOR SHALL INTERFACE THE MOTORIZED DAMPER WITH THE BOILER B-1 CONTROL BOX TO OPERATE UPON BOILER RUNNING.

LEGENDS

	REMOVE & DISPOSE OF

Site Key Plan

SCALE:N.T.S.



Bldg Key Plan

SCALE:N.T.S.

H2M architects + engineers
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CONSULTANTS:

MARK	DATE	DESCRIPTION
1	05/16/2025	PROGRESS SET
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
CJD/CJS	CJD	EVI	CJS

PROJECT No.:	DATE:	SCALE:
BNYD 1907	APRIL 2026	

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

BNY

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

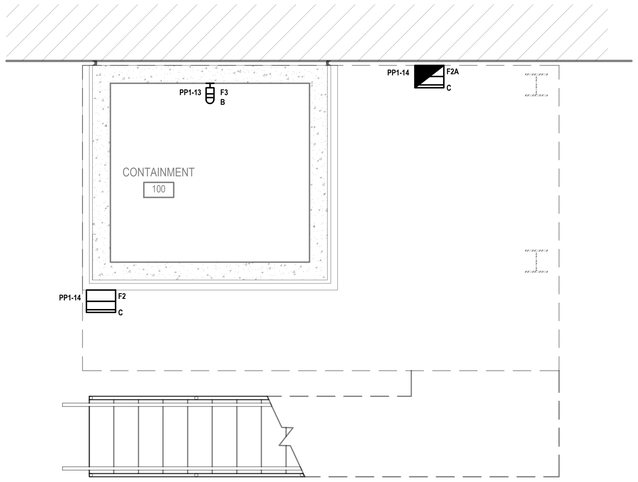
SHEET TITLE

ELECTRICAL DEMOLITION AND POWER PLAN

DRAWING No.: **E-100.00**

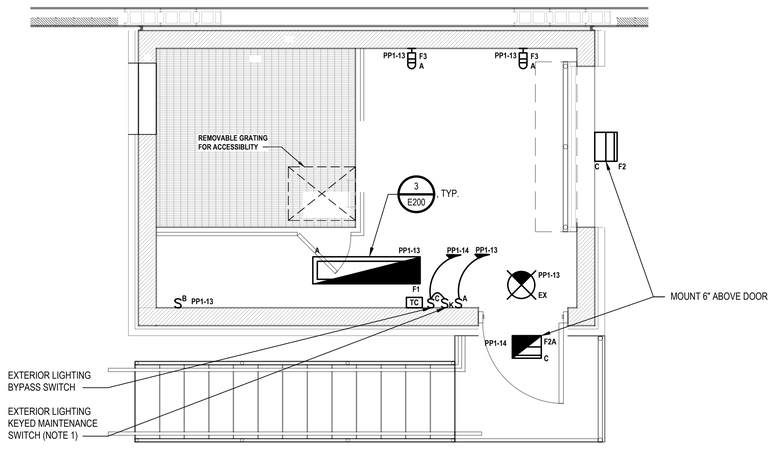
SHEET No.: 21 OF 24

X:\BB\NYD (Brooklyn Navy Yard) - 4270\0BNY01907A - 4388\1 - Mitigation\02-BIM-CADD\Cov-docs\exhE-100.00 - Electrical Demolition and Power Plan.rvg Last Modified: Apr 15, 2026 - 2:32pm Plotted on - Aug 04, 2026 - 4:52pm By cdelgatto



1 Electrical Building 62 First Floor Lighting Plan

SCALE:3/8"=1'-0"

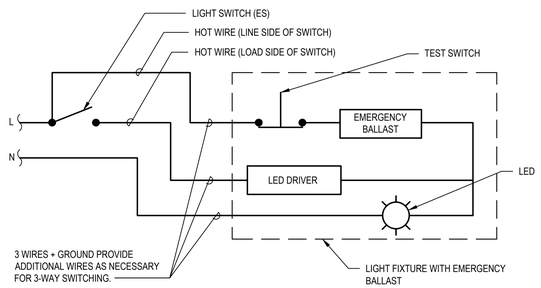


2 Electrical Building 62 Platform Lighting Plan

SCALE:3/8"=1'-0"

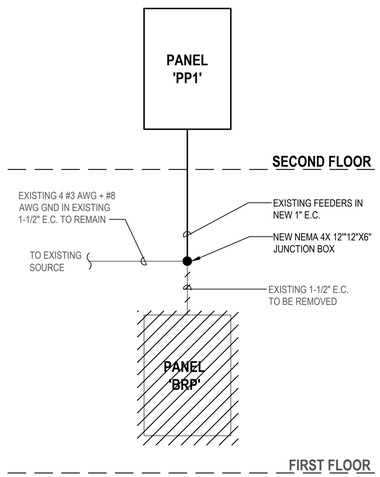
NOTE:

1. CONTRACTOR SHALL PROVIDE 2" X 4" PHENOLIC NAME PLATE STATING: 'MAINTENANCE SWITCH - TURN TO 'ON' POSITION TO PREVENT LIGHTS FROM TURNING ON.



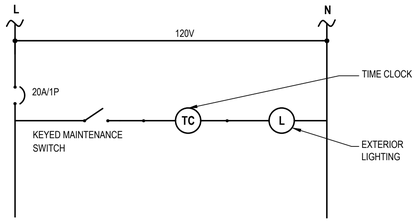
3 Typical Detail of Light Fixture with Emergency Ballast

SCALE:NTS



4 Existing and New Single Line Diagram

SCALE:NTS



5 Exterior Lighting Wiring Detail

SCALE:N.T.S.

LIGHTING FIXTURE SCHEDULE

DESIGNATION	SYMBOL	MANUFACTURER	MODEL NUMBER	TYPE	WATTS	COLOR TEMPERATURE	VOLTAGE	LUMENS	MOUNTING	REMARKS	MOUNTING HEIGHT
F1		CURRENT	LXEM-4-40-ML-RFA-ED-U-ELL14	LED	42	4000	UNV	4533	SURFACE	INTEGRAL EMERGENCY BACKUP WITH 90 MINUTES OF BACKUP CAPACITY	CEILING
F2		CURRENT	TRP2-36L-25-3K7-2-UNV-BLT	LED	32	3000	UNV	4200	SURFACE		WALL, TOP OF FIXTURE 6'-8" A.F.G., U.O.N.
F2A		CURRENT	TRP2-36L-25-3K7-2-UNV-BLT-E	LED	32	3000	UNV	4200	SURFACE	INTEGRAL EMERGENCY BACKUP WITH 90 MINUTES OF BACKUP CAPACITY	WALL, TOP OF FIXTURE 6'-8" A.F.G., U.O.N.
F3		CURRENT	VWGL-2	LED	20	4000	120	2772	WALL		WALL, TOP OF FIXTURE 6'-0" ABOVE BOTTOM OF CONTAINMENT
EX		COMPASS	CER	LED	2		UNV	4200	SURFACE	INTEGRAL EMERGENCY BACKUP WITH 90 MINUTES OF BACKUP CAPACITY	CEILING

LIGHTING GENERAL NOTES:

G1. PROVIDE ALL REQUIRED WIRING NECESSARY BETWEEN SWITCHES, CONTROLLERS AND/OR OCCUPANCY SENSORS FOR COMPLETE LIGHTING CONTROL. WHERE 3 OR 4 WAY SWITCHES ARE USED, PROVIDE ALL REQUIRED WIRING BETWEEN SWITCHES. WIRE SIZE SHALL EQUAL POWER FEED SIZE.

G2. CONTRACTOR SHALL LOCATE AND INSTALL ALL LIGHT FIXTURES IN MECHANICAL ROOMS TO PROVIDE CLEARANCE FROM ALL MECHANICAL EQUIPMENT. COORDINATE WITH MECHANICAL CONTRACTOR PRIOR TO INSTALLING FIXTURES, SWITCHES, CONDUIT, AND WIRING.

G3. FIXTURES INDICATED WITH CIRCUIT DESIGNATIONS SHALL BE CONNECTED TO LINE SIDE OF CIRCUIT.

G4. FIXTURES INDICATED WITH LETTER DESIGNATIONS SHALL BE CONNECTED TO THE SWITCH, OCCUPANCY SENSOR AND/OR POWER PACK WITH CORRESPONDING LETTER DESIGNATION.

G5. PROVIDE AND INSTALL A DEDICATED NEUTRAL FOR EACH CIRCUIT. CONTRACTOR IS NOT PERMITTED TO USE COMMON NEUTRALS.

G6. PROVIDE BOX AND ACCESSORIES AS PER MANUFACTURER'S RECOMMENDATION FOR ALL SWITCHES OCCUPANCY SENSORS, AND/OR POWER PACKS.

G7. VERIFY EXACT LOCATIONS AND MOUNTING HEIGHTS WITH ARCHITECT/ENGINEER IN FIELD.

G8. ALL CEILING MOUNTED FIXTURES WITH EMERGENCY BALLASTS AND ALL FIXTURES THAT ARE PART OF AN EMERGENCY LIGHTING SYSTEM, FED FROM AN EMERGENCY GENERATOR OR CENTRAL BATTERY SYSTEM SHALL BE LABELED. THESE LABELS SHALL BE EASILY READ FROM THE FLOOR LEVEL AND STATE THAT THE FIXTURE IS AN EMERGENCY FIXTURE AND CONTAIN THE PANEL NAME AND CIRCUIT NUMBER THAT IT IS FED FROM.

G10. WIRING FOR EMERGENCY BALLAST IS NOT SHOWN ON PLANS. FIXTURES WITH EMERGENCY BALLASTS SHALL BE PROVIDED WITH AN UNSWITCHED POWER FEED FROM CIRCUIT FEEDING LIGHT FIXTURE.

G11. PROVIDE ALL HARDWARE AND ACCESSORIES TO MOUNT FIXTURES SECURELY. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECT/ENGINEER IN FIELD.

G12. CONTRACTOR SHALL USE SILICONE WATER PROOF SEALANT TO SEAL TOP, LEFT, AND RIGHT EDGES OF LIGHT FIXTURES TO WALL TO PREVENT MOISTURE FROM ACCUMULATING BEHIND FIXTURE. BOTTOM EDGE SHALL BE LEFT UNSEALED FOR DRAINAGE. COLOR OF SILICONE SHALL MATCH EITHER WALL COLOR OR FIXTURE COLOR. (TYP. OF ALL WALL MOUNTED FIXTURES INCLUDING INTERIOR, EXTERIOR, EXIT AND EMERGENCY LIGHTING)

Panel Wiring Schedule (3-Phase)

Panelboard: PP1 | Voltage: 120/208V | Phase: 3 | Wire: 4 | AIC Rating: 42,000
Manufacturer: EATON | Mains: 100A MCB | Mains Rating: 125A
Panel Type: - | Mounting: SURFACE | Options: - | Note: -
NEMA Type Enclosure: 3R

LOAD DESCRIPTION	BREAKER OPTION	TRIP AMPS AND POLES	CONNECTED LOAD VOLT AMPERES ØA	ØB	ØC	CIRC. No.	A B C	CIRC. No.	CONNECTED LOAD VOLT AMPERES ØA	ØB	ØC	TRIP AMPS AND POLES	BREAKER OPTION	LOAD DESCRIPTION
REC - MAINTENANCE		20A/1P	540			1		2	540			20A/1P		REC - MAINTENANCE
B-1 CONTROL FEED		30A/1P		1656		3		4		500		20A/1P		BF-1 CONTROL PANEL
BF-1 PUMP #1		15A/2P			560	5		6			560	15A/2P		BF-1 PUMP #2
			560			7		8	560					
EUH-1	HACR	30A/2P		2500		9		10		–		20A/1P		SPARE
					2500	11		12			–	20A/1P		SPARE
LTS - INTERIOR		20A/1P	126			13		14	128			20A/1P		LTS - EXTERIOR
SPARE		20A/1P	–	–		15		16	–	–		20A/1P		SPARE
SPARE		20A/1P		–	–	17		18		–	–	20A/1P		SPARE
SPARE		20A/1P	–		–	19		20	–		–	20A/1P		SPARE
SPARE		20A/1P		–		21		22		–		20A/1P		SPARE
SPARE		20A/1P	–		–	23		24	–		–	20A/1P		SPARE
SPARE		20A/1P		–		25		26		–		20A/1P		SPARE
SPARE		20A/1P	–		–	27		28	–		–	20A/1P		SPARE
SPARE		20A/1P		–		29		30		–		20A/1P		SPARE
SPARE		20A/1P	–		–	31		32	–		–	20A/1P		SPARE
SPARE		20A/1P		–		33		34		–		20A/1P		SPARE
SPARE		20A/1P	–		–	35		36	–		–	20A/1P		SPARE
SPARE		20A/1P		–		37		38		–		20A/1P		SPARE
SPARE		20A/1P	–		–	39		40	–		–	20A/1P		SPARE
SPARE		20A/1P		–		41		42		–		20A/1P		SPARE

Connected Totals: ØA 2.20 KVA | ØB 3.50 KVA | ØC 3.62 KVA | Total 9.32 KVA | 26 Amperes

(All Phases to be balanced to within 7% using Actual Load Totals.)

Breaker Options:
AFCI - Arc Fault Circuit Interrupter
AS - Powerlink AS Breaker
AUX - Auxiliary Contacts
GFCI - Ground Fault Circuit Interrupter
HACR - Heating, A/C & Refrigeration
LO - Handle lock-off device
PA - Handle Padlock Attachment
SF - Subfeed
ST - Shunt Trip Type
TC - Time Clock Control

Site Key Plan

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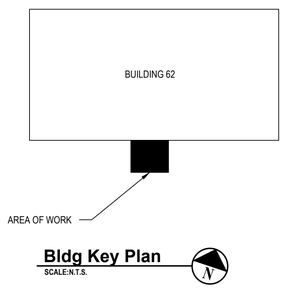

Bldg Key Plan

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CJD/CJS	CJD	-	-

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CLIENT
Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300
Brooklyn, NY 11205

CONTRACT
ALL CONTRACTS

STATUS
FINAL BID DOCUMENT

SHEET TITLE
ELECTRICAL LIGHTING PLAN, SCHEDULES, AND DETAILS

DRAWING No.: **E-200.00**
SHEET No.: 22 OF 24

X:\BNYD (Brooklyn Navy Yard) - 407\08BNYD19070A - 438911 - Mitigation\02.BIM-CAD\Con-docs\4eoCE-200.00 - Electrical Lighting Plan, Schedules, and Details.dwg | Last Modified: Apr 15, 2026 - 2:52pm | Plotted on: Aug 04, 2026 - 4:53pm | By cdelgatto

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
BTU	BRITISH THERMAL UNIT
BTUH	BTU PER HOUR
CLG	CEILING
(D)	DEMOLISH
DEG. F	° FAHRENHEIT
DIA	DIAMETER
DN	DOWN
(E)	EXISTING
EA	EACH
G	GAS
'GC'	GENERAL CONSTRUCTION CONTRACTOR
'H'	HVAC CONTRACTOR
IN.	INCHES
IN. W.C. (W.G.)	INCHES WATER COLUMN (WATER GAUGE)
M	METER
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
(P)	PROPOSED
'P'	PLUMBING CONTRACTOR
PD	PRESSURE DROP
TYP	TYPICAL

LEGEND

SYMBOL	DESCRIPTION
	PIPING UP
	PIPING DOWN
	PIPING RISE OR DROP
	BRANCH-TOP CONNECTION
	BRANCH-BOTTOM CONNECTION
	CAPPED PIPE
	GAS COCK, GAS STOP
	GAS PIPING (G)
	TO BE REMOVED
	POINT OF CONNECTION
	POINT OF DISCONNECTION

NYC BUILDING DEPARTMENT NOTES

THE GAS AND ALL ASSOCIATED EQUIPMENT SHALL BE CONSTRUCTED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THE 2022 NEW YORK CITY BUILDING CODE, AS CITED IN CHAPTER 29 AND REFERENCED TO THE NEW YORK CITY FUEL GAS CODE (FGCNYC).

1. THE MATERIALS USED IN THE PLUMBING SYSTEM SHALL BE PROVIDED IN FULL ACCORDANCE WITH SECTION PC702-MATERIALS AND PC605-MATERIALS, JOINTS & CONNECTIONS.
2. EQUIPMENT HOOK-UP AND THE JOINING OF PIPING SHALL BE IN FULL COMPLIANCE WITH SECTION PC705-JOINTS AND PC706-CONNECTION BETWEEN DRAINAGE PIPING AND FITTING.
3. VERTICAL AND HORIZONTAL PIPING WILL BE HUNG AND SUPPORTED IN THE FULL COMPLIANCE WITH PC-308 PIPING SUPPORT.
4. PROTECTION OF PIPING AS OUTLINED IN PC305- PROTECTION OF PIPES AND PLUMBING SYSTEM COMPONENTS, SHALL BE PROVIDED AS REQUIRED.
5. TESTS AND INSPECTIONS OF PLUMBING PIPING SYSTEMS SHALL BE IN ACCORDANCE WITH NYCPC-SECTION PC312.
6. INDIRECT, SPECIAL AND MISCELLANEOUS PIPING SHALL BE AS DIRECTED IN THE NYCPC-CHAPTER 8; INDIRECT/SPECIAL WASTE.
7. GAS PIPING INSTALLATION, MATERIAL AND SIZES SHALL ADHERE TO THE 2022 NEW YORK CITY FUEL GAS CODE.
8. RODENT PROOFING SHALL COMPLY WITH SECTION PC304- RODENT PROOFING.
9. ALL TRENCHING SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION PC306.
10. TEMPORARY TOILET FACILITIES SHALL BE PROVIDED FOR CONSTRUCTION PERSONNEL AS PER SECTION PC311.

PLUMBING GENERAL NOTES

1. THE CONTRACTOR, BY PRESENTING THEIR BID FOR THE WORK, REPRESENTS THAT HE/SHE HAS INSPECTED THE SITE AND IS COMPLETELY FAMILIAR WITH THE SCOPE OF WORK AND ALL FIELD CONDITIONS RELATED TO, AND AFFECTING THE WORK AND ITS PERFORMANCE. EXCEPTIONS AFFECTING THE WORK AND ITS PERFORMANCE, OR CONFLICTS BETWEEN FIELD CONDITIONS, SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER PRIOR TO THE SUBMISSION OF BIDS.
2. APPLY FOR AND SECURE ALL REQUIRED PERMITS AND INSPECTIONS AND PAY ALL COSTS FOR THE SAME.
3. ALL PIPE PENETRATIONS THROUGH FIRE RATED CONSTRUCTION SHALL BE FIRE STOPPED TO MATCH THE SAME RATING AS THE WALL/FLOOR. ALL PIPE PENETRATIONS THROUGH CONCEALED SPACES SHALL BE FIRE BLOCKED TO PREVENT DRAFT IN NON FIRE RATED WALL/FLOOR. ALL PIPE PENETRATIONS THROUGH THE THERMAL ENVELOPE OF THE BUILDING SHALL BE CAULKED OR GASKETED COMPATIBLE WITH THE CONSTRUCTION TYPE. (SEE ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE RATED CONSTRUCTION).
4. DO NOT SCALE DRAWINGS. DRAWINGS FOR PLUMBING WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE.
5. COORDINATE CONTRACT DOCUMENTS, PROJECT REQUIREMENTS, WORK OF OTHERS, AND EQUIPMENT AND MATERIALS PURCHASED WITH FIELD DIMENSIONS. INSTALL ALL EQUIPMENT AS PER MANUFACTURER'S REQUIREMENTS TO PROVIDE PROPER CLEARANCE FOR INSTALLATION, OPERATION, AND MAINTENANCE. CONTRACTOR'S INTENDED MEANS AND METHODS OF INSTALLATION AND CONTRACTOR'S FABRICATED ITEMS SHALL ENSURE A PROPER "FIT" AND INSTALLATION. BRING ANY CONFLICTS TO THE ATTENTION OF THE ARCHITECT/ENGINEER DURING THE SUBMITTAL PHASE FOR RESOLUTION PRIOR TO PURCHASING ANY EQUIPMENT.
6. MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITIONS AT ALL POINTS, WHERE HEADROOM AND SPACE CONDITIONS APPEAR INADEQUATE, NOTIFY THE ARCHITECT/ENGINEER PRIOR TO PROCEEDING WITH INSTALLATION. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE FROM FINISHED FLOOR TO UNDERSIDE OF PIPES, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
7. FIELD VERIFY AND COORDINATE ALL PIPING DIMENSIONS BEFORE FABRICATION. MAKE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF OTHER TRADES OR FOR PROPER EXECUTION OF THE WORK. OBTAIN THE APPROVAL OF THE ARCHITECT/ENGINEER FOR MODIFICATIONS.
8. PROVIDE PRODUCTS OF ONE MANUFACTURER WHERE TWO OR MORE ITEMS OF THE SAME TYPE OF MATERIAL OR EQUIPMENT IS REQUIRED.
9. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL PIPING TRANSITIONS REQUIRED FOR FINAL CONNECTIONS TO EQUIPMENT.
10. COORDINATE LOCATIONS AND SIZES OF ALL FLOOR, WALL, AND ROOF OPENINGS WITH ALL OTHER TRADES. COORDINATE ALL PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURE WITH GENERAL CONSTRUCTION WORK.
11. COMPLETE ALL PRESSURE TESTS BEFORE ANY PLUMBING EQUIPMENT, OR PIPING INSULATION IS APPLIED.
12. TESTING, ADJUSTING, AND BALANCING AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) OR THE NATIONAL ENVIRONMENTAL BALANCING BUREAU (NEBB). PERFORM ALL TESTING, ADJUSTING, AND BALANCING IN ACCORDANCE WITH THE SPECIFICATIONS.
13. MAKE ALL ATTACHMENTS TO JOISTS, TRUSSES, OR JOIST GIRDERS AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. THE USE OF C-CLAMPS IS NOT PERMITTED.
14. ARRANGE FOR, COORDINATE, AND MAKE CONNECTION TO ALL SERVICES PROVIDED BY OTHERS. CONFORM TO ALL REQUIREMENTS APPLICABLE TO CONNECTIONS IMPOSED BY UTILITY COMPANIES AND AUTHORITIES HAVING JURISDICTION.
15. INSTALL FIXTURES AND EQUIPMENT WITH VALVES, UNIONS, ETC. TO ALLOW FOR EASE OF SERVICE AND/OR REMOVAL.
16. CORE DRILL ALL PENETRATIONS THROUGH CONCRETE FLOORS, WALLS, AND FOOTINGS.
17. FURNISH AND INSTALL ALL SLEEVES FOR PIPE AND CONDUIT FLOOR, WALL, AND PARTITION PENETRATIONS.
18. ALL INSTALLED PLUMBING PIPING TO BE TESTED AND INSPECTED BY CONTRACTOR AS PER THE NEW YORK CITY PLUMBING CODE SECTION 312.1 REQUIRED TESTS AND SECTION 312.1.1 TEST GAUGES.
19. NO EXISTING GAS PIPING SHALL BE INSTALLED OR CONNECTED TO EQUIPMENT, OR LEFT ABANDONED.

SPECIAL INSPECTION REQUIREMENTS

PROGRESS INSPECTION CATEGORIES

■ ENERGY CODE COMPLIANCE INSPECTIONS	TR8	BC 110.3.5
■ FIRE RESISTANCE PENETRATION AND JOINTS	TR8	BC 1704.27

SCOPE OF WORK

1. REMOVING EXISTING GAS PIPING AND ALL ASSOCIATED GAS RELATED APPLIANCES FROM METER TO EXISTING BOILER. INSTALLATION OF NEW GAS PIPING FROM METER TO NEW BOILER ON MEZZANINE. NEW GAS PIPING SHALL NOT BE LOCATED IN OR PASS THROUGH EGRESS STAIR ENCLOSURES, A ROOM OR SPACE CONTAINING A FIRE STANDPIPE RISER, A FIRE RATED CONSTRUCTION AND OR ANY PUBLIC CORRIDORS.
2. RELOCATE EXISTING DOMESTIC WATER SERVICE, METER AND BACKFLOW TO ABOVE THE RAISED PLATFORM. PROVIDE NEW WATER CONNECTIONS TO THE BOILER SYSTEM.

FUEL GAS NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH NFPA 54 - NATIONAL FUEL GAS CODE, THE 2022 FUEL GAS CODE OF NEW YORK CITY (FGCNYS), 2022 CONEDISON YELLOW BOOK, AND THE REQUIREMENTS OF THE LOCAL AUTHORITIES HAVING JURISDICTION.
2. GAS PIPING:
   - 2.1. INDOOR - STEEL PIPE- SCHEDULE 40 WITH WELDED OR THREADED JOINTS. THREADED JOINTS SHALL BE 150 POUND MALLEABLE IRON, FORGED STEEL, BLACK IRON, OR GALVANIZED STEEL.
   - 2.2. OUTDOOR - ABOVE GROUND - GALVANIZED PIPE OR PROPERLY COATED BLACK STEEL PIPE WITH SCREWED OR THREADED JOINTS.
   - 2.3. WELDED JOINTS MUST BE USED FOR GAS PIPING LARGER THAN 4-INCH, OR 3-INCH FOR SCHOOLS.
3. GAS PIPING ENTERING A BUILDING SHALL BE ABOVE GRADE. PENETRATIONS THROUGH BURIED WALLS ARE NOT PERMITTED.
4. GAS PRESSURE TEST:
   - 4.1. GALVANIZED OR BARE STEEL - UP TO 14" W.C. - AIR AT 3 PSIG FOR 30 MINUTES - AIR AT 15 PSIG FOR 1-HOUR (SED)
   - 4.2. GALVANIZED OR BARE STEEL - GREATER THAN 14" W.C. - AIR AT 50 PSIG FOR 30 MINUTES - AIR AT 1.5 TIMES THE WORKING PRESSURE FOR 1-HOUR (SED)
   - 4.3. COATED OR WRAPPED - LESS THAN 2-INCH - AIR AT 90 PSIG FOR 1-HOUR - ALL SIZES - AIR AT 100 PSIG FOR 1-HOUR (SED)
   - 4.3. COATED OR WRAPPED - 2-INCH TO 12-INCH - AIR AT 90 PSIG FOR 4-HOURS
5. SUPPLY ALL GAS-FIRED EQUIPMENT WITH GAS PIPING AS PER THE FUEL GAS CODE OF NEW YORK CITY. PROVIDE EACH PIECE OF EQUIPMENT WITH A DIRT LEG, UNION AND GAS COCK. PROVIDE A VENTED REGULATOR IF EQUIPMENT REQUIRES LOWER THAN LINE GAS PRESSURE.
6. SHUTOFF VALVES INSTALLED IN TUBING SYSTEMS MUST BE RIGIDLY AND SECURELY SUPPORTED INDEPENDENTLY OF THE TUBING.

MANUAL GAS VALVE STANDARDS

VALVE STANDARDS	APPLIANCE SHUTOFF VALVE APPLICATION UP TO 1/2 PSIG PRESSURE	OTHER VALVE APPLICATIONS		
		UP TO 1/2 PSIG PRESSURE	UP TO 2 PSIG PRESSURE	UP TO 5 PSIG PRESSURE
ANSI Z21.15/CGA9.1	X	–	–	–
ASME B16.44	X	X*	X**	–
ASME B16.33	X	X	X	X

NOTES:
1. FOR SI: 1 POUND PER SQUARE INCH GAUGE = 6.895 kPa.
2. X* IF LABELED 2G
3. X** IF LABELED 5G

PIPE MATERIAL SCHEDULE

SYSTEM	MATERIAL	FITTINGS	TESTING PROCEDURE
GAS PIPING	ASTM A53 SCHEDULE 40 BLACK STEEL	STANDARD WEIGHT 150 LBS. W.O.G. MALLEABLE IRON WITH THREADED JOINTS	THE TEST PRESSURE SHALL BE NOT LESS THAT 1-1/2" TIMES THE PROPOSED MAXIMUM WORKING PRESSURE, BUT NOT LESS THAN 3 PSIG, IRRESPECTIVE OF DESIGN PRESSURE. ALL TESTING PROCEDURES MUST COMPLY WITH NYC FGC SECTION 406.
WASTE PIPING	ASTM A74, ASTM A888 CAST-IRON	HUBLESS PIPE FITTINGS: DRAINAGE PATTER, BITUMIN COATED; CAST IRON SOIL PIPE INSTITUTE STANDARD NO. 301. HUBLESS JOINT COUPLINGS: STAINLESS STEEL SHIELD AND CLAMP ASSEMBLY, AND ELASTOMER SEALING SLEEVE; CISPI-310.	TEST SHALL CONSIST OF PLUGGING THE END OF THE BUILDING SEWER AT THE POINT OF CONNECTION WITH THE PUBLIC SEWER, FILLING THE BUILDING SEWER WITH WATER, TESTING WITH NOT LESS THAN A 10-FOOT (3048 MM) HEAD OF WATER AND MAINTAINING SUCH PRESSURE FOR 15 MINUTES.
DOMESTIC WATER	ASTM B75, ASTM B88 TYPE L COPPER	WROT COPPER TUBE FITTINGS, SOLDER JOINT: ASME B16.22. CAST COPPER ALLOY TUBE FITTINGS, SOLDER JOINT: AMSE B16.18.	UPON COMPLETION OF A SECTION OF OR THE ENTIRE WATER SUPPLY SYSTEM, THE SYSTEM, OR PORTION COMPLETED, SHALL BE TESTED AND PROVED TIGHT UNDER A WATER PRESSURE NOT LESS THAN THE WORKING PRESSURE OF THE SYSTEM; OR BY AN AIR TEST OF NOT LESS THAN 50 PSI (344 KPA). THIS PRESSURE SHALL BE HELD FOR NOT LESS THAN 15 MINUTES.
INSULATION FOR COLD WATER PIPING SHALL BE 1-INCH FIBERGLASS WITH JACKET, WITH CONDUCTIVITY OF 0.23. ALL COLD WATER PIPING SHALL BE INSULATED WITHIN THE BUILDING			

GAS REGULATOR SCHEDULE

SYMBOL	LOCATION	CAPACITY (CFH)	INLET PRESSURE	OUTLET PRESSURE	VALVE BODY SIZE
REG-1	BOILERS	>1560	1 PSIG	11" W.C.	3"

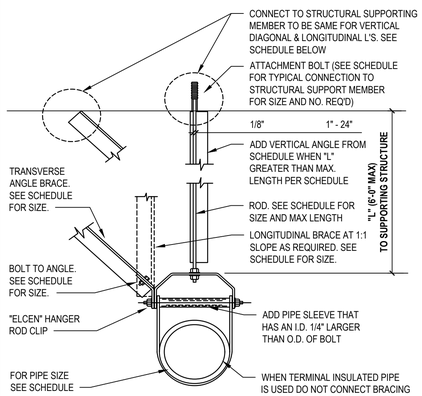
SEISMIC BRACING NOTES

GENERAL

1. PIPES SHALL BE BRACED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE SECTION 1613, THE LATEST EDITION OF THE SMACNA SEISMIC RESTRAINT MANUAL FOR BUILDINGS WITH SEISMIC DESIGN CATEGORY C, D, AND E FOR FIRE SPRINKLER AND PLUMBING SYSTEMS WITH AN IMPORTANCE FACTOR GREATER THAN 1.0.
2. ALTERNATIVE DETAILS DIFFERING FROM THE LATEST EDITION OF THE SMACNA MANUAL MAY BE USED IF APPROVED BY THE STRUCTURAL ENGINEER ON RECORD.
3. IN-LINE EQUIPMENT SHALL BE BRACED INDEPENDENTLY OF THE PIPES. REFER TO THE SEISMIC DETAILS AND SCHEDULES ON THE CONTRACT DOCUMENTS.
4. COLD-FORMED ANGLES SHALL CONFORM TO THE AISI "SPECIFICATIONS FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS" WITH A MINIMUM FY OF 33 PSI.
5. HOT-ROLLED SHAPES AND PLATES SHALL CONFORM TO ASTM A36. PIPES USED AS BRACES SHALL BE STANDARD STEEL PIPES PER ASTM A500-A OR A-53.
6. PIPE HANGERS SHALL BE POSITIVELY ATTACHED TO THE SUPPORTING STRUCTURE ABOVE. THE USE OF C-CLAMPS OR OTHER FRICTION-TYPE ANCHORS TO HANG PIPE IS PROHIBITED IN SEISMIC REGIONS. FRICTION-TYPE ANCHORS SUCH AS C-CLAMPS WITH PROPERLY ATTACHED RETAINING STRAPS MAY BE USED IF APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.
7. REFER TO THE STRUCTURAL DRAWINGS FOR ACCEPTABLE EXPANSION ANCHOR TYPES AND TEST LOADS AS REQUIRED.
8. APPROPRIATE EXPANSION/CONTRACTION CAPABILITIES SHALL BE PROVIDED IN PIPES WHICH CROSS BUILDING EXPANSION JOINTS. THE TOTAL RELATIVE MOVEMENT IN ANY HORIZONTAL DIRECTION ON EACH SIDE OF THE JOINT SHALL BE EQUAL TO THE SIZE OF THE BUILDING JOINT.
9. REQUIREMENTS FOR BRACING OF PIPES
   - 9.1. BRACING, DETAILS, SCHEDULES AND NOTES APPLY TO ALL TYPES OF PIPES.
   - 9.2. BRACE PIPING AS DESCRIBED.
     - 9.2.1. FUEL-OIL, FUEL GAS, AND COMPRESSED AIR PIPING THAT IS NOMINAL 1-INCH OR LARGER.
     - 9.2.2. PIPING LOCATED IN BOILER ROOMS, MECHANICAL EQUIPMENT ROOMS THAT IS NOMINAL 2-INCH OR LARGER.
     - 9.2.3. ALL OTHER PLUMBING AND SPRINKLER PIPING LARGER THAN NOMINAL 2-INCH.
     - 9.2.4. PIPING SUSPENDED BY INDIVIDUAL HANGERS 12-INCH OR LESS IN LENGTH, AS MEASURED FROM THE TOP OF THE PIPE AND THE BOTTOM OF THE SUPPORT WHERE THE HANGER IS ATTACHED, NEED NOT BE BRACED. HOWEVER, HANGERS FOR PIPING, REGARDLESS OF SIZE, SHALL BE POSITIVELY ATTACHED TO THE SUPPORTING STRUCTURE ABOVE. FRICTION-TYPE ANCHORS SUCH AS C-CLAMPS SHALL NOT BE PERMITTED TO SUPPORT PIPE.
10. TRANSVERSE BRACING SHALL BE AT 40-FEET MAXIMUM, EXCEPT WHERE A LESSER SPACING IS INDICATED IN THE TABLES FOR BRACING OF PIPES.
11. LONGITUDINAL BRACING SHALL BE AT 80-FEET MAXIMUM EXCEPT WHERE THE LESSER SPACING IS INDICATED IN THE TABLES, IN PIPES WHERE THERMAL EXPANSION IS A CONSIDERATION, AN ANCHOR POINT MAY BE USED AS THE SPECIFIED LONGITUDINAL BRACE PROVIDED IT HAS A CAPACITY EQUAL TO OR GREATER THAN LONGITUDINAL BRACE. THE LONGITUDINAL BRACES AND CONNECTIONS MUST BE CAPABLE OF RESISTING THE ADDITIONAL FORCE INDUCED BY EXPANSION AND CONTRACTION.
12. FOR FUEL OIL AND GAS PIPING, THE BRACING DETAILS, SCHEDULES, AND NOTES MAY BE USED, EXCEPT THAT TRANSVERSE BRACING SHALL BE AT 20-FEET MAXIMUM AND LONGITUDINAL BRACING SHALL BE AT 40-FEET MAXIMUM.
13. TRANSVERSE BRACING FOR ONE PIPE SECTION MAY ALSO ACT AS LONGITUDINAL BRACING FOR A PIPE SECTION OF THE SAME SIZE AND CONNECTED PERPENDICULAR TO IT IF THE BRACING IS INSTALLED WITHIN 24-INCHES OF THE ELBOW OR THE TEE. SEE CHAPTER 4 OF THE SMACNA SEISMIC RESTRAINT MANUAL FOR TYPICAL LOCATIONS OF BRACING.
14. SEISMIC BRACES FOR PIPES ON TRAPEZE HANGERS MAY BE USED.
15. PROVIDE FLEXIBILITY IN JOINTS WHERE PIPES PASS THROUGH BUILDING EXPANSION JOINTS OR WHERE RIGIDLY SUPPORTED PIPES CONNECT TO EQUIPMENT WITH VIBRATION ISOLATORS.
16. BRANCH LINES SHALL NOT BE USED TO BRACE MAIN LINES.
17. A RIGID PIPING SYSTEM SHALL NOR BE BRACED TO DISSIMILAR PARTS OF THE BUILDING OR TO TWO DISSIMILAR BUILDING SYSTEMS THAT MAY RESPOND DIFFERENTLY DURING AN EARTHQUAKE.
18. CAST-IRON PIPE OF ALL TYPES, GLASS PIPE, AND OTHER PIPE JOINED WITH A SHIELD AND CLAMP ASSEMBLY, WHERE THE TOP OF THE PIPE IS 12-INCHES OR MORE FROM THE SUPPORTING STRUCTURE, SHALL BE BRACED ON EACH SIDE OF A CHANGE IN DIRECTION OF 90-DEGREES OR MORE.
19. RISER JOINTS SHALL BE BRACED OR STABILIZED BETWEEN FLOORS,
20. VERTICAL RISERS SHALL BE LATERALLY SUPPORTED WITH A RISER CLAMP AT EACH FLOOR.
21. FOR RISERS IN HUBLESS PIPING SYSTEMS WHERE THE RISER JOINTS ARE UNSUPPORTED BETWEEN FLOORS. SEE CHAPTER 9 OF THE SMACNA SEISMIC RESTRAINT MANUAL FOR RISER BRACING DETAILS.
22. THE SPACING OF VERTICAL SUPPORTS AND LATERAL BRACING, AND THE DETAILS OF THE VERTAIL SUPPORTS FOR THE FIRE-SPRINKLER SYSTEM SHALL COMPLY WITH NFPA 13, CHAPTER 9.

EQUIPMENT REQUIREMENTS

1. CONTRACTOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE FROM EACH EQUIPMENT MANUFACTURER STATING THAT EQUIPMENT WITH AN OPERATING WEIGHT OVER 400 POUNDS THAT ARE FLOOR OR ROOF MOUNTED, 20 POUNDS OR GREATER FOR SUSPENDED OR WALL MOUNTED EQUIPMENT, OR EQUIPMENT THAT MUST REMAIN OPERATIONAL DURING AN EARTHQUAKE, WILL WITHSTAND THE SEISMIC DESIGN PROVISIONS OF THE 2020 INTERNATIONAL BUILDING CODE.
2. EQUIPMENT TO REMAIN OPERATIONS SHALL INCLUDE BUT NOT LIMITED TO:
   - 2.1. LIFE SAFETY SYSTEMS AND EQUIPMENT
   - 2.2. EMERGENCY AND STANDBY SYSTEMS
   - 2.3. MEDICAL GAS SYSTEMS, EQUIPMENT AND STORAGE
   - 2.4. EQUIPMENT UTILIZING FUEL-OIL AND FUEL-GAS
   - 2.5. EQUIPMENT CONVEYING HAZARDOUS MATERIALS
   - 2.6. ALL PLUMBING EQUIPMENT SERVICING PATIENT OR CLINICAL CARE AREAS
3. WHERE SEISMIC CALCULATIONS ARE REQUIRED FOR EQUIPMENT SUBMITTALS, THESE SHALL BE PERFORMED BY A REGISTERED STRUCTURAL ENGINEER IN THE STATE OF NEW YORK, WHO SHALL SIGN AND SEAL THESE CALCULATIONS. CALCULATIONS SHALL UTILIZE SEISMIC DESIGN FORCES AS FOUND IN THE 2020 INTERNATIONAL BUILDING CODE.
4. OTHER FLOOR OR PAD MOUNTED EQUIPMENT WITHOUT VIBRATION ISOLATORS SHALL BE BOLTED TO THE SLAB WITH 3/8-INCH DIAMETER EXPANSION BOLTS. SEE STRUCTURAL DRAWINGS FOR MORE DETAIL ON TYPE OF BOLT AND SPACING REQUIREMENTS.
5. VIBRATION ISOLATORS AND THE ANCHORAGE OF THESE ASSEMBLIES FOR FLOOR OR ROOF MOUNTED OR SUSPENDED EQUIPMENT SHALL BE DESIGNED FOR THE APPROPRIATE SEISMIC FORCES PER THE 2020 INTERNATIONAL BUILDING CODE.



1 Seismic Pipe Bracing Detail

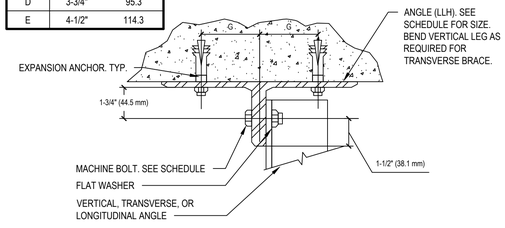
SCALE: NTS

SCHEDULE FOR BRACING PIPES AND CONDUIT

PIPE SIZE (IN.)	MAXIMUM WEIGHT (LB/FT)	BRACE SPACING (FT)		VERTICAL HANGER ANGLES (IN.)	TRANSVERSE BRACE ANGLES (IN.)	LONGITUDINAL BRACE ANGLES (IN.)	BOLT SIZE (IN.)	CONNECTION TYPE TO STRUCTURAL MEMBER	ROD SIZE (IN.)	MAXIMUM LENGTH FOR RODS (IN.)
		TRANS. BRACING	LONG. BRACING							
2.5	7.9	40	80	L2 X 2 X 16GA	L3 X 3 X 16GA	L3 X 3 X 16GA	3/8	C	1/2	25
3	10.8	40	80	L2.5 X 2.5 X 16GA	L4 X 4 X 16GA	L4 X 4 X 16GA	3/8	C	1/2	25
4	16.3	40	80	L4 X 4 X 14GA	L4 X 4 X 14GA	L4 X 4 X 14GA	3/8	D	5/8	31.25
5	23.3	40	80	L4 X 4 X 14GA	L4 X 4 X 14GA	L4 X 4 X 14GA	1/2	D	3/4	37.5
6	31.5	40	40	L4 X 4 X 14GA	L3 X 3 X 12GA	L3 X 3 X 12GA	5/8	D	3/4	31.25
8	50.3	40	40	L4 X 4 X 14GA	L4 X 4 X 12GA	L4 X 4 X 12GA	3/4	D	7/8	43.75
10	74.7	20	20	L4 X 4 X 14GA	L3 X 3 X 12GA	L3 X 3 X 12GA	3/4	D	7/8	37.5

NOTES:
1. SEE DETAIL 2 ON CURRENT SHEET FOR STRUCTURAL MEMBER CONNECTION TYPES.
2. PROVIDE STANDARD CUT WASHERS BETWEEN ANGLE BRACES AND SECURING NUTS.

TYPE	G	
	in	mm
C	3"	76.2
D	3-3/4"	95.3
E	4-1/2"	114.3



SCHEDULE FOR TYPICAL CONNECTIONS TO STRUCTURAL SUPPORTING MEMBERS

TYPE	MAXIMUM LOAD CAPACITY (LB)	EXPANSION ANCHORS TO CONCRETE (IN.)	MACHINE BOLT END OF BRACE (IN.)	SPREADER SIZE (IN.)	MACHINE BOLT AT WOOD (IN.)	HOLLOW CORE PLANK ROD (IN.)	ANGLE SUPPORTING STRUCTURAL MEMBER
C	1586	2-1/2	1/2	C5 X 6.7	3/4	3/8	2 - 4 X 3 X 3/8 X 0 FT, 4 IN. LLH
D	2020	2-5/8	1/2	C6 X 8.2	3/4	1/2	2 - 5 X 3 X 3/8 X 0 FT, 4 IN. LLH

2 Typical Seismic Brace Connections to Structural Supporting Members

SCALE: NTS

APPLICATION NUMBER: B00933910-S4

RELATED APPLICATIONS:

1. ARCHITECTURAL: B00933910-I1
2. STRUCTURAL: B00933910-S1
3. MECHANICAL: B00933910-S2
4. BOILER: B00933910-S3

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CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
CJM	CJM		JRM
PROJECT No.: BNYD1907	DATE: APRIL 2026		SCALE: AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300 Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

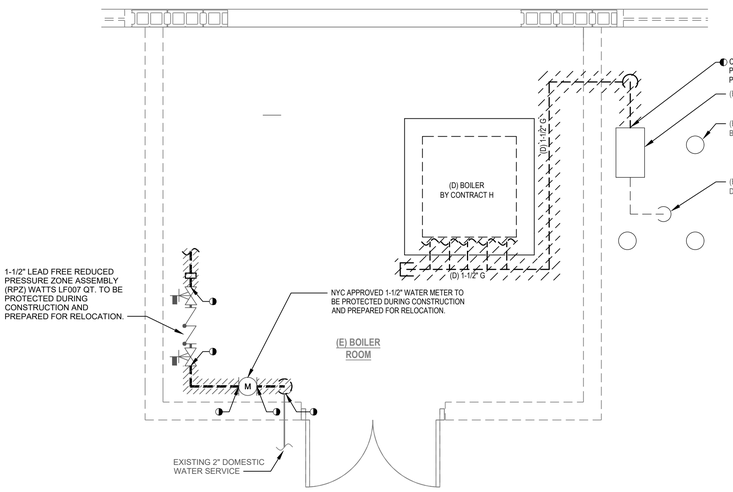
SHEET TITLE

GENERAL NOTES, LEGENDS AND ABBREVIATIONS

DRAWING No. **P-001.00**

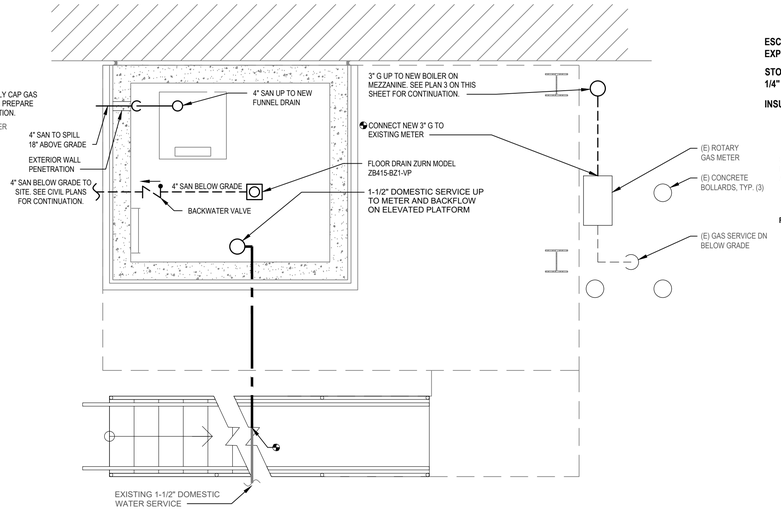
SHEET No. 23 OF 24

X:\BKNYD (Brooklyn Navy Yard) - 4070\BKNYD1907 - 4368 - Restoration - Boilers - Bldg 62\24\02-BIM\CADD\Cvr-Index\plan\P001.0 - Plumbing Notes and Schedules.dwg Last Modified: Aug 03, 2026 - 5:05pm Plotted on: Aug 03, 2026 - 5:06pm By cgale



1 Building 62 Boiler Room Plumbing Demoltion Plan

SCALE: 3/8"=1'-0"

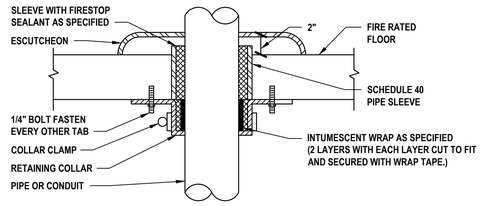


2 Building 62 Boiler Room Plumbing Proposed Plan

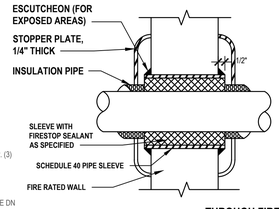
SCALE: 3/8"=1'-0"

LEGEND

	EQUIPMENT TO BE DISCONNECTED AND REMOVED
	PIPING SHALL BE HEAT TRACED USING THERMON 5-FLX-1 HEAT TRACE OR APPROVED EQUAL. INSULATE PIPING USING 3" THICK CLOSED CELL FLEXIBLE FOAM INSULATION RATED FOR OUTDOOR USE.



THROUGH FIRE RATED FLOOR



THROUGH FIRE RATED WALL

FIRE STOPPING NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT PENETRATIONS ARE PROPERLY FIRE STOPPED WITH THE FOLLOWING:

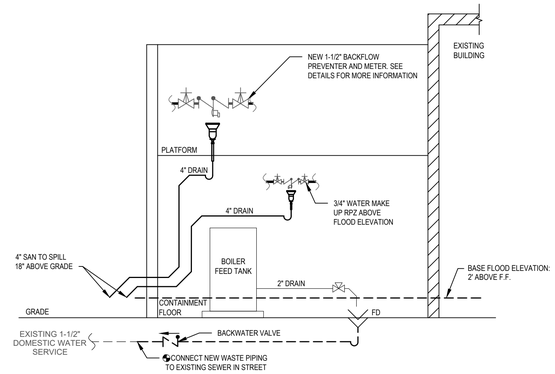
1.A. THE FIRE STOPPING SYSTEM AND COMPONENTS SHALL BE AS MANUFACTURED BY 3M. NO SUBSTITUTIONS SHALL BE PERMITTED.

1.B. METAL PIPES OR CONDUIT THROUGH BLOCK WALL SHALL USE UL SYSTEM NO. CAJ1044 AND 3M PRODUCT CP25 WB & CAULK

1.C. METAL PIPES THROUGH GYPSUM WALLS SHALL USE UL SYSTEM NO. WL 1001 AND 3M PRODUCT CP 25 WB & CAULK

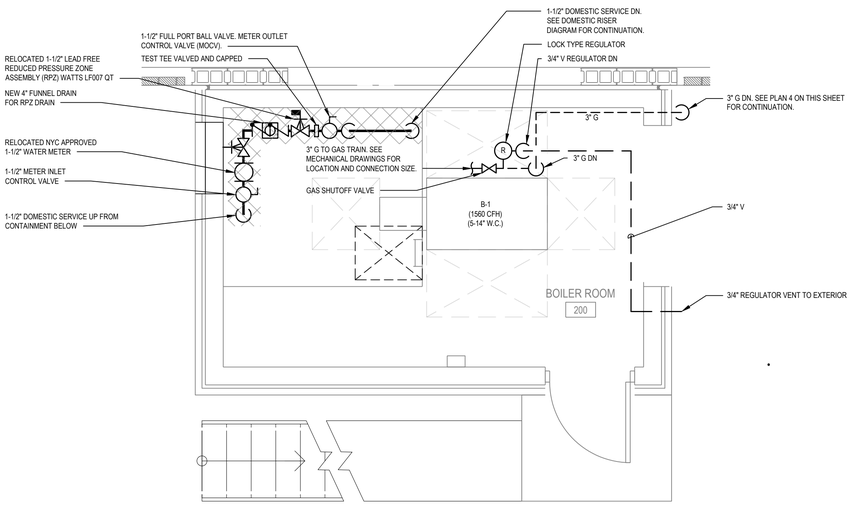
3 Pipe Penetrations Through Rated Construction

SCALE: NTS



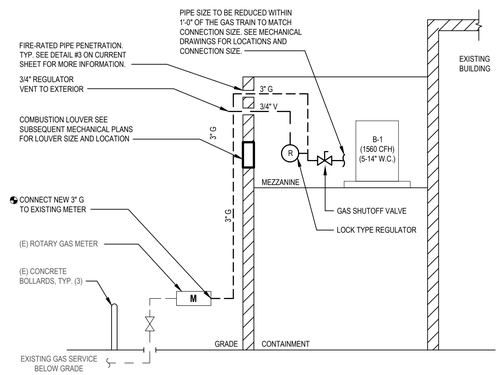
4 Domestic Water Riser Diagram

SCALE: NTS



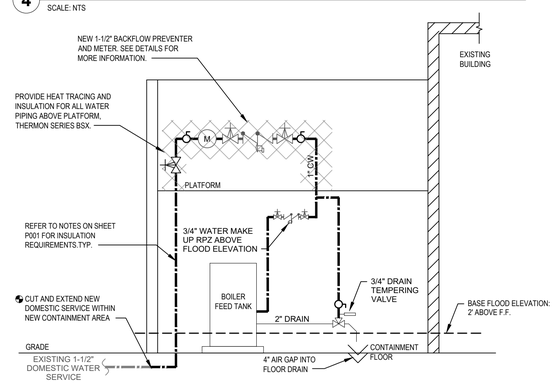
5 Building 62 Boiler Room Platform Plumbing Proposed Plan

SCALE: 3/8"=1'-0"



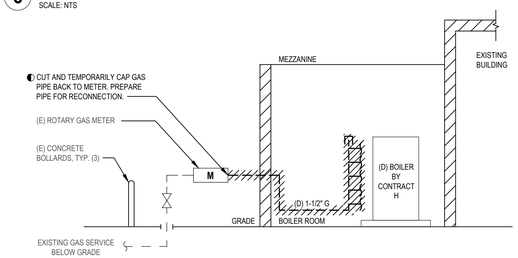
6 Gas Riser Diagram

SCALE: NTS



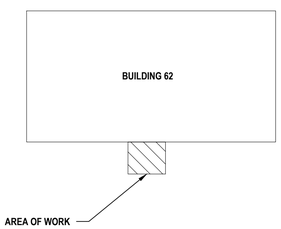
7 Domestic Water Riser Diagram

SCALE: NTS



8 Gas Riser Diagram

SCALE: NTS



9 Bldg Key Plan

SCALE: N.T.S.

APPLICATION NUMBER: B00933910-S4

RELATED APPLICATIONS:

1. ARCHITECTURAL: B00933910-I1
2. STRUCTURAL: B00933910-S1
3. MECHANICAL: B00933910-S2
4. BOILER: B00933910-S3

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CONSULTANTS:

MARK	DATE	DESCRIPTION
	07-31-2026	Final Bid Document
	11-14-2025	Final Submission
	07-10-2025	100% Resubmission
	09-30-2024	Issued for 100%

DESIGNED BY:	DRAWN BY:	CHECKED BY:	REVIEWED BY:
CJM	CJM		JRM

PROJECT No.:	DATE:	SCALE:
BNYD1907	APRIL 2026	AS SHOWN

CLIENT

Brooklyn Navy Yard Development Corporation

Restoration of Boilers at Building 62

63 Flushing Avenue, Suite 300 Brooklyn, NY 11205

CONTRACT

ALL CONTRACTS

STATUS

FINAL BID DOCUMENT

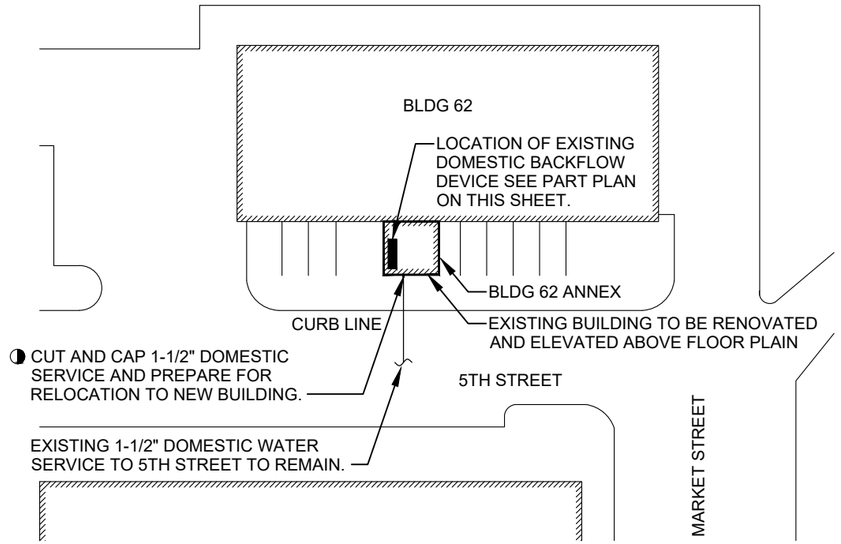
SHEET TITLE

BUILDING 62 PLUMBING PLANS

DRAWING No. **P-100.00**

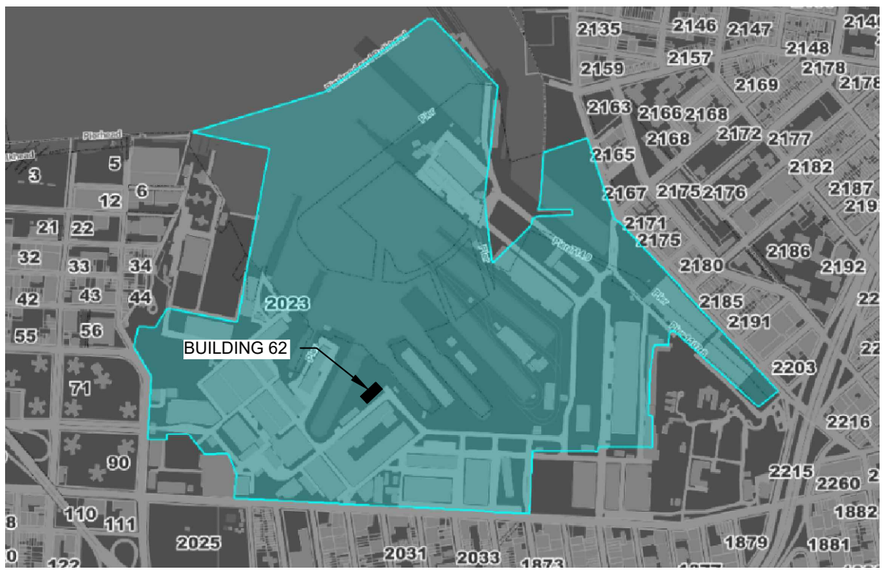
SHEET No. 24 OF 24

X:\BKNY\ (Brooklyn Navy Yard) - 4070\BKNY01907 - 438A Restoration - Boilers - Bldg 62-24\02-BIM-CADD\Civil\dwg\Layout\P100.00 - Plumbing Plans.dwg Last Modified: Aug 03, 2026 - 5:57pm Plotted on: Aug 03, 2026 - 5:58pm By cgale



PLUMBING DEMOLITION SITE PLAN

NOT TO SCALE



SITE PLAN

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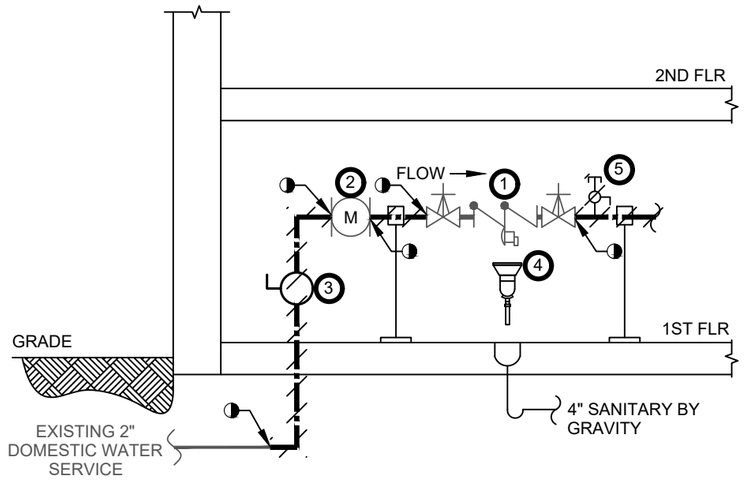


DEMOLITION DOMESTIC RPZ SECTION

NOT TO SCALE

KEY LEGEND

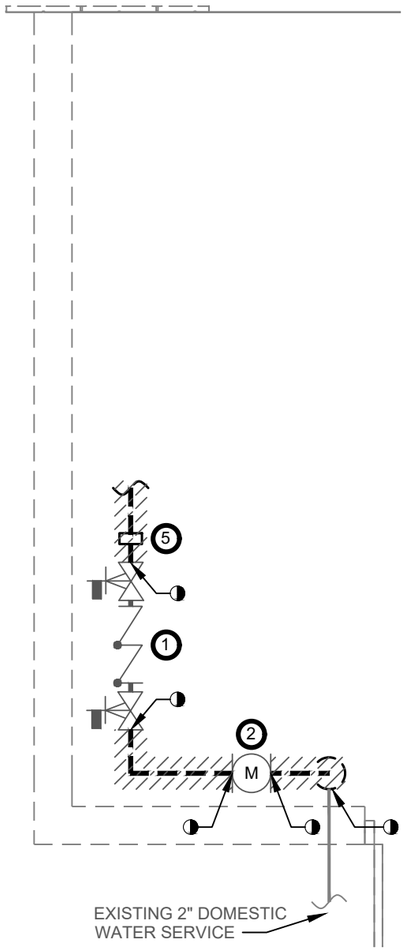
1. EXISTING 1-1/2" LEAD FREE REDUCED PRESSURE ZONE ASSEMBLY (RPZ) WATTS LF009M2QT (SERIAL NO. 032159) TO BE RELOCATED.
2. EXISTING 1-1/2" WATER METER TO BE RELOCATED.
3. EXISTING 1-1/2" SHUTOFF VALVE TO BE REMOVED.
4. EXISTING FUNNEL DRAIN TO BE REMOVED.
5. EXISTING TEST TEE TO BE REMOVED.

LEGEND

FD	FLOOR DRAIN
	PIPE DOWN
	CENTER LINE
	TAMPER SWITCH

HATCH LEGEND

EQUIPMENT TO BE DISCONNECTED AND REMOVED



PARTIAL DEMOLITION PLAN - OF FIRST FLOOR DOMESTIC SERVICE

NOT TO SCALE

BLOCK: 2023
LOT: 1
ZONING MAP NO.: 12D
ZONING DISTRICT: M3-1

H2M architects + engineers
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BROOKLYN NAVY YARD DEVELOPMENT CORP.
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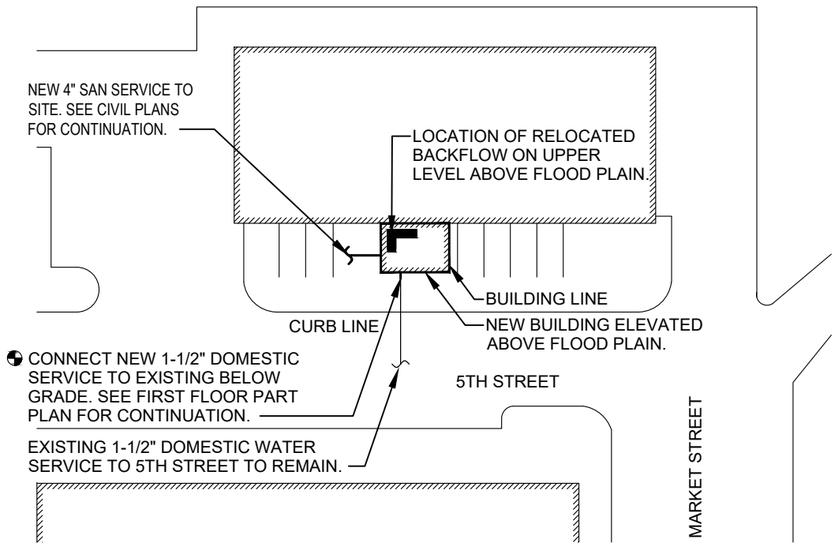
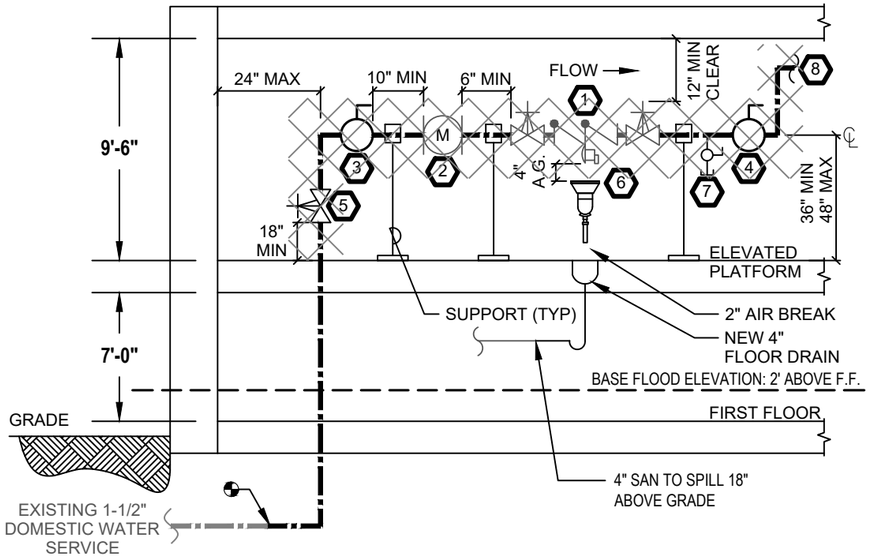
PROJECT # BNYD 1907
DATE JULY 2025
SCALE # AS SHOWN
DRAWING NO. RPZ-1



PLUMBING PROPOSED SITE PART PLAN

NOT TO SCALE



DOMESTIC RPZ SECTION

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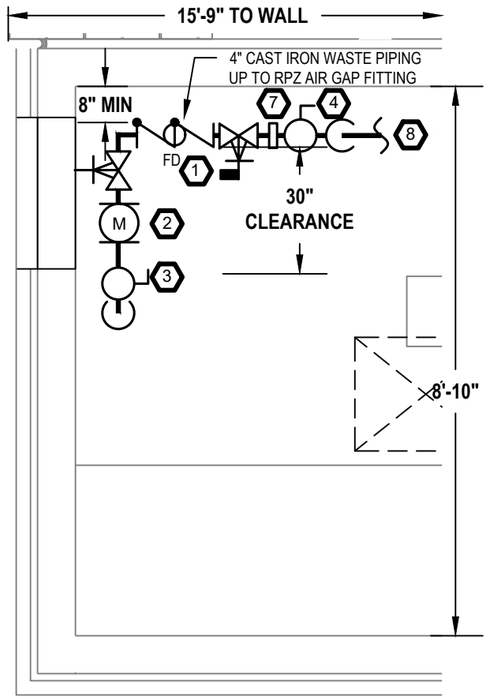
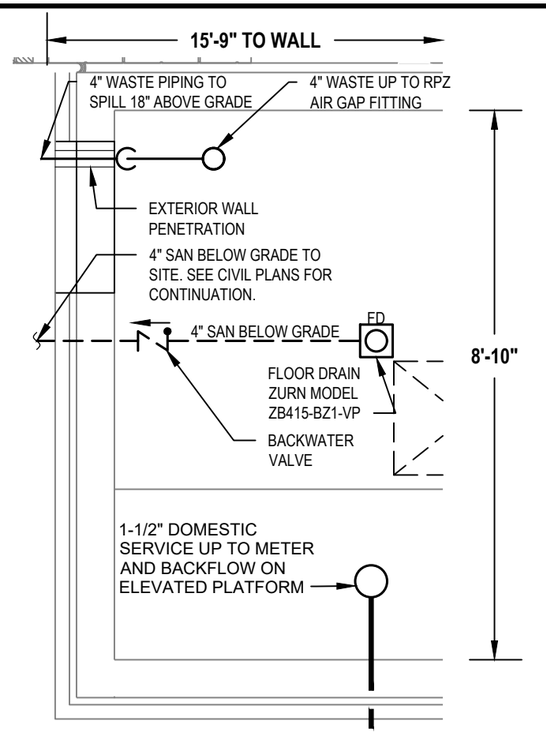


PARTIAL ELEVATED PLATFORM PLAN - DOMESTIC SERVICE

NOT TO SCALE



PARTIAL FIRST FLOOR PLAN - DOMESTIC SERVICE

NOT TO SCALE

KEY LEGEND

1. RELOCATED 1-1/2" LEAD FREE REDUCED PRESSURE ZONE ASSEMBLY (RPZ) WATTS-LF009M2QT.
2. RELOCATED NYC APPROVED 1-1/2" WATER METER.
3. NEW 1-1/2" METER INLET CONTROL VALVE (MICV) BALL VALVE.
4. NEW 1-1/2" FULL PORT BALL VALVE. METER OUTLET CONTROL VALVE (MOCV).
5. NEW 1-1/2" OS&Y HOUSE CONTROL VALVE (HCV).
6. NEW FUNNEL DRAIN TO FLOOR DRAIN WITH 2" AIR GAP.
7. NEW TEST TEE VALVED AND CAPPED.
8. 1-1/2" DOMESTIC WATER TO BUILDING

LEGEND

- FD FLOOR DRAIN
- PIPE DOWN
- CENTER LINE
- TAMPER SWITCH

HATCH LEGEND

PIPING SHALL BE HEAT TRACED USING THERMON 5-FLX-1 HEAT TRACE OR APPROVED EQUAL. INSULATE PIPING USING 2" THICK CLOSED CELL FLEXIBLE FOAM INSULATION RATED FOR OUTDOOR USE.

BACKFLOW PREVENTER DEVICE INSTALLATION NOTES:

1. THE CONTRACTOR SHALL INSTALL THE PIPING, BACKFLOW PREVENTER (BFP), VALVES, ETC. IN ACCORDANCE WITH THE APPROVED DRAWINGS. NO DEVIATION WILL BE ACCEPTED OR CERTIFIED.
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6. THE INSTALLATION SHALL COMPLY IN ALL RESPECTS WITH NYS DOH REQUIREMENTS EXCEPT AS MODIFIED OR UPGRADED BY THE NYC DEP.
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9. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE.
10. ALL WORK TO BE FILED WITH THE NYC DOB AND APPLICATION NUMBER REFERENCED ON NYS DOH GEN 215B FORM.

BLOCK: 2023
LOT: 1
ZONING MAP NO.: 12D
ZONING DISTRICT: M3-1

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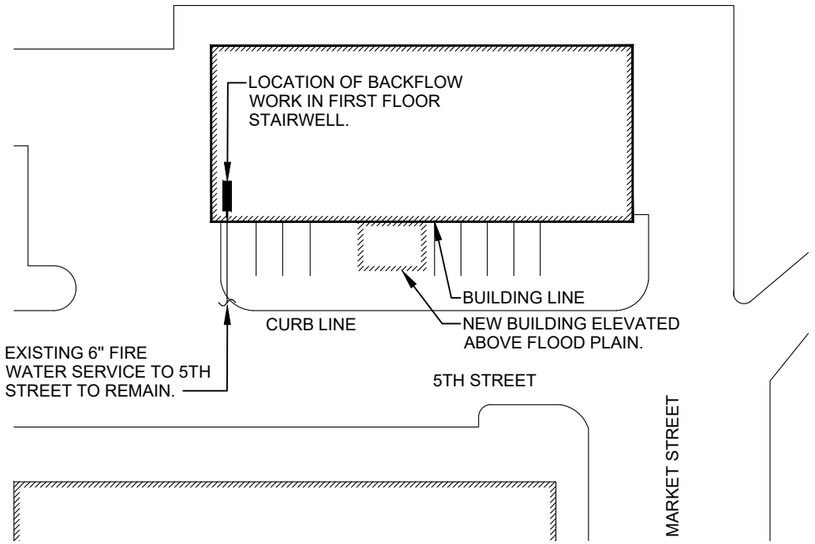
BROOKLYN NAVY YARD DEVELOPMENT CORP.
63 FLUSHING AVE, SUITE 300, BROOKLYN NY 11205

PROJECT #	DRAWING NO.
BNYD 1907	RPZ-2
DATE: JULY 2025	
SCALE #: AS SHOWN	



PLUMBING PROPOSED SITE PART PLAN

NOT TO SCALE

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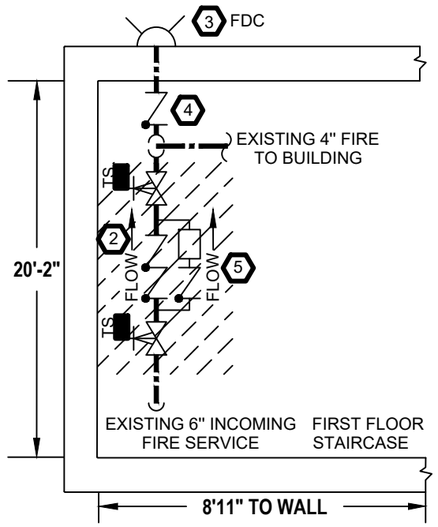


PARTIAL STAIRWELL DEMOLITION PLAN - FIRE SPRINKLER DCDA

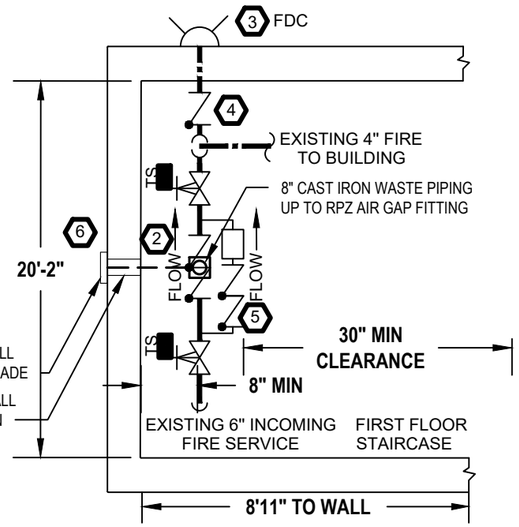
NOT TO SCALE

LEGEND

FD	FLOOR DRAIN
	PIPE DOWN
℄	CENTER LINE
	TAMPER SWITCH

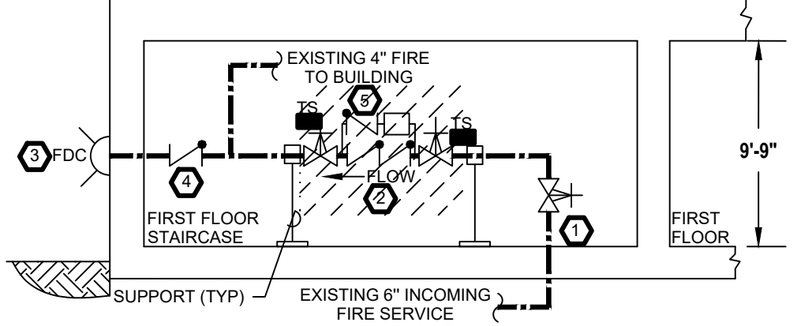
HATCH LEGEND

EQUIPMENT TO BE DISCONNECTED AND REMOVED



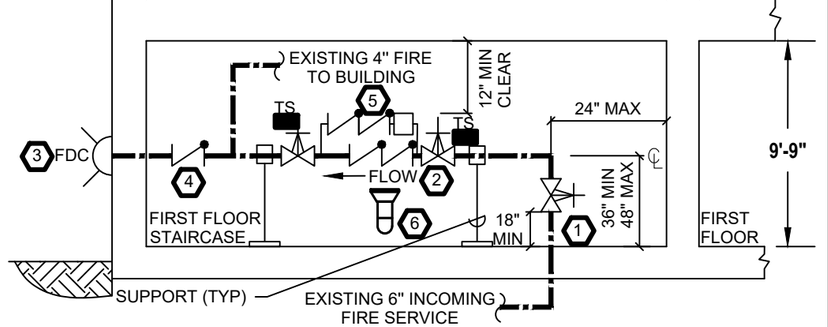
PARTIAL STAIRWELL PLAN - FIRE SPRINKLER RPDA SERVICE

NOT TO SCALE



FIRE SPRINKLER DCDA DEMOLITION SECTION

NOT TO SCALE



FIRE SPRINKLER RPDA SECTION

NOT TO SCALE

KEY LEGEND (DEMO)

1. EXISTING 6" FIRE WATER SERVICE CONTROL VALVE.
2. REMOVE AND DISPOSE OF EXISTING 6" DCDA BACKFLOW PREVENTION DEVICE (SERIAL NO. 5155) IN ITS ENTIRETY. PREPARE WATER SERVICE FOR RECONNECTION TO NEW BFP DEVICE.
3. EXISTING SIAMESE FIRE DEPARTMENT CONNECTION
4. EXISTING 4" CHECK VALVE.
5. REMOVE AND DISPOSE OF EXISTING 3/4" DCDA BYPASS (SERIAL NO. 5155) AND BADGER WATER METER

KEY LEGEND

1. EXISTING 6" FIRE WATER SERVICE CONTROL VALVE.
2. NEW 6" WATTS LF957RPDA-OSY. CONNECT TO EXISTING 6" FIRE SERVICE SUPPLY PIPING AND ADJUST AS NECESSARY.
3. EXISTING SIAMESE FIRE DEPARTMENT CONNECTION
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6. NEW 8" CAST IRON WASTE PIPING UP TO AIR GAP FITTING. DRAIN TO EXTERIOR WITH WALL PENETRATION MIN. 18" ABOVE GRADE.

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BROOKLYN NAVY YARD DEVELOPMENT CORP.
63 FLUSHING AVE, SUITE 300, BROOKLYN NY 11205

PROJECT #	BNYD 1907
DATE	JULY 2025
SCALE #	AS SHOWN
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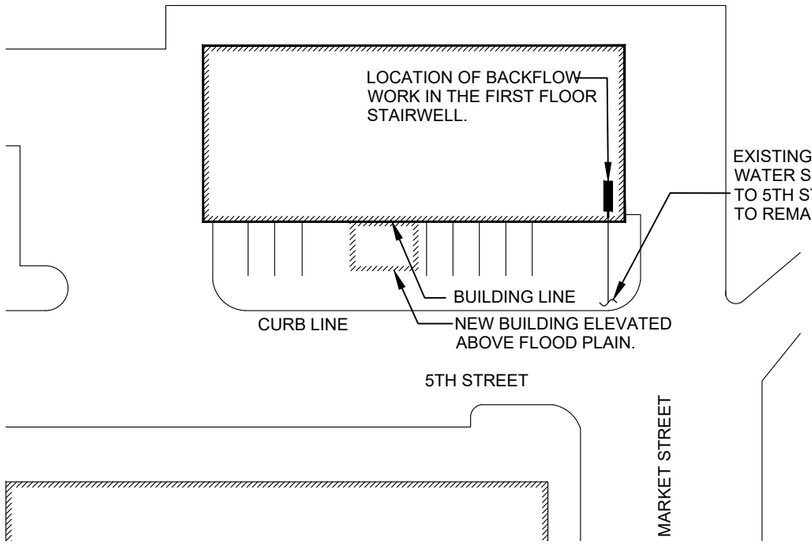

PLUMBING PROPOSED SITE PART PLAN

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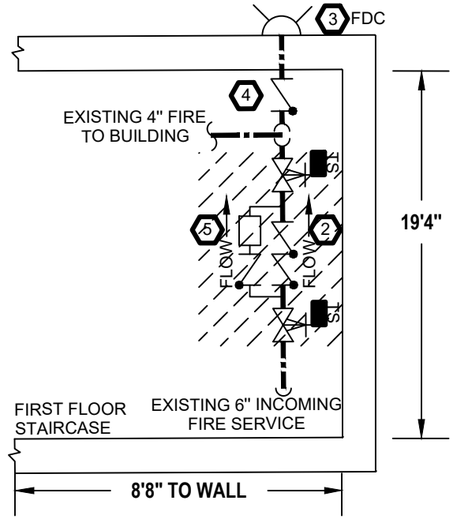


LEGEND

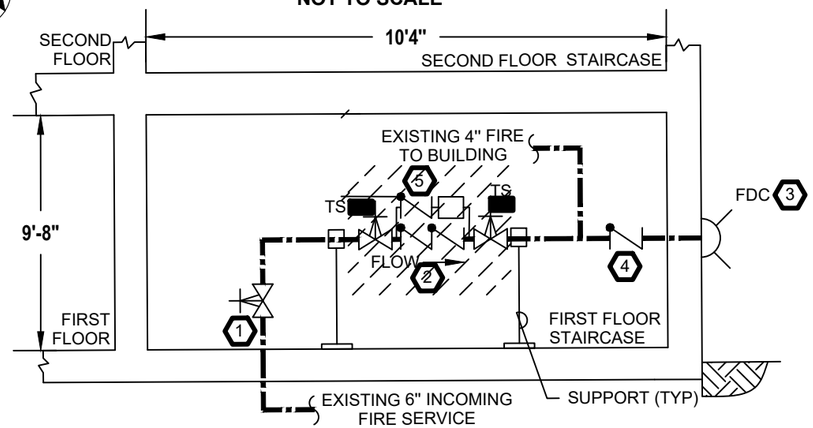
FD	FLOOR DRAIN
	PIPE DOWN
℄	CENTER LINE
	TAMPER SWITCH

HATCH LEGEND

EQUIPMENT TO BE DISCONNECTED AND REMOVED

PARTIAL STAIRWELL PLAN - FIRE SPRINKLER RPDA SERVICE

NOT TO SCALE



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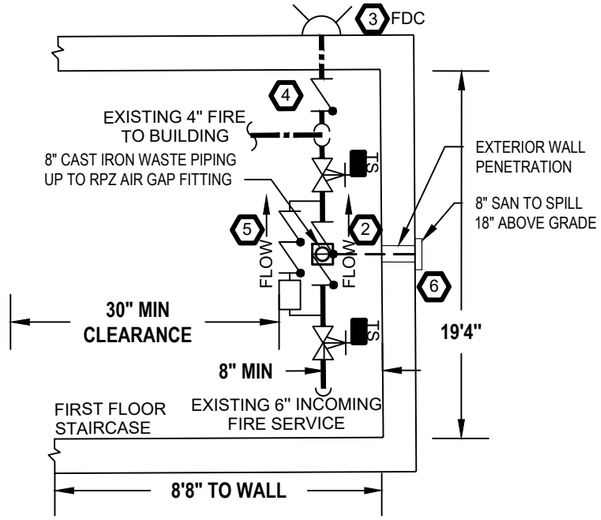

PARTIAL STAIRWELL PLAN - FIRE SPRINKLER RPDA SERVICE

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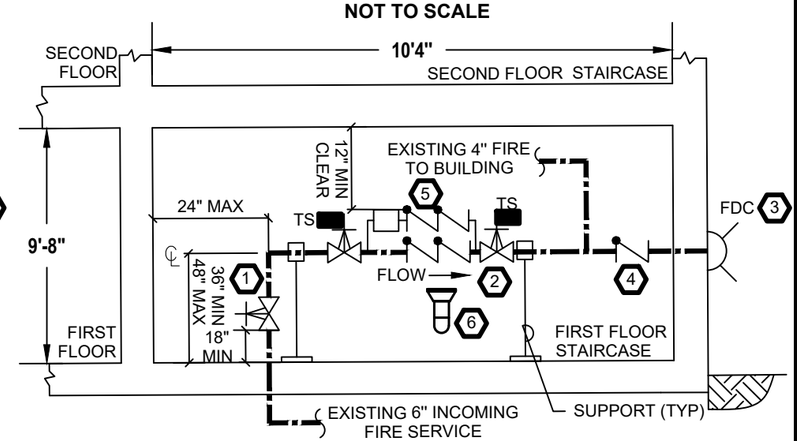

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BROOKLYN NAVY YARD DEVELOPMENT CORP.
63 FLUSHING AVE, SUITE 300, BROOKLYN NY 11205

PROJECT #	BNYD 1907
DATE	JULY 2025
SCALE #	AS SHOWN
DRAWING NO.	RPZ-4

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SECTION 000010 – SMP COMPLIANCE

PART 1 - GENERAL

1.01 SMP COMPLIANCE FOR THE PROJECT

A. The Work for this project falls within the Voluntary Cleanup Agreement (VCA) area of the Brooklyn Navy Yard (BNY) site. As such, this Work is subject to the requirements of the Site Management Plan (SMP) that is in place.
B. All Work performed within the VCA area shall comply with the SMP.

1.02 NOMENCLATURE

A. Where the terms “Qualified Environmental Professional” or “QEP” are used throughout this specification, they shall mean the firm of CORE Environmental Consultants, Inc. as may be abbreviated by CORE.
B. This Article shall serve as a supplement to Section 011113, “Summary of Work,” Article 1.01, “Nomenclature,” of these Contract Documents.
C. The Brooklyn Navy Yard (BNY) shall refer to the entire property owned and operated by the Brooklyn Navy Yard Development Corporation (BNYDC).
D. The Voluntary Cleanup Agreement (VCA) area shall refer to the entire BNY property, with the exception of the areas noted in the Site Management Plan.
E. The Site Management Plan (SMP) refers to the document titled “Brooklyn Navy Yard Industrial Park, Kings County, Brooklyn, New York Site Management Plan, NYSDEC Site Number V00120,” prepared by CORE Environmental Consultants, Inc. (CORE) for the BNYDC, dated February 2022.
F. The Excavation Work Plan (EWP) refers to Appendix E of the above-referenced SMP.
G. Intrusive Activities are defined as any Work activities that breach the on-site engineered cover system that is in place within the VCA area of the Site.
H. Contamination shall refer to the contaminants of concern for the BNY VCA area, as described in Article 1.04 of this Section.

1.03 PARTIAL LISTING OF OVERALL CONTRACT REQUIREMENTS

A. Unless otherwise specified, the Contractor shall perform all Work in accordance with the SMP.

1.04 EXISTING CONDITIONS

A. As stated in Article 1.01, the majority of this project work falls within the VCA area, which is subject to the requirements of the SMP. The main contaminant of concern on the site are polychlorinated biphenyls (PCBs), with the potential for exposure to secondary contamination such as VOCs, SVOCs, and heavy metals.
B. The existing conditions at the Site require additional protections and requirements that are presented within this Section.

1.05 SUBMITTALS

A. Submit the following under provisions of Section 013300:
    a. As part of the Environmental Protection Plan / Erosion Control Plan, as described in Section 015719, “Temporary Environmental Controls,” the Contractor shall provide the following:
        i. A description of how the Work will be performed;
        ii. Methods to be employed for excavation;
        iii. Dewatering;
        iv. Removal/restoration of pavement.

b. In the event that inadequate soil must be disposed of off-site as part of this project, the Contractor shall submit the following prior to transportation and disposal off-site:
    i. An example transportation and disposal manifest for review and approval by BNYDC.
c. The Contractor shall submit a Site-Specific Health and Safety Plan (SSHASP) to BNYDC a minimum of twenty (20) calendar days prior to the start of any intrusive activities.
d. Notification of Intrusive Activities prior to the start of intrusive activities.

1.06 SITE ACCESS AND CONTROL

A. The Contractor shall provide site security in accordance with Appendix E, “Excavation Work Plan,” Section E.2, “Site Security” of the SMP. This includes restricting public access to any open excavations or excavated soil in accordance with the EWP.

1.07 SITE PERSONNEL REQUIREMENTS

A. All on-site Contractor personnel that may come into contact with soils below the 1’ thick site-wide engineered cover system during intrusive work shall be 40-hour HAZWOPER trained. The Contractor shall submit the certificates of HAZWOPER training completion for these designated personnel as part of the Site-Specific Health and Safety Plan (SSHASP).

1.08 NOTIFICATION OF INTRUSIVE WORK

A. The Contractor shall notify the BNY of any intrusive activities a minimum of twenty (20) calendar days prior to the start of these intrusive activities. This notification shall include a schedule detailing the start and completion of all intrusive activities.
B. These intrusive activities may not commence until written authorization to proceed is received from the BNY. BNY is required to notify the NYSDEC of any Site-wide cover breaches a minimum of fifteen (15) calendar days prior to the start of Work.

1.09 TESTING REQUIREMENTS

A. Any fill material brought to the Site shall meet the lower of the Commercial Use SCOs and the Protection of Groundwater SCOs as set forth in 6 NYCRR Part 375-6.7(d). The Contractor shall identify a clean backfill source meeting these requirements prior to Site mobilization.
B. The QEP will be responsible for collecting and analyzing backfill samples to ensure that these samples meet the criteria set forth above.
C. The BNY reserves the right to reject any proposed backfill source for any reason. In the event that a backfill source is rejected, the Contractor shall propose secondary backfill sources to be used. All materials proposed for import onto the Site will be approved by the QEP and will be in compliance with provisions in the SMP prior to receipt at the Site.
D. The Contractor shall select and notify the BNY of any potential borrow source ten (10) business days prior to importing the material to the Site to allow for testing and laboratory analysis. The BNYDC and QEP are not responsible for any delays to the project associated with sampling and analysis of potential borrow sources.

1.10 ON-SITE RE-USE OF EXCAVATED MATERIAL

A. Soil excavated from beneath the site-wide engineering cover may be re-sued as fill on-site based on soil screening by a QEP. Visual, olfactory, and instrument-based (e.g. photo-ionization detector) soil screening will be performed by a QEP during all excavations into known or potentially impacted material (remaining contamination).
B. Soil screening will be performed when intrusive work is done and will include all excavation and intrusive work performed.

1.11 DISPOSAL OF SUITABLE EXCESS EXCAVATED MATERIAL

A. Excess, inadequate material excavated by the Contractor shall become the Contractor's property and is to be properly disposed of at the Contractor's expense. The BNYDC reserves the right to have the Contractor dispose of the material on another site within the yard at no additional cost to the BNYDC.
B. All excess material excavated from below the site-wide engineered cover shall be properly disposed of off-site at a disposal facility permitted to accept PCB-impacted waste. Prior to off-site transportation and disposal, the Contractor shall propose a disposal facility that is permitted to receive the excess material generated and provide example transportation and disposal waste manifests for review and approval by BNYDC as described in Article 1.05 of this Section.
C. The Contractor is responsible for obtaining any necessary permits for the transportation and off-site disposal of any excess excavated soil or materials generated from beneath the 1' thick site-wide engineered cover.

1.12 COVER SYSTEM RESTORATION

A. After completion of soil removal and any other intrusive activities, the site-wide cover system shall be restored in a manner that complies with the SMP. The existing site-wide cover is comprised of buildings, concrete and asphalt pavement, and millings.
B. The restored site-wide cover shall be comprised of at least 12 inches of soil meeting the Commercial Use SCOs as set forth in 6 NYCRR Part 375-6.7(b), a building, or concrete, asphalt, or millings at least 6 inches in thickness.

1.13 DEWATERING

A. Means and Methods of construction of the Work are the sole responsibility of the Contractor. The Contractor shall conduct the Work in such a manner that the potential for dewatering fluid generation is limited.
B. Impacted water originating from equipment decontamination, excavation dewatering, and monitoring well purging shall be pumped into storage tanks for off-site disposal. A licensed liquid hauler shall remove, transport, and dispose of the liquid in compliance with all applicable regulations.
C. Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream, or river), if any, will be performed under a State Pollutant Discharge Elimination System (SPDES) permit.
D. The Contractor shall take proper care to protect the excavation from storm events and to ensure that large quantities are dewatering fluid are not generated unnecessarily.
E. In the event that the Contractor does not include adequate protections during a storm event that results in excavation flooding, the Contractor shall be solely responsible for removal, handling, sampling, and disposal of the excess dewatering fluid at no additional cost to the BNYDC. The Contractor shall not hold BNYDC responsible for any schedule delays experienced due to excavation flooding or additional required dewatering work.

1.14 REFERENCES

A. This specification shall serve as a supplement to the following specification sections of these Contract Documents:
    a. Section 011113, "Summary of Work"
        i. Article 1.01, "Brief Purpose of Project – General"
        ii. Article 1.02, "Nomenclature"
        iii. Article 1.05, "Partial Listing of Overall Contract Requirements"
        iv. Article 1.06, "Existing Conditions"
    b. Section 011400, "Work Restrictions"
        i. Article 1.02, "Site Access and Control"
        ii. Article 1.03, "Work Hours, Employee Conduct and Employee Requirements"

c. Section 013216, “Construction Schedule”
    i. Article 1.02, “Schedule Preparation Milestone Dates & Requirements”
d. Section 014100, “Regulatory Requirements”
    i. Article 1.02, “Codes”
    ii. Article 1.03, “Governing Agencies”
e. Section 015719, “Temporary Environmental Controls”
    i. Article 1.02, “Definitions”
    ii. Article 3.01, “Protection of Environmental Resources”
f. Section 017839, “Project Record Documents”
    i. Article 1.05, Submittal of Record Documents
g. Section 312319, “Dewatering”
    i. Article 1.03, “Project Conditions”
    ii. Article 1.04, “Regulatory Requirements”
h. Section 312323, “Backfilling”
    i. Article 2.01, “Fill Materials”
i. Section 312333, “Trenching”
    i. Article 2.01, “Materials”
    ii. Article 2.04, “Excavation”
    iii. Article 2.05, “Backfilling”

PART 2 - PRODUCTS
NOT USED

PART 3 – EXECUTION
NOT USED

END OF SECTION 000010

SECTION 011113 - SUMMARY OF WORK **H2M**

PART 1 - GENERAL

1.01 BRIEF PURPOSE OF PROJECT - GENERAL

A. The Brooklyn Navy Yard Development Corporation is proceeding with repair damage from Hurricane Sandy and mitigation efforts against future flood-related losses at utility substations and boilers in the Brooklyn Navy Yard. To that end, Building 62 within the Brooklyn Navy Yard is to be addressed with following general scope of work:

1. Electrical:
   a. Remove and replace low voltage panelboard.
   b. Remove and replace light fixtures.
   c. Provide power to new mechanical equipment.
2. Mechanical:
   a. Provide a new boiler for space heating, including a new boiler feed system and flue.
   b. Provide new louver for combustion air.
   c. Provide unit heater in boiler room.
   d. Install all new equipment on the mezzanine.
3. Architectural:
   a. Build new building to accomodate new boiler equipment, to include walls, roofs and doors.
   b. Provide new concrete platform and steel stairs to house equipment at a higher elevation.
   c. Provide a green roof.
4. Structural:
   a. Provide concrete mechanical pad for new boiler to bear on;
   b. Provide slab on metal deck supported by structural steel channels and wide flanged beams to support second floor platform
   c. Provide new foundation (i.e. piles, walls and grade beams, etc.)
   d. Provide new cold formed steel roof rafters to support roof structure and green roof

1.02 NOMENCLATURE

A. Where the terms "Engineer/Architect" or "Architect/Engineer" are used throughout these Contract Documents, they shall mean the firm of H2M architects + engineers as may be abbreviated by H2M.

B. The terms "Contractor" and/or "Prime Contractor" where used shall refer to the individual or company who has entered into an agreement with the Owner to perform the work contained within these Contract Documents. The lack of word capitalization shall be incidental.

C. The Contractor may be referred to as the "General Contractor", "Prime Contractor" or similar wording. The lack of word capitalization shall be incidental.

1.03 ABBREVIATED SUMMARY OF WORK

A. Furnish all labor, equipment, materials, tools, means, methods, and incidentals necessary to complete the Work as required by the Contract Documents for this Construction Contract.

B. The work included is as shown on the Contract Plans and as outlined in the technical specifications.

C. All other work shown and specified within the Contract Documents.

1.04 PARTIAL LISTING OF SPECIFIC CONTRACT REQUIREMENTS

A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but is not limited to, the following:

1. Guidelines and requirements of the New York City Department of Environmental Protection (NYCDEP) and Occupational Safety & Health Administration (OSHA).
2. Coordination with Department of Buildings to obtain required permits and permit inspections.
3. Local laws and ordinances of the City of New York and the Brooklyn Navy Yard Development Corporation.
4. Guidelines and requirements of OSHA.

1.05 PARTIAL LISTING OF OVERALL CONTRACT REQUIREMENTS

A. The Contract Documents detail the work included in the Contract. Related requirements and conditions covered by the Contract Documents include, but is not limited to, the following:

1. Coordination with the Brooklyn Navy Yard Development Corporation and local consumers (tenants) regarding the interruption of electrical service and subsequent shut-downs of existing electrical;
2. Coordination with utility companies necessary to schedule utility mark-out services and in the event of damage to existing facilities;
3. Coordination with the Brooklyn Navy Yard Development Corporation and the Engineer during testing operations;
4. Coordination with the NYC Electrical Advisory Board (NYCEAB);
5. Coordination with the Brooklyn Navy Yard Development Corporation, the Engineer, the Special Inspector, the Department of Buildings to obtain required permits and permit inspections.
6. Site safety in accordance with all applicable federal, state, and local regulations.

1.06 EXISTING CONDITIONS

A. The Drawings show certain information that has been obtained by the Owner and various utilities regarding the location of various pipelines, utilities, and structures that exist at the location of the project both below and above grade.

B. The Owner and the Engineer/Architect expressly disclaims all responsibility for the accuracy or completeness of the information given on the Drawings with regard to existing facilities.

C. In the case where the Contractor discovers an obstruction not indicated on the Drawings or not described via specification reference, then the Contractor shall immediately notify the Engineer/Architect of the obstructions' existence.

D. The Engineer/Architect will determine if the obstruction is to be relocated or removed.

E. Compensation for this extra work will be paid for in accordance with the provisions in the Contract for "EXTRA WORK".

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 011113

SECTION 011400 - WORK RESTRICTIONS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site access and control of areas outside of site.

B. Work hours, employee conduct and miscellaneous employee requirements.

C. Contract requirements related to maintaining Owner's current operations and excess inspection required.

1.02 SITE ACCESS AND CONTROL

A. The Contractor shall not close any road for any period in time unless approved ahead of time by the Brooklyn Navy Yard Development Corporation. The Contractor shall take whatever measures are necessary to not cause any inconvenience to the area's residents.

B. The Contractor is responsible to employ methods to prevent construction materials and/or debris from leaving the work areas. The Contractor is responsible to routinely monitor the areas surrounding the site during the day as well as at the end of the work-day and to immediately clean-up any area to its previous condition.

C. The Contractor shall employ methods to prevent the transmission of dirt from vehicles driving on exposed areas of the work area from reaching the surrounding roadways. The Contractor will be responsible to immediately clean the roadway, should the measures being taken by the Contractor not satisfactorily control the transmission of any dirt to the roadway.

D. Any damages to areas outside the site, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.

E. The Contractor shall comply with all state and local requirements for allowable weight limits of vehicles on all public roads and the requirements of the BNYDC upon their roads.

F. The Owner reserves the right to back charge the Contractor for all costs associated with maintaining areas outside the work area, which may be disturbed by the Contractor should the Contractor fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

G. The Contractor shall maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibility of the Contractor.

H. Contractor shall be responsible for protecting private property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and misc. equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by the Engineer or Brooklyn Navy Yard Development Corporation. Contractor shall protect all of the physical structures, property and improvements from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the

Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.

I. Keep all existing driveways, roads, and parking areas free and clear of materials and equipment. Do not unreasonably encumber the work area with materials and equipment.

J. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material.

K. The Contractor is responsible for cleaning up the work area. Failure to maintain a clean work site daily, will result in others performing the work and the contractor being back charged for the cleaning cost plus construction administration fees.

L. Do not discard or dispose of any waste on-site.

M. The Contractor shall be responsible for managing dust.

1.03 WORK HOURS, EMPLOYEE CONDUCT AND EMPLOYEE REQUIREMENTS

A. The Contractor will be permitted to schedule working days and hours as specified in the Contract, if no times are specified therein then the work hours shall be Monday - Friday 7:00 am to 3:00 pm unless otherwise noted on the contract plans or applicable permits.

B. Employees are to act in a professional manner. Any employee using inappropriate language or who is disruptive to the work environment will be banned from the site. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.

C. Any employee found under the influence of any drug or alcohol will be banned from the site.

1.04 WORKSIT SAFETY REQUIREMENTS

A. Safety Toolbox Meetings and Attendance Records

1. The Contractor shall conduct onsite safety toolbox meetings at least once per week to address job-specific hazards, safe work practices, and any updates to safety procedures. The Contractor is responsible for maintaining a daily sign-in sheet for all personnel attending these meetings. The sign-in sheet shall include the date, project name, attendees' names, and signatures, and must be kept on file for review by the Owner or their representative upon request.

B. OSHA Certification Requirement

1. All site workers shall possess a valid OSHA 10-hour or 30-hour Construction Safety and Health Certification prior to commencing work on the project. This requirement ensures compliance with applicable safety standards and promotes a safe work environment. The Contractor is responsible for verifying and maintaining documentation of each worker's certification and making these records available for review by the Owner or their representative upon request.

1.05 CONTRACT REQUIREMENTS RELATED TO MAINTAINING OWNER'S CURRENT OPERATIONS AND EXCESS INSPECTION REQUIRED

A. The Contractor shall schedule working days and hours as specified. The Contractor shall pay all excess costs for inspection services provided by the Owner/Engineer/Architect for working beyond the times specified.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 011400

SECTION 012100 - ALLOWANCES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Allowance pricing for the following items:
   1. Independent Laboratory Testing Allowance
   2. Contingency Allowance for Additional Work
   3. Subcontractor costs for window removal/replacement

B. This Section covers the requirements for use of the cash allowances listed above contained in the proposal (Bid Forms, Price Schedule) and included in the Contract Price bid by the Contractor and defines and stipulates the charges that will be paid for out of the stipulated allowances.

C. The Contractor shall include the cash allowances stipulated in this Section in the amount bid (Base Bid).

D. Eligible costs described in this Section, and Sections referenced herein, will be the only costs paid for out of the stipulated allowances.

E. All other costs associated with the project as specified and/or shown, including but not limited to the delivery, installation and all Contractor overhead and/or collateral expenses are to be distributed among the other portions of the work and shall be included in the lump sum base bid.

1.02 SUBMITTALS

A. Make all submissions under the provisions of Section 013300.

B. For each type of product/material specified to be furnished under allowance pricing provide documentation of the unit pricing on manufacturer's letterhead certifying pricing of the product/material.

C. Submit additional backup information to substantiate the invoiced amount(s) as the Engineer/Architect may require for review and approval, prior to order or payment of item.

D. Provide written breakdowns for extra work as the Owner may require.

1.03 CHANGES TO STIPULATED (CASH) ALLOWANCE

A. If the actual cost of services differs from the cash allowance, then the Contract Price will be adjusted accordingly.

1.04 PAYMENTS TO BE MADE OUT OF TESTING ALLOWANCE

A. Include the cash allowance of $20,000.00 (TWENTY thousand Dollars and Zero Cents) in the amount bid for independent testing laboratory services specified in Section 014500.

B. The actual invoiced charges of the testing laboratory, including toning companies where called for, incurred for field and laboratory tests, as specified only in Section 014500 - Quality Control, shall be paid for out of the cash allowance.
   1. Any other requirement specified herein throughout these specifications for providing the services of an independent testing laboratory, underground utility location company, or similar outside independent service are to be borne by the Contractor.

2. All costs for quality control services are to be included as part of the Contract Price (Base bid).

C. One (1) week prior to each partial payment, submit a certified invoice from each company listing and detailing the total costs incurred since the last invoice.

1. The invoice shall be on company letterhead signed by an authorized representative of the company and shall include man-hours, tests conducted, date of tests and associated costs and fees.
2. Payment for costs will not be made unless the information is provided and certified. Payment for costs will not be made unless the typed test data reports have been received by the Engineer.
3. In the case of pipe toning, flags must be set to delineate the route of underground pipes and utilities prior to submission of partial payment request.

D. If in the event test results (provided by the independent testing laboratory) show non-compliance with these specifications, then at the option of the Contractor and only with the approval of the Owner, he may re-test samples to verify the original test results at his/her own expense.

E. Costs for re-testing failed components of the work, when ordered by the Engineer/Architect, will not be paid for out of the cash allowance and will be directly borne by the Contractor.

F. Funds remaining at project closeout shall be credited to the Owner.

G. Include allowance in lump sum amount in proposal statement. Show as separate line item in Schedule of Values.

1.05 PAYMENTS TO BE MADE OUT OF CONTINGENCY ALLOWANCE FOR ADDITIONAL WORK

A. Include the cash allowance of $25,000.00 (TWENTY-FIVE thousand Dollars and Zero Cents) in the amount bid for use upon the Owner’s instructions.

B. Should any additional work be required due to unforeseen conditions or Owner requests, the cost shall be negotiated by the Engineer and paid for out of the allowance. Include allowance in lump sum amount in proposal statement. Show as separate line item in Schedule of Values.

C. One (1) week prior to each partial payment, submit a certified invoice listing and detailing the total costs incurred since the last invoice. The invoice shall be on company letterhead signed by an authorized representative of the company and shall include man-hours, work conducted, date of work and associated costs and fees.

D. Funds remaining at project closeout shall be credited to the Owner.

1.06 PAYMENTS TO SUBCONTRACTOR FOR REMOVAL/REPLACEMENT OF WINDOW

A. Include the cash allowance of $15,000.00 (FIFTEEN thousand Dollars and Zero Cents) in the amount bid for use upon the Owner’s instructions.

B. One (1) week prior to each partial payment, submit a certified invoice listing and detailing the total costs incurred since the last invoice. The invoice shall be on company letterhead signed by an authorized representative of the company and shall include man-hours, work conducted, date of work and associated costs and fees.

C. Funds remaining at project closeout shall be credited to the Owner.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 012100

SECTION 012500 - PRODUCT SUBSTITUTION PROCEDURES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes the requirements for substitution of specified products during construction.

B. The Engineer/Architect will consider requests for substitutions only within thirty (30) days from the date of the Notice to Proceed.

C. Only products not specifically named in the bid are eligible for substitution in accordance with the requirements contained herein these specifications.

D. Products named by the Bidder, at the time of bid, shall be furnished and installed and substitutions will not be considered by the Owner/Engineer/Architect for those products named in the bid.

1.02 CONTRACTOR'S OPTIONS

A. For products specified only by reference standard, select any product meeting that standard.

B. For products specified by naming several products or manufacturers, select any one of the products or manufacturers named which complies with the Specifications.

C. Where products are not named, then submit products that meet the specifications.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Name - The Drawings and Specifications list acceptable manufacturers, commercial names, trademarks, brands and other product, material and equipment designations. Such names are provided to establish the required type, quality and other salient requirements of procurement.

B. Equals - An item equal to that named or described on the Drawings or in the Specifications may be provided by Contractor if accepted by the Engineer/Architect.

C. A request for product substitution constitutes a representation that the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
2. Shall provide the same warranty for the Substitution as for the specified Product.
3. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Shall reimburse the Owner and the Engineer/Architect for review or redesign services associated with re-approval by authorities.
6. Shall reimburse the Owner for all additional engineering services claimed by the Engineer for extra services associated with the review of the Contractor’s substituted item since it could not have been originally included in the Engineer’s professional engineering services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.

7. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
8. Substitution Submittal Procedure:
    a. The Contractor shall submit three (3) copies of the Request for Substitution FORM for consideration including all required information.
    b. The Contractor shall use the form included within this Section.
    c. All forms shall be type written.
    d. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
9. The burden to prove product equivalence rests on the Contractor.
10. The Engineer will notify Contractor in writing of decision to accept or reject request and at that time the Contractor can make a formal submittal in accordance with the requirements contained in Section 013300.
11. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.

PART 3 - EXECUTION

3.01 NOT USED

3.02 REQUEST FOR SUBSTITUTION FORM

3.03 PROJECT: _ SUBSTITUTION REQUEST NUMBER:

3.04 CONTRACTOR:

3.05 ADDRESS:

3.06 DATE:

3.07 H2M PROJECT NUMBER: OWNER:

3.08 CONTRACT NAME: CONTRACT NO.

3.09 SPECIFICATION TITLE:

3.10 SECTION: PAGE: ARTICLE/PARAGRAPH:

3.11 DRAWING NO(S):

3.12 PROPOSED SUBSTITUTION:

3.13 MANUFACTURER: ADDRESS:

3.14 TRADE NAME: PHONE #:

3.15 INSTALLER: ADDRESS:

3.16 PHONE #: ( )_____

3.17 HISTORY: □ NEW PRODUCT □ 2-5 YEARS OLD □ 5-10 YEARS OLD □ MORE THAN 10 YEARS OLD

3.18 DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED PRODUCT:

3.19 □ POINT-BY-POINT COMPARATIVE DATA ATTACHED

3.20 REASON FOR NOT PROVIDING SPECIFIED ITEM (ATTACH SEPARATE SHEET IF NECESSARY):

3.21 TYPICAL SIMILAR INSTALLATION:

3.22 PROJECT:

3.23 ENGINEER/ARCHITECT:

3.24 ADDRESS:

3.25 OWNER:

3.26 DATE INSTALLED:

3.27 SUBMIT COMPLETE INSTALLATION LIST ON SEPARATE SHEETS.

3.28 PROPOSED SUBSTITUTION AFFECTS OTHER PARTS OF WORK: □ NO □ YES

3.29 EXPLAIN:

3.30 GROSS SAVINGS TO OWNER FOR ACCEPTING SUBSTITUTION: $

3.31 PROPOSED SUBSTITUTION CHANGES CONTRACT TIME: □ NO □ YES

3.32 ADD / DEDUCT (CIRCLE): DAYS

3.33 SUPPORTING DATA ATTACHED FOR EVALUATION OF THE PROPOSED SUBSTITUTION:

3.34 □ PRODUCT DATA □ PHOTOS □ DRAWINGS □ TESTS □ REPORTS □ SAMPLES

3.35 □ OTHER (EXPLAIN):

3.36 ATTACHED DATA INCLUDES DESCRIPTION, SPECIFICATIONS, DRAWINGS, PHOTOGRAPHS, PERFORMANCE AND TEST DATA ADEQUATE FOR EVALUATION OF REQUEST; APPLICABLE PORTIONS OF DATA ARE CLEARLY IDENTIFIED.

3.37 ATTACHED DATA ALSO INCLUDES A DESCRIPTION OF CHANGES TO CONTRACT DOCUMENTS THAT PROPOSED SUBSTITUTION WILL REQUIRE FOR ITS PROPER INSTALLATION.

3.38 THE UNDERSIGNED CERTIFIES THAT THE FOLLOWING PARAGRAPHS, UNLESS MODIFIED BY ATTACHMENTS, ARE CORRECT:

A. Proposed Substitution has been fully checked and coordinated with Contract Documents.
B. Proposed Substitution does not affect dimensions shown on Drawings.
C. Proposed Substitution does not require revisions to any other Prime Contractor's work.
D. The undersigned will pay for changes to building design, including Architectural and Engineering design, detailing, and construction costs caused by requested Substitution.
E. Proposed Substitution will have no adverse affect on other trades, construction schedule, or specified warranty requirements.
F. Maintenance and service parts will be locally available for proposed substitution.
G. The undersigned further states that the function, appearance, and quality of proposed Substitution are equivalent or superior to specified item.

3.39 THIS REQUEST FOR PRODUCT SUBSTITUTION ALSO CONSTITUTES A REPRESENTATION THAT I, AS THE CONTRACTOR:

A. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
B. Shall provide the same warranty for the Substitution as for the specified Product.
C. Shall coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner, including extra charges by other Prime Contractors, material suppliers, and vendors.
D. Waives claims for additional costs or time extension that may subsequently become apparent.
E. Shall reimburse the Owner and the Engineer/Architect for review or redesign services associated with re-approval by authorities.
F. Shall reimburse the Owner for all additional engineering/architectural services claimed by the Engineer/Architect for extra services associated with the review of the Contractor's substituted item since it could not have been originally included in the Engineer/Architect's professional services agreement. Reimbursement shall be based on the man-hours expended, at current billing rates.

3.40 CONTRACTOR'S AUTHORIZED REPRESENTATIVE (TYPEWRITTEN): _____

3.41 AUTHORIZED SIGNATURE: _____

3.42 DATE: _____

END OF SECTION 012500

SECTION 012900 - PAYMENT PROCEDURES **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work under this Section specifies the procedures used to process partial payments

1.02 APPLICATIONS FOR PAYMENT

A. The form of application for payment shall be AIA Document G702, application and certificate for payment supported by AIA Document G703, Continuation Sheet.

B. Submit one (1) copy of each payment application, completed, signed and notarized.

C. Submit one (1) copy of the Brooklyn Navy Yard Development Corporation voucher or other required documentation.

D. Submit certified payroll receipts for all works and subcontractors. Payroll receipts shall be submitted with every application for payment. All payroll receipts shall be certified correct and notarized by a Notary in the State of New York. Application for Payment will not be processed unless all payroll receipts are received.

E. Applications must be filled out in Construction Management's chosen platform for payment.

F. The Brooklyn Navy Yard Development Corporation will not pay for any stored materials and equipment that is not installed.

G. Contractor shall pay all workers and have all subcontractors pay all workers the prevailing New York State Dept. of Labor wage rates.

H. The Brooklyn Navy Yard Development Corporation may conduct on-site interviews with all workers to verify payment of prevailing wage rates is enforced.

I. StartFragment The Contractor shall submit the Monthly Payment Application within the first week of the current month, encompassing all work executed during the preceding month.EndFragment

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 012900

SECTION 012973 - SCHEDULE OF VALUES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of Values

1.02 SCHEDULE OF VALUES

A. Submit for approval prior to the start of the work a Schedule of Values that indicates a breakdown of the labor, materials and equipment and other costs used in the preparation of the bid. This schedule shall be in sufficient detail to indicate separate figures for such items as excavation, concrete, equipment and all other items making up the lump sum price. The cost breakdown shall be separately itemized for each lump sum bid item in the project.

B. Where the cost breakdown includes items for bond payment, insurance payment, job set-up, or job mobilization, these items will be paid based on paid invoices and copies of cancelled checks.

C. Submit a Schedule of Values to the Engineer/Architect for review and approval within fifteen (15) calendar days from the date shown on the Notice to Proceed.

1.03 FORM OF SUBMITTAL

A. Submit typewritten Contract Cost Breakdown on AIA Form G703 - Application and Certificate for Payment Continuation Sheet or EJCDC 1910-8-E. The Engineer reserves the right to revise the form or provide a form prepared by the Engineer.

B. Use the Table of Contents of the Contract Specifications as a basis for format for listing costs of work for Sections under Divisions 1-48 as sections apply to work. Not all Sections need be assigned a breakout price as determined by the Engineer/Architect.

C. Identify each line item with number and title as listed in Table of Contents.

D. Provide dollar values for each line item for labor, overhead, profit, material, and equipment components for each category of work if requested by the Engineer.

E. List quantities of materials specified under unit price allowances.

F. The Schedule of Values, after approval by the Engineer/Architect, shall be the basis for the Contractor's Application for Payment and shall be entered into Cosntruction Management's chosen platform for the Contractor's Application of Payment.

G. The first Application for Payment will not be reviewed prior to an approved breakdown.

1.04 PREPARATION OF SCHEDULE OF VALUES

A. In addition to the above, provide a separate line item cost for each of the following items which shall be supported by proof where requested by Architect/Engineer:

1. Performance and payment bonds.
2. Insurance.
3. Mobilization and Demobilization (Amounts shall be equal in value).
4. Temporary facilities and measures as specified in Section 015000.
5. Project Coordination Meetings as specified in Section 013100.

6. Preparation of the Project Construction Schedule, and updates, as specified in Section 013300.
7. Preparation of Monthly Schedules as specified in Section 013100
8. Rubbish removal and daily cleaning up. (Provide a total dollar amount and a daily rate for each calendar day during the contract period.)
9. All Cash Allowance items as contained in Section 012100.
10. On-site, full time superintendent starting on the date of the Notice To Proceed and ending on the date that all punch list items are completed, which for the purposes of the Schedule of Values, shall be the contract completion date.
11. Surveyor used for layout, if necessary.
12. A total dollar amount for furnishing all the Operations and Maintenance Manuals specified throughout the specifications.
13. Record Drawing retainage amount specified in Section 017839.
14. Final cleaning.

B. Show total costs including overhead and profit.

C. Provide additional details and data to substantiate the cost breakdown as requested by the Engineer.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 012973

SECTION 013100 - PROJECT MANAGEMENT & COORDINATION **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes:
   1. Requests for Interpretation or for information
   2. Administration of subcontracts
   3. Coordination of work with utility companies, Owner and the Engineer/Architect
   4. Communication and coordination requirements
   5. Daily Report Submission

B. Site staffing requirements for the Contractor's superintendent is also specified herein, the costs for which shall be included in the Contract price.

1.02 FOR INTERPRETATION OR INFORMATION

A. The Contractor shall contact the Engineer when the Contractor feels that additional information is needed to perform the work of the Contract.

B. The Engineer/Architect's verbal response(s) to the Contractor's formal requests, if provided, shall not constitute an official response and if acted upon by the Contractor are done so at the Contractor's own risk and liability and shall not be subject to claims for additional compensation.

C. The Engineer/Architect will respond in writing to the request as soon as possible.

1.03 SUBCONTRACTOR ADMINISTRATION AND COORDINATION

A. Terms and conditions of the Contract shall be binding upon each subcontractor.

B. Provide at least one (1) copy of each approved shop drawing to each subcontractor whose work may depend upon the contents of the shop drawing submittal. The Owner reserves the right to stop all work, without claims for delay, until such time as appropriate subcontractors are furnished with appropriate shop drawings.

C. Each Contractor shall sequence and schedule the work of subcontractors, coordinate construction and administration activities of subcontractors. Subcontractor and vendor questions and clarifications shall be directed to the Engineer by the Contractor.

D. The Contractor's on-site project superintendent shall inspect all the work of all of his/her subcontractors, as it is being constructed. The Contractor's subcontractor shall not be permitted to do any work on the site without the Contractor's job site superintendent also being there to inspect the work as it is being performed.

1.04 UTILITY COORDINATION

A. Comply with the requirements of 16 NYCRR Part 753 - Protection of Underground Facilities. Submit a letter stating the case number.

B. Comply with the utility coordination requirements contained in the General Notes.

1.05 PUBLIC/PRIVATE UTILITIES

A. Notify all public and private utilities in accordance with Article 20, Section 322-a of the New York State General Business Law for location and mark-out of existing utilities in the vicinity of the work.

B. Repair all utilities damaged during the Work to the standards and approval of the respective utility at no cost to the Owner.

1.06 SPECIFIC COORDINATION REQUIREMENTS

A. Sequence and schedule work so as not to interfere with the work by others. Coordinate the work of this Contract with the work by others. In case of conflicts due to improper coordination by the Contractor, the Owner/Engineer's resolution will be final. No compensation will be awarded for extra work required to resolve conflicts.

B. Follow routing shown for pipes and conduit as closely as practicable. Place runs parallel with curb lines. Utilize spaces efficiently to maximize accessibility for other installations, maintenance, and to facilitate repairs.

1.07 CONTRACTOR'S JOB SITE SUPERINTENDENT

A. Employ an on-site superintendent as specified herein below. He/She shall be a full-time employee of the Contractor.

B. He/She shall have the authority to sequence and schedule the work, and to staff the project, so as not to interfere with the work by others and to complete the work daily within the time so required.

C. Each Superintendent shall have a minimum of five (5) years of experience as a job site superintendent for projects of equal size and complexity.

D. The Superintendent shall be qualified to perform the duties so required to successfully complete the work in accordance with the Contract Documents.

E. The Superintendent shall speak English. If required by the Engineer, provide a resume for the proposed superintendent that shall be typed and shall list the qualifications of the superintendent. The Contractor shall employ a superintendent acceptable to the Owner.

1.08 CONTRACTOR'S DAILY REPORT (SUBMITTED THROUGH ORION)

A. The Contractor shall provide a summary outline the activies done for the day.

B. The Contractor shall provide a photo log capturing the construction progress.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 013100

SECTION 013119 - PROGRESS MEETINGS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for progress meetings.

1.02 PRE-CONSTRUCTION CONFERENCE

A. The Contractor is required to attend the pre-construction conference at a location, date, and time selected by the Owner.

B. The owner, a partner, or a corporate officer representing the Contractor shall attend the conference. The job site superintendent and office project manager for the Contractor shall also attend.

C. The Engineer will prepare an agenda for the conference.

1.03 PROGRESS MEETINGS

A. Progress meetings will be held approximately once every two (2) weeks during the project. The Owner may elect to hold meetings more or less frequently.

B. At least seven (7) calendar days advance notice will be given by the Engineer or the date for the upcoming meeting will be set during the progress meeting.

C. Attendance at progress meetings shall be mandatory for all Contractors. An amount of $500 shall be deducted from the Contract Amount for each announced meeting not attended by the Contractor.

D. The job site superintendent and/or office project manager for the Contractor shall attend.

E. Subcontractors shall attend when requested by the Owner or Engineer at no cost to the Owner.

F. Meetings will be conducted by Engineer at a location selected by the Owner, normally at or adjacent to the project site.

G. The minimum agenda will cover:

1. Review minutes of previous meetings.
2. Identify present problems and resolve them.
3. Plan work progress during next work period.
4. Review the status of off-site fabrication and delivery schedule.
5. Review shop drawings and submittal schedules.
6. Review change order status.
7. Review status of construction progress schedule.
8. Coordinate access requirements.
9. Other business related to the work.

1.04 OTHER MEETINGS

A. Attend special meetings which may be required or called for by federal, state or local authorities, utility companies, Owner, Engineer or any other firm, person, or organization related to the project.

1.05 CONDUCTING MEETINGS

A. General - This paragraph covers Owner and/or Engineer meetings with Contractor and/or his subcontractors. Neither Owner nor Engineer wishes to meet solely with a subcontractor and requests for such meetings will be discouraged. If a meeting is deemed necessary, every effort will be made to have Contractor attend. If, for some reason, circumstances do not allow such, the meeting may be held, minutes of the meeting will be sent to Contractor and decisions on any major questions will be reserved until contractor has been consulted. Subcontractors may accompany Contractor to meetings provided contractor notifies Engineer in advance.

B. Chairman - When Engineer or Engineer and Owner attend meetings, Engineer, or his duly authorized representative, will act as chairman. Should Owner-Contractor meetings be necessary, Owner will chair such meetings.

C. Notices - Engineer or Owner will issue notices of meetings to all parties concerned and will note, thereof, who must attend and who may attend if they so desire. When Contractor desires a formal meeting, make a request through Engineer. Except when Engineer determines that a prompt meeting is essential, all notices will be issued at least one week in advance of the meeting date.

D. Agenda - All parties shall inform Engineer of items desired to be discussed and Engineer will notify all parties of all items to be considered. This is to allow each party to fully prepare for the meeting. This shall not be construed to mean that other items cannot be brought up at the meetings.

E. Time Limits - It is the intent to hold productive and efficient meetings and to keep them as short as is reasonably possible. The Chairman will be the sole judge as to whether or not further discussion on any matter is warranted and all discussions shall cease when he so orders.

F. Minutes - Minutes of meetings will be kept, written and distributed by the Chairman or his duly authorized representative. Minutes of all meetings will be available upon request to the Chairman.

G. Conduct - It is the intent to conduct all meetings in an orderly manner, to reasonably discuss all items and to hear and observe the rights and opinions of all parties. The Chairman will allow each party to speak, however, he reserves the right to order any individual to leave the meeting at any time for any reason.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 013119

SECTION 013216 - CONSTRUCTION SCHEDULE **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for two keek lookahead schedules, preparing construction schedules and for keeping them up to date.

B. All schedules shall be submitted in accordance with the requirements contained herein in Section 013300.

C. Refer to Section 013100 regarding the requirements for attendance at Project Coordination Meetings and additional requirements concerning the submission of other project coordination and sequencing information.

1.02 SCHEDULE PREPARATION MILESTONE DATES & REQUIREMENTS

A. The Contractor shall prepare Draft #1 Construction Schedule for presentation and discussion during the Bid Phase submission.

1. The Engineer/Architect will provide at least seven (7) calendar days written notice regarding the date of the first Project Coordination Meeting.
2. At the Engineer/Architect's discretion, after Award, Project Coordination Meeting No. 1 may immediately take place on the same date and directly following the Pre-Construction Conference. The Notice To Proceed will contain information regarding the Pre-Construction Conference and Project Coordination Meeting No. 1 should it be so decided by the Engineer.
3. Draft #1 Construction Schedule shall be prepared as specified hereinafter.
    a. The schedule shall show all the major and subordinate tasks necessary to complete the project in the specified time and interim milestones.
    b. It being understood that the Contractor's allotted time for others to perform their work is non-binding and does not relieve the Contractor from completing all the work in the specified contract completion time in accordance with the Contract Documents. It also being understood that this is the Contractor's realistic best estimate of the time needed for others to complete their related work.
    c. The schedule shall also show the dependencies and time allocated for each task.
4. The date, place, and time for Project Coordination Meeting No. 2 shall be established at the first meeting, but in no case be more than ten (10) calendar days from the date of the first meeting.

B. As a result of the first meeting, a better understanding of the Contractor's time requirements will have been achieved. Within five (5) working days of the date of Project Coordination Meeting No. 1, the Contractor shall prepare Draft #2 Construction Schedule and submit it to the Engineer/Architect for review. The Contractor shall mail his/her schedule via Overnight Mail with a Return Receipt Requested.

1. Project Coordination Meeting No. 2 shall focus on the time needed to complete each task and subordinate task and for establishing task dependencies.
2. The Contractor shall deliver to the Engineer a hard copy of his/her Draft #2 Construction Schedule at the meeting.

C. The Engineer/Architect's decision regarding the time allotted for a given task shall be final and each Contractor shall apply necessary resources to accomplish the work. Submission of a bid shall be intended to mean that the Contractor agrees that the determination is binding.

D. Once revisions to the schedule have been made after Project Coordination Meeting No. 2, the agreed upon schedule shall become the Final Construction Schedule. The Contractor shall mail his/her Final Construction Schedule via Overnight Mail with a Return Receipt Requested.

1.03 PRIME CONTRACTORS SCHEDULE TYPES

A. Gantt Chart Type: The Contractor shall prepare a Gantt Chart type schedule as specified hereinafter.

1.04 CONSTRUCTION SCHEDULE - GENERAL

A. Coordinate the work and maintain the construction schedule. In the event actual progress begins to lag the schedule, promptly employ additional means and methods of construction to make up the lost time.

B. Keep the construction schedule current and revise and resubmit as often as necessary to accurately reflect the conditions of the work, past progress and anticipated future progress.

C. The construction schedule shall be completed, submitted, and deemed received by the Engineer prior to the first payment application.

D. The schedule, when approved by the Engineer/Architect and the Owner, shall establish the dates for starting and completing work for the various portions of the Contract. It shall be the duty of the Contractor to conform to his/her own schedule and to perform the work within the time limits indicated. Failure to adhere to the approved schedule shall expose the Contractor to disputes, claims and additional costs incurred by others.

E. Coordinate letting of subcontracts, material purchases, shop drawing submissions, delivery of materials, and sequence of operations, to conform to the schedule.

F. Coordinate the construction schedule with the proposed schedules of the equipment suppliers and subcontractors.

G. The schedule shall be plotted out in color and shall be 36-inch by 40-inch. It shall contain as many sheets as are necessary to show all rolled down tasks. Partially printed schedules will not be accepted.

H. Prepare the schedule in a manner so that the actual progress of the work can be recorded and compared with the expected progress.

I. The schedule shall be Gantt Chart and use the following convention:

1. Tasks for the General Contractor in blue ink.
2. Task links/task dependency in blue ink.
3. Work by others in green ink.
4. Milestone dates (zero duration) by a red diamond.
5. The end date for each task and subtask at the end of a bar.

6. The description of all major tasks within the bar. The bar shall be red.
7. Critical path.

J. The construction schedule shall also show the following:

1. Critical sequence items where new units must come on-line before existing facilities go off-line, if applicable to the project.
2. Lead time for major manufactured systems and equipment.

K. Project scheduling software shall be the latest version of Microsoft Project ®

L. One licensed latest version of Microsoft Project ® shall be delivered to the Owner, which shall remain registered to the Owner after the project is completed.

M. Preparing and submitting a 'lookahead' schedule

1. StartFragment A two-week schedule outlining the anticipated work, deliveries, and project milestones shall be submitted prior to the commencement of each week.EndFragment

1.05 REVISION OF PROJECT PROGRESS SCHEDULE

A. The Contractor shall evaluate and provide updated construction schedules monthly in accordance with job requirements. Each update shall be submitted to the Engineer/Architect for information purposes and be provided by the last Friday of every month.

B. From time to time, and at stages deemed appropriate by the Engineer/Architect, the Engineer/Architect may ask for updated schedules from the Contractor to reflect the project's status. The percent complete for each task may be shown for review by the Engineer/Architect.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 013216

SECTION 013223 - SURVEYING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project record documents shall be prepared as specified herein.

1.02 QUALITY ASSURANCE

A. The Contractor shall employ a land surveyor licensed in the State where the project is located. The surveyor shall be acceptable to the Architect/Engineer in terms of experience and qualifications.
   1. Submit evidence of the surveyor's errors and omissions (professional liability) insurance coverage in the form of an insurance certificate.
   2. The surveyor shall maintain a minimum coverage of $1,000,000 for professional liability.
   3. The Owner, Architect/Engineer, and Contractor shall be named as insurance certificate holders.
   4. A thirty-day cancellation notice shall be provided.
   5. Physical work shall not be performed until the certificate is provided and approved by the Owner.

B. All instruments used on the project shall be of professional quality and in first class condition.
   1. All instruments shall have been calibrated by a manufacturer’s service station within the last twelve (12) months.

1.03 SUBMITTALS FOR REVIEW

A. Submit name, address, and telephone number of Surveyor before starting survey work.

B. Surveyor’s professional liability insurance certificate.

C. On request, submit documentation verifying accuracy of survey work.

D. Submit a copy of the site drawing signed by the land surveyor showing locations of other benchmarks set by the surveyor, baseline location and offset hubs. If requested, the Architect/Engineer will provide a reproducible drawing or a drawing in digital format for use by the surveyor.

1.04 EXAMINATION

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Engineer/Architect of any discrepancies discovered.

1.05 SURVEY REFERENCE POINTS

A. The Contractor’s surveyor shall locate and protect survey control and reference points located throughout the project site.

B. Control datum for survey is that indicated on the Drawings or will be provided by the Architect/Engineer.

C. The Contractor shall protect survey control points prior to starting any site work. Preserve permanent reference points during construction.

D. Promptly report to the Engineer/Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
   1. The surveyor shall replace dislocated survey control points based on original survey control when directed by the Engineer/Architect.
   2. Make no changes without prior written notice to Engineer/Architect.

E. The surveyor shall set control lath for rough and final grading purposes. Lath shall be placed at sufficient intervals to control grade or as directed by the Engineer/Architect.

F. All new structures, pits, chambers, drainage pools, curbs, roads, swales, and other physical elements shall be located by survey control.

G. Underground pipelines need not be located using survey control but shall be located using standard survey equipment operated by persons experienced in their operation.

1.06 SURVEY REQUIREMENTS

A. The Engineer/Architect will provide one (1) benchmark.

B. The Contractor shall, with his own forces, obtain working or construction lines or grades as needed subject to the check of the surveyor. The surveyor shall set offsets.

C. Establish elevations, lines, offsets and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements, stakes for grading, curbs, fill and topsoil placement, utility locations, slopes and invert elevations.

D. The Contractor shall provide at least 48 hours notice and adequately protected access to all underground structures, valves, pipes, and utilities installed as work of this Contract to H2M prior to backfilling. Please contact H2M at least 48 hours in advance of backfilling. In the event the trench must be backfilled in less than 48 hours, the Contractor shall stake the junctions and termination points of the utility and note the depth to the top of the utility on the stake. Stakes must be protected for at least 48 hours until H2M survey can record the locations.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 013223

SECTION 013233 - CONSTRUCTION PHOTOGRAPHS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pre-construction photographs.

B. Periodic construction photographs.

C. Final completion construction photographs.

1.02 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit images files within five (5) days of taking photographs.

1. Format: Provide images in JPG format, minimum 1600 x 1200 pixels, 400 dpi minimum, in unaltered original files, with same aspect ratio as sensor resolution, un-cropped, in a folder named by date of photograph, accompanied by key plan file.
2. Quantities: Submit an average of twenty (20) photographs per week over the duration of the Project.
    a. Preconstruction Photographs: Provide photographs, taken within the limits of the work, to document existing conditions. Engineer/Architect will designate the date and location of the exposures that will generally be taken just prior to the construction operations. The minimum number of photographs required shall be sixty-four (64).
3. Identification: Provide the following information with each submission:
    a. Project name and number.
    b. Name of Contractor who took the photographs.
    c. Date and time picture was taken.
    d. Location of picture relative to a specific location on the site, (for example, “10 ft. southeast of Operations Building”).
4. Frequency: Submit photographs weekly under the provisions of Section 013300 - Submittal Procedures.

1.03 CLOSEOUT SUBMITTALS

A. Provide two (2) digital DVD discs containing all digital photographs, key plans and identifications for the entire construction duration, organized by folders named by date of photograph, under the provisions of Section 017800 - Closeout Submittals.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC MEDIA

A. Digital Camera: Minimum sensor resolution of 5 megapixels.

PART 3 - EXECUTION

3.01 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work, Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location and direction.
   2. Use flash in low light levels or backlit conditions.
   3. Select vantage points to show status of construction and progress since last photographs were taken.

B. Digital images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image editing software.
   1. Date and Time: include date and time in each file name for each image.

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for making submissions for the project. Electronic submissions will be required unless expressly noted otherwise.

1.02 SUBMITTAL LOG

A. StartFragment The Contractor shall prepare and submit a comprehensive Submittal Log identifying all anticipated submittals required for the execution of the project. This log shall include a proposed schedule indicating the planned submission dates for each item, aligned with the overall project timeline and construction activities. The Submittal Log shall be submitted for review and approval prior to the commencement of work and shall be updated regularly to reflect any changes in scope, sequencing, or scheduleEndFragment

1.03 IDENTIFICATION OF SUBMITTALS

A. Each and every submission shall be provided by the Contractor and shall be accompanied by a SUBMISSION TRANSMITTAL FORM. Identify each submittal and re-submittal using the form.

1.04 COORDINATION OF SUBMITTALS

A. Prior to submitting to the Engineer/Architect, fully coordinate all interrelated work. As a minimum, do the following:
   1. Determine and verify all field dimensions and conditions by field measuring existing conditions and the installed work of this Contract and work by others.
   2. Coordinate with all trades, subcontractors, vendors, system and equipment suppliers and manufacturers, public agencies, and utility companies and secure all necessary approvals, in writing.

B. Make submittals in groups containing all associated items that in some way depend upon each other.
   1. The Engineer/Architect may elect not to review partial or incomplete submissions, whereupon he will notify the Contractor of the additional submissions that are required before a review can be made.

1.05 TIMING OF SUBMITTALS

A. Make submittals far enough in advance of scheduled dates of installation to provide time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery. The Engineer/Architect will review submittals within 15 business days.

B. Submissions may be returned reviewed, unreviewed, rejected, returned conditioned upon submission of related items, or for other reasons set forth in the Contract Documents.

C. Make submissions well in advance as the returning, rejecting or disapproval of submissions or other similar circumstances are possible and are deemed "avoidable delays". Costs for these

delays or those attributed to Contractor's tardiness in making submittals shall be borne by the Contractor.

D. Submittals requiring Engineer/Architect's review as required under the technical specifications of these documents shall be submitted prior to installation.

E. If material or equipment is installed before it has been deemed to be in general compliance with the Contract Documents, as determined by the Engineer/Architect, the Contractor shall be liable for its removal and replacement at no extra charge and without an increase in contract time.

1.06 DESTINATION OF SUBMITTALS

A. Submissions shall be sent to the Engineer/Architect's office to the attention of the Project Manager whom will be named in the Notice to Proceed or at the Construction Kick-Off meeting.

B. All submittals shall be made via electronic format via e-mail or information exchange server. An information exchange server will be made available to each prime contractor by the Engineer.

C. When submitting samples, the contractor shall arrange for the delivery of said samples to the office of the Engineer/Architect. Samples shall be clearly marked with name of the project and the Engineer/Architect's project manager.

D. The Contractor is responsible for the pick-up of the sample from the Engineer/Architect's office following approval. In the event that a sample is not retrieved from the Engineer/Architect's office within thirty days of approval, it will be disposed of.

1.07 CLARITY OF SUBMITTALS

A. All printed materials shall be neat, clean, professionally drafted by hand or by computer, clear, legible, and of such quality that they can be easily reproduced by normal photocopying or blueprinting machines.

B. Information shall be separated into groups, subsystems, or similar equipment/function. Copies not conforming to this paragraph will be returned to the Contractor without the Engineer/Architect's review.

1.08 CONTRACTOR'S REPRESENTATION

A. By making a submission, the Contractor represents that he has determined and verified all field measurements and dimensions, field construction criteria, site and building constraints in terms of limitations in moving equipment into an enclosed space, materials, catalog and model numbers and similar data and that he has checked and coordinated each submission with other work at or adjacent to the project site as required.

1.09 ENGINEER/ARCHITECT'S REVIEW

A. Engineer/Architect will review and comment on each submission conforming to the requirements of this Section.

1. Engineer/Architect's review will be for conformance with the design concept of the project and will be confined to general arrangement and compliance with the Contract Documents only, and will not be for the purpose of checking dimensions, weights, clearances, fittings, laying lengths, tolerances, interference's, for coordinating the work by others or subcontractors.
2. The Engineer/Architect's review of a separate item, or portion of a system, does not represent a review of an assembly or system in which the item functions.

B. The Engineer/Architect will mark submittals as follows:

1. NO EXCEPTION TAKEN (A) - No corrections, no marks. The content of this submittal has been reviewed by the Engineer/Architect and been found to be in general compliance with the Contract Documents. No further submission of this submittal is required and the information contained in the submittal may be built into the work in accordance with the Contract Documents.
2. MAKE CORRECTIONS NOTED (B) - Minor amount of corrections. The content of this submittal has been reviewed by the Engineer/Architect and has been found in general to be in compliance with the Contract Documents. The notations made on the submittal by the Engineer/Architect shall be incorporated into the work in accordance with the terms and conditions of the Contract Documents. No further submission of this submittal is required.
3. AMEND AND RESUBMIT (C) - The content of this submittal has been reviewed by the Engineer/Architect and this review has determined that additional data and/or modification to the submitted data or other changes are required to bring the work represented in this submittal into compliance with the Contract Documents. This submittal shall be reviewed and revised in accordance with the Engineer/Architect's comments and resubmitted to the Engineer/Architect for review. The information contained on the resubmittal shall not be incorporated into the work until the submittal is returned to the Contractor marked "NO EXCEPTION TAKEN" or "MAKE CORRECTIONS NOTED".
4. REJECTED (D) - The content of this submittal has been reviewed by the Engineer/Architect and has been determined not to be in accordance with the requirements contained in the Contract Document and requires too many corrections or other justifiable reason. The submittal shall be corrected and resubmitted or a submittal of an alternate shall be provided. No items are to be fabricated under this mark.
5. SUBMIT SPECIFIED ITEM (E)- The content of this submittal has been reviewed by the Engineer/Architect and this review has indicated that the work displayed in the submittal is not in compliance with the Contract Documents. The Contractor shall submit another submittal for this portion of the work, which complies with the Contract Documents.
6. RECEIVED (R) - This submittal is accepted on the project and filed for record purposes only, in accordance with the terms and conditions of the Contract Documents. Documents marked "RECEIVED" will not be returned.

C. No payment will be made on any item for which a submission is required if such submission:

1. has not been made,
2. has been made but was not stamped "No Exceptions Taken" by Engineer/Architect,
3. has been made and stamped "Make Corrections Noted", but contractor has not complied with Engineer/Architect's notes marked on the submittal,
4. has been made and stamped "No Exceptions Taken", but item provided does not conform to the shop drawing nor to the Contract Documents.

D. Submittals not required by these specifications will not be recognized or processed.

E. Provide space for the Engineer/Architect's review stamp.

1.10 RESUBMISSIONS

A. Prepare new and additional submissions, make required corrections, and resubmit corrected copies until found in compliance with the Contract Documents.

B. On, or with, resubmittals, clearly describe revisions and changes made, other than the corrections requested by Engineer/Architect, which did not appear on the previous submissions.

1.11 CONTRACTOR'S RESPONSIBILITIES

A. Engineer/Architect's review of submittals shall not relieve the Contractor of his/her responsibility for any deviation from the requirements of the Contract Documents nor relieve the Contractor from responsibility for errors or omissions in the submittals.

B. No portion of the work requiring a submission shall be commenced until the Engineer/Architect has found the submission in general compliance with the Contract Documents.

C. The Contractor shall provide notification of any specification or drawing deviation.

1.12 EXCESS COSTS FOR ENGINEERING/ARCHITECTURAL SERVICES

A. The Owner will charge to the Contractor, and will deduct from the partial and final payments due the Contractor, all excess engineering and architectural expenses incurred by the Owner for extra services (work) conducted or undertaken by the Engineer/Architect as stipulated below:

1. Services and other similar charges because of the Contractor's errors, omissions, or failures to conform to the requirements of the Contract Documents as related to administrative charges associated with non-compliance with the requirements for making project submissions.
2. Services and other similar charges required to examine and evaluate any changes or alternates proposed by the Contractor and which may vary from the Contract Documents.
3. Services and other similar charges as a result of the Contractor's proposed substitution of materials, equipment or products which require a redesign of any portion of the project, as contained in the Contract Documents at the time of bid.
4. Services and other similar charges as a result of the Contractor's proposed substitution of products which require an engineering and/or architectural evaluation to determine if the substituted product is equal to that specified.
5. Services and other similar charges as a result of changes by the Contractor to dimensions, weights, sizes, voltages, phase, horsepower, materials of construction, and similar physical or operating characteristics of the product furnished which require redesign of the project in any way.
6. Services and other similar charges for the review of resubmissions of shop drawings that have been marked as "No Exceptions Taken" or "Make Corrections Noted".
7. Services and other similar charges for the review of shop drawings submitted more than two (2) times for the same product or portion of the work.

1.13 MISCELLANEOUS SUBMITTALS

A. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.14 SUBCONTRACTOR LIST

A. The Contractor shall submit within ten (10) calendar days after the date of the Notice to Proceed, a list of all subcontractors, including the names of the major subcontractors that were submitted at the time of the bid.

1.15 MATERIAL SAFETY DATA SHEETS (MSDS)

A. Comply with "Right to Know" requirements of Chapter 551 of Laws of New York, 1980, concerning notification of the use of toxic substances.

B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled "Toxic and Hazardous Substances" shall be identified to the Owner/Engineer/Architect by the Contractor's submission of a standard Material Safety Data Sheet (MSDS) in accordance with "Right To Know" requirements.

C. Products will not be permitted to be kept on site without a MSDS.

1.16 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer/Architect.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation. Provide manufacturer's instructions with shop drawings.

1.17 CERTIFICATIONS

A. Submit certifications of compliance indicated in the Contract Documents.

B. Certifications shall be complete and exact, they shall be properly authenticated by the written signature, in ink, of an owner, officer or duly authorized representative of the person, firm or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 013300

SECTION 014100 - REGULATORY REQUIREMENTS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Codes
B. Governing agencies
C. Permits

1.02 CODES

A. Comply with the requirements of the various codes referred to in these Specifications. Such codes shall be the date of the latest revision in effect at the time of receiving bids.
B. If there is a conflict between local, state, and/or Federal regulatory requirements, seek a consultation with the State Department of Labor. Resolve conflicts to the satisfaction of the State Department of Labor prior to commencing work.

1.03 GOVERNING AGENCIES

A. All work shall conform to and be performed in strict accordance with all governing agencies such as, but not limited to:
    1. Occupational Safety and Health Act - OSHA
    2. New York City Codes, Rules, Laws, and Ordinances
    3. New York State Department of Health
    4. Brooklyn Navy Yard Development Corporation Codes, Rules, Laws and Ordinances
    5. New York City Department of Buildings Codes and Requirements

1.04 PERMITS AND INSPECTIONS

A. Representatives of the Owner shall have access to the work for inspection purposes. The Contractor shall provide facilities suitable to the Owner to facilitate inspections of the installed work.
B. The Contractor shall provide adequate time in the construction schedule for required permit inspections.
C. A list of special permit inspections required on this project are attached to this project specification as Appendix A.
D. Obtain and pay for all permits, fees, licenses, certificates, inspections and other use charges required in connection with the work.
E. All road opening permit fees are the responsibility of the contractor. The contractor shall contact the New York Department of Transportation to assess the total fee charged.
F. Obtain final approval including letter of completion from New York City Departmnent of Buildings.

1.05 COORDINATION WITH GAS/ELECTRIC/TELEPHONE/CABLE UTILITY COMPANY

A. Comply with the gas/electric/telephone/cable utility companies regarding excavation around or in the vicinity of existing facilities.

1.06 UTILITY WORK WITHIN RIGHT-OF-WAY

A. Utility Work, either overhead or underground, within the boundaries of the NYC right-of-way, shall conform to procedures set forth by the applicable permits.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 014100

SECTION 014320 - PRE-INSTALLATION MEETINGS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for pre-installation meetings.

1.02 PRE-INSTALLATION MEETINGS

A. As required in individual specification sections, the Contractor shall convene a pre-installation meeting at the site prior to commencing work of the section.

B. Pre-installation meetings are to be convened at least one week prior to commencing work on the section. The contractor shall arrange and require attendance of Owner/Architect/Engineer and parties directly affecting, or affected by, work of the specific section.

1. At least seven (7) calendar days advance notice is to be given.
2. The contractor shall prepare agenda and preside at meeting. At a minimum the following items are to be discussed:
3. Review conditions of installation, preparation and installation procedures.
4. Review coordination with related work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 014320

SECTION 014500 - QUALITY CONTROL **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for monitoring the quality of the constructed project.

B. Work of this Section also includes services of an independent testing laboratory for quality assurance testing.

1.02 REFERENCES

A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

C. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing Agency for Bituminous Paving Materials.

D. ASTM E548 - Practice for Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies.

E. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.03 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise.

C. Perform work by persons qualified to produce workmanship of specified quality.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.04 QUALITY ASSURANCE - TESTING LABORATORY

A. In order to establish compliance with the Contract Documents, materials shall be tested, examined and evaluated before they are incorporated into the work. During and after installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.

B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.

C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.

D. In the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Engineer/Architect reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.

E. Engineer/Architect reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Engineer/Architect.

F. The testing laboratory shall meet the following criteria:

1. Be capable of performing all of the required tests.
2. Be regularly engaged in performing the types of services required.
3. Have adequate facilities, materials, equipment, and personnel to perform the services.
4. Have an adequately trained, experienced and qualified staff.
5. Have at least one registered professional engineer licensed in the state in which the project is located who shall be capable of performing field tests, supervising laboratory testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.
6. Shall be able to be on the Project site within two hours after being notified.
7. Comply with the requirements of ASTM C1077, ASTM D3740, ASTM D4561, ASTM E548 and ASTM E699.

G. Testing Equipment: Calibrated at reasonable intervals with devices of accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.05 REFERENCES

A. Conform to reference standards by date that the project was last bid.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 SUBMITTALS

A. Within seven (7) calendar days from the date of the Notice to Proceed, submit documentation from testing laboratories that clearly indicates experience, location, qualifications of staff, and descriptions of any limitations or restrictions of the firm.

B. Certified copies of each test report shall be mailed directly to the Engineer/Architect. The Contractor shall arrange with the laboratory to secure copies.

C. Each report shall be in writing and shall include the testing method used, the test results, the specified results, the exact location of where the test specimens were taken, the date taken, Project identification, Contractor's name and other pertinent information required for a complete and meaningful test report.

D. Each report shall be signed and certified by a responsible officer of the testing laboratory.

E. Mail reports directly to Engineer/Architect within 24 hours after the sample is taken, except in those instances when tests cannot be immediately performed because of required curing, incubation periods, or lengthy testing procedures.

F. The laboratory shall verbally communicate test results when requested by the Engineer/Architect. This does not eliminate nor replace the requirements for a written report.

1.07 SCHEDULING - LABORATORY SERVICES

A. Except where otherwise specified, the Engineer/Architect will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.

B. Engineer/Architect will notify Contractor of his decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.

C. Contractor shall make his own arrangements for the sampling and testing of materials he proposes to incorporate into the work.

D. Notify Engineer/Architect at least 72 hours in advance of the times at which scheduled samples or tests will be conducted.

E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Where possible, any work that has been installed but has not been sampled or tested as required shall be tested by other means. Upon Engineer/Architect's request, uncover any work, which has been buried or covered, and perform special tests designated by Engineer/Architect. If the work cannot be tested by other means, Engineer/Architect may declare the work unacceptable. All costs associated with noncompliance and for special testing shall be borne by the Contractor.

F. Should the testing laboratory be scheduled to take or collect samples or to perform tests, and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other

reason, reschedule the tasks for a date acceptable to Engineer/Architect. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor and will not be paid for under the allowance.

G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.08 TESTING REQUIREMENTS

A. Compaction Testing - Soil:
   1. Perform compaction testing in accordance with ASTM D2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth) or ASTM D1556 Density and Unit Weight of Soil In Place by the Sand Cone Method.
   2. Perform tests and analysis of fill material in accordance with ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 55-lb. Rammer and 12-inch Drop.

B. Compaction Testing - Asphaltic Concrete Pavement:
   1. Perform asphaltic concrete compaction testing in accordance with ASTM D2950 - Standard Test Method of Density of Bituminous Concrete in Place by Nuclear Methods.
   2. Calibrate nuclear density measurement equipment based on theoretical maximum specific gravity of asphaltic concrete pavement material.
   3. Perform test to determine theoretical maximum specific gravity in accordance with ASTM D2041 Theoretical Maximum Specific Gravity of Bituminous Pavement Mixtures. Perform test on mix at plant prior to delivery. Collect sample at plant in accordance with ASTM D979 - Sampling Bituminous Paving Mixtures and perform test in approved laboratory if plant does not have necessary equipment.

C. Asphalt Testing:
   1. Collect samples at point of delivery in accordance with ASTM D979, Standard Practice for Sampling Bituminous Paving Mixtures.
   2. Perform extraction test in accordance with ASTM D2172, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
   3. Perform gradation test in accordance with ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.

1.09 TESTING SCHEDULE

A. Compaction Testing of Soil:
   1. Pipe Installation: 1 test per 100 linear feet per foot of backfill.
   2. Pavement Subgrade: 1 test per 50 square feet per lift.

B. Asphalt Testing: 1 test per 50 square feet per course.

C. Compaction Testing of Pavement: 1 test per 50 square feet per course.

D. Concrete - Cast in place

E. Structural steel - high strength bolting

F. Mechanical systems

1.10 FIELD OBSERVATION OF CONTRACTOR'S WORK

A. The Engineer/Architect will provide periodic observation of the Contractor's work.

1.11 SPECIAL INSPECTION OF CONTRACTOR'S WORK

A. The Special Inspector will conduct the required permit inspections of the Contractor's work.

B. Refer to contractor drawings for a list of all special inspections required on this project.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance. Seal cracks or openings of substrate prior to applying next material or substance.

B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 FIELD QUALITY CONTROL

A. Allow representatives of the testing laboratory access to the work at all time. Provide all equipment, labor, materials, and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.

B. Test specimens and samples shall be taken by the person(s) designated in other Sections, or as directed by Engineer/Architect. Conduct field sampling and testing in the presence of Engineer/Architect. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

END OF SECTION 014500

BROOKLYN NAVY CORPORATION **63 FLUSHING AVENUE, SUITE 300** **BROOKLYN, NY 11205**	**STATEMENT OF SPECIAL INSPECTIONS AND TESTS** AS REQUIRED BY THE 2020 BUILDING CODE OF NEW YORK STATE
BC NYS § 1704.3 REQUIRES THE PROJECT DESIGN PROFESSIONAL TO COMPLETE THE STATEMENT OF SPECIAL INSPECTIONS AND TESTS. COMPLETION OF THE STATEMENT OF SPECIAL INSPECTIONS & TESTS AND SUBMISSION TO THE BUILDING DEPARTMENT WITH THE CONSTRUCTION PERMIT APPLICATION IS A CONDITION FOR ISSUANCE OF THE BUILDING PERMIT.	
OWNER BUILDING BROOKLYN NAVY YARD DEVELOPMENT CORPORATION	
PROJECT TITLE RESTORATION OF BOILERS AT BUILDING 62	
PROJECT # PROJECT ADDRESS BNYD-1907A PROJECT LOCATION ADDRESS 1, PROJECT LOCATION CITY, PROJECT LOCATION STATE,PROJECT LOCATION ZIP	
ARCHITECT/ENGINEER H2M ARCHITECTS, ENGINEERS, LAND SURVEYING AND LANDSCAPE ARCHITECTURE, D.P.C.	
NAME OF PERSON COMPLETING THIS STATEMENT PHONE DATE DANIEL J. AIELLO, PE (631) 756-8000 MAY 2024	
COMMENTS	

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSENCE**	**CRHEQCUKIRIEFD**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
A. STEEL CONSTRUCTION				1705.2		
1. STRUCTURAL STEEL.	X	X	AISC 360 CHAPTER N.5	1705.2 1705.2.1	**X**	051200
2. COLD FORMED STEEL DECK.		X	SDI QA/QC 2011	1705.2 1705.2.2	**X**	053100
3A. INSTALLATION OF OPEN-WEB STEEL JOIST AND JOIST GIRDERS		X	SJI SPECIFICATION (SECTION 2207.1)	1705.2 1705.2.3 1705.2.4		051200

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BRCEFNEYRSENCE	CRHEEQCUKIRIEFD	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
B. CONCRETE CONSTRUCTION				1705.3 TABLE 1705.3		
1. INSPECTION OF REINFORCING STEEL, INCLUDING PRESTRESSING TENDONS, AND PLACEMENT.		X	ACI 318: CH. 20, 25.2, 25.3, 26.6.1-26.6.3	1705.3 1908.4	**X**	033000
2A. REINFORCING BAR WELDING - WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706.		X	AWS D1.4; ACI 318: 26.6.4	1705.3.1 TABLE 1705.3		
2B. REINFORCING BAR WELDING-SINGLE-PASS FILLET WELDS, MAXIMUM 5/16 INCHES.		X	AWS D1.4; ACI 318: 26.6.4	1705.3.1 TABLE 1705.3		033000
2C. REINFORCING BAR WELDING - ALL OTHER WELDS.	X		AWS D1.4; ACI 318: 26.6.4	1705.3.1 TABLE 1705.3		033000
3. CAST IN CONCRETE ANCHORAGE		X	ACI 318: 17.8.2	TABLE 1705.3	**X**	033000
4A. POST INSTALLED CONCRETE MEMBERS - ADHESIVE ANCHORS INSTALLED HORIZONTALLY OR UPWARDLY INCLINED TO RESIST SUSTAINED TENSION LOADS.	X		ACI, 318: 17.8.2.4	TABLE 1705.3		033000
4B. POST INSTALLED CONCRETE MEMBERS -		X	ACI, 318: 17.8.2	TABLE 1705.3	**X**	033000

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSENCE**	**CRHEEQCUKIRIEFD**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4A.						
5. VERIFY USE OF DESIGN MIX.		X	ACI 318: CH. 19, 26.4.3, 26.4.4	TABLE 1705.3, 1904.1, 1904.2, 1908.2, 1908.3		
6. SAMPLING FRESH CONCRETE, SLUMP, AIR CONTENT, TEMPERATURE, STRENGTH TEST SPECIMENS.	X		ASTM C172, ASTM C31; ACI 318: 26.4, 26.12	TABLE 1705.3, 1908.10	**X**	033000
7. INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X		ACI 318: 26.5	TABLE 1705.3 1908.6 1908.7 1908.8	**X**	033000
8. INSPECTION FOR MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.		X	ACI 318: 26.5.3-26.5.6	TABLE 1705.3, 1908.9	X	
9A. INSPECTION OF PRESTRESSED CONCRETE FOR - APPLICATION OF PRESTRESSING FORCES	X		ACI 318: 26.10.	TABLE 1705.3		
9B INSPECTION OF PRESTRESSED CONCRETE FOR - GROUTING OF BONDED PRESTRESSING	X		ACI 318: CH. 26.9	TABLE 1705.3		

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSENCE**	**CRHEEQCUKIRIEFD**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
TENDONS						
10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS		X	ACI 318: 26.11.2	TABLE 1705.3		
11. VERIFICATION OF IN-SITU CONCRETE STRENGTH PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND SLABS.		X	ACI 318: 26.11.1.2(B)	TABLE 1705.3		033000
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED		X	ACI 318 CH.19 AND 20.	TABLE 1705.3		
C. MASONRY CONSTRUCTION						
1. MASONRY CONSTRUCTION	X		ACI 530 /ASCE 5/ TMS 402 AND ACI 530.1 / ASCE 6 / TMS 602 CH.3	1705.4	**X**	042201
2. EMPIRICALLY DESIGNED MASONRY, GLASS UNIT MASONRY AND MASONRY VENEER IN RISK CATEGORY IV.		X	TMS 402 / ACI 530 / ASCE 5 LEVEL B CH. 3	1705.4.1 2109 2110 OR CH. 14		
3. VERTICAL MASONRY FOUNDATION ELEMENTS		X		1705.4 1705.4.2		

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BRCEFNEYRSENCE	CRHEEQCUKIRIEFD	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
D. WOOD CONSTRUCTION				1705.5		
1. WOOD CONSTRUCTION - FABRICATION OF WOOD STRUCTURAL ELEMENTS AND ASSEMBLIES.		X		1705.5, 1704.2.5		
2. HIGH-LOAD DIAPHRAGMS.		X		1705.5 1705.5.1 2306.2 1704.2		
3. METAL-PLATE-CONNECTED WOOD TRUSSES SPANNING 60 FEET OR GREATER (TEMP. AND PERMANENT INSTALLATIONS)		X		1705.5.2		
E. SOILS				1705.6		
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY		X		1705.6 TABLE 1705.6	**X**	312323.13
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL		X		1705.6	**X**	312323.13
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL		X		1705.6	**X**	312323.13

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSENCE**	**CRHEEQCUKIRIEFD**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
MATERIALS						
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL	X			1705.6		
5. PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.		X		1705.6		
F. DRIVEN DEEP FOUNDATIONS				1705.7		
1. VERIFY ELEMENT MATERIALS, SIZES AND LENGTHS COMPLY WITH THE REQUIREMENTS	X			1705.7 TABLE 1705.7		
2. DETERMINE CAPACITIES OF TEST ELEMENTS AND CONDUCT ADDITIONAL LOAD TESTS, AS REQUIRED.	X			1705.7 TABLE 1705.7		
3. INSPECT DRIVING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT.	X			1705.7 TABLE 1705.7		
4. VERIFY PLACEMENT, LOCATIONS, AND PLUMBNESS, CONFIRM TYPE AND SIZE OF	X			1705.7 TABLE 1705.7		

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSENCE**	**CRHEEQCUKIRIEFD**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**
HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENETRATION, DETERMINE REQUIRED PENETRATIONS TO ACHIEVE DESIGN CAPACITY, RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY DAMAGE TO FOUNDATION ELEMENT.						
5. FOR STEEL ELEMENTS, PERFORM ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.2.	X			1705.7 TABLE 1705.7		
6. FOR CONCRETE ELEMENTS AND CONCRETE-FILLED ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3.	X			1705.7 TABLE 1705.7		
7. FOR SPECIALTY ELEMENTS, PERFORM ADDITIONAL INSPECTIONS AS DETERMINED BY THE REGISTERED DESIGN PROFESSIONAL RESPONSIBLE IN CHARGE	X			1705.7 TABLE 1705.7		

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BRCEFNEYRSENCE	CRHEEQCUKIRIEFD	IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY
G. CAST-IN-PLACE DEEP FOUNDATIONS				1705.8		
1. INSPECT DRILLING OPERATIONS AND MAINTAIN COMPLETE AND ACCURATE RECORDS FOR EACH ELEMENT	X			1705.8 TABLE 1705.8		
2. VERIFY PLACEMENT LOCATIONS AND PLUMBNESS, CONFIRM ELEMENT DIAMETERS, BELL DIAMETERS (IF APPLICABLE), LENGTHS, EMBEDMENT INTO BEDROCK (IF APPLICABLE) AND ADEQUATE END BEARING STRATA CAPACITY. RECORD CONCRETE OR GROUT VOLUMES.				1705.8 TABLE 1705.8		
3. FOR CONCRETE ELEMENTS, PERFORM TESTS AND ADDITIONAL SPECIAL INSPECTIONS IN ACCORDANCE WITH SECTION 1705.3				1705.8 TABLE 1705.8		
H. HELICAL PILE FOUNDATIONS				1705.9		
1. INSTALLATION AND LOAD TESTS (IF APPLICABLE)				1705.9	**X**	316615
I. FABRICATED ITEMS		X		1705.10 1704.2.5		

J. WIND RESISTANCE				1705.11		
1. APPLICABLE IN EXPOSURE CATEGORY B WITH A BASIC WIND SPEED OF 120 MPH AND EXPOSURE CATEGORIES C OR D WITH BASIC WIND SPEED OF 110 MPH OR GREATER.		X		1705.11	**X**	
1A. STRUCTURAL WOOD - FIELD GLUING OPERATION OF ELEMENTS OF MAIN WIND FORCE-RESISTING SYSTEM (MWRS).	X			1705.11.1		
1B. STRUCTURAL WOOD - NAILING, BOLTING, ANCHORING, AND FASTENING ELEMENTS OF THE MWRS.		X		1705.11.1	**X**	061000
2A. COLD FORMED		X		1705.11.2		

STEEL - WELDING OPERATIONS OF ELEMENTS OF MWRS.						
2B. COLD FORMED STEEL - SCREW ATTACHMENTS, BOLTING, ANCHORING, AND FASTENING OF ELEMENTS OF MWRS.		X		1705.11.2		
3. WIND-RESISTING COMPONENTS - ROOF COVERING, ROOF DECK, AND ROOF FRAMING CONNECTIONS. EXTERIOR WALL COVERING AND WALL CONNECTIONS TO ROOF AND FLOOR DIAPHRAGMS AND FRAMING.		X		1705.11 1705.11.3	**X**	061 000 073 113
K. SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE: APPLICABLE TO SPECIFIC				1705.12		

STRUCTURES, SYSTEMS, AND COMPONENTS.						
1. STRUCTURAL STEEL - SEISMIC FORCE-RESISTING SYSTEMS & ELEMENTS.	X		AISC 341 CHAPTER J	1705.12.1.1 OR 1705.12.1.2		
2A. STRUCTURAL WOOD - FIELD GLUING OPERATION OF ELEMENTS OF SEISMIC FORCE-RESISTING SYSTEM (SFRS).	X			1705.12.2		
2B. STRUCTURAL WOOD - NAILING, BOLTING, ANCHORING, AND FASTENING OF ELEMENTS OF SFRS.		X		1705.12.2		
3. COLD-FORMED STEEL FRAMING - WELDING AND FASTENERS.		X		1705.12.3		
4. DESIGNATE		X	ASCE 7	1705.12.4		

D SEISMIC SYSTEMS - VERIFY THAT LABEL, ANCHORAGE, AND MOUNTING CONFORMS TO THE CERTIFICATE OF COMPLIANCE.			SECTION 13.2.2			
5. ARCHITECTURAL COMPONENTS.		X		1705.12.5		
6. PLUMBING, MECHANICAL AND ELECTRICAL COMPONENTS.		X		1705.12.6		
7. STORAGE RACKS AND ACCESS FLOORS		X		1705.12.7		
8. SEISMIC ISOLATION SYSTEMS.		X		1705.12.8		
9. COLD-FORMED STEEL SPECIAL BOLTED MOMENT FRAMES.		X		1705.12.9		
L. STRUCTURAL TESTING FOR SEISMIC RESISTANCE: APPLICABLE				1705.13		

TO SPECIFIC STRUCTURES, SYSTEMS, AND COMPONENTS.						
1. STRUCTURAL STEEL.	X	X	AISC 341 CHAPTER J	1705.13.1		
2. NONSTRUCTURAL COMPONENTS.		X	ASCE 7 SECTION 13.2.1	1705.13.2		
3. DESIGNATED SEISMIC SYSTEMS.		X	ASCE 7 SECTION 13.2.2	1795.13.3		
4. SEISMIC ISOLATION SYSTEMS		X	ASCE 7 SECTION 17.8	1705.13.4		
M. SPRAYED FIRE-RESISTANT MATERIALS [BF]				1705.14		
1. PHYSICAL AND VISUAL TESTS. APPLICABLE TO SPECIFIC STRUCTURES.		X		1705.14.1		
2. STRUCTURAL MEMBER SURFACE CONDITIONS		X		1705.14.2		
3. APPLICATIO		X		1705.14.3		

N.						
4. THICKNESS.		X	ASTM E 605	1705.14.4		
5. DENSITY.		X	ASTM E 605	1705.14.5		
6. BOND STRENGTH.		X	ASTM E 736	1705.14.6		
N. MASTIC AND INTUMESCENT FIRE-RESISTANT COATINGS [BF].		X	AWCI 12-B	1705.15		
O. EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS).		X	ASTM E 2570	1705.16		
P. FIRE-RESISTANT PENETRATIONS AND JOINTS [BF] HIGH RISE BUILDING OR BUILDINGS ASSIGNED TO RISK CATEGORY III OR IV.		X	ASTM E 2174 ASTM E 2393	1705.17		
Q. TESTING FOR SMOKE CONTROL [F]		X		1705.18		

INSPECTION AND TESTING (CONTINUOUS & PERIODIC IS AS DEFINED BY THE BC NYS)	**CONTINUOUS**	**PERIODIC**	**REFERENCE STANDARD**	**BRCEFNEYRSSENCE**	**CRHEEQCUKIRIEF**	**IDENTIFY SPEC SECTION AND PROVIDE CLARIFYING NOTES IF NECESSARY**

												D	

END OF SECTION

SECTION 014550 - ENVIRONMENTAL PROTECTION **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Control of environmental pollution and damage that the Contractor must consider for air, water, and land resources in preparing a bid and while constructing the project. This Section includes management of site aesthetics, noise, solid and liquid waste and wastewater, and other pollutants that may be generated by the Contractor.

B. Include all costs associated with environmental protection as specified herein and as specified in other Sections of these specifications in the total price bid.

1.02 DEFINITIONS

A. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Impact wetlands,
4. Effect other species of importance to man, or;
5. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

B. Definitions of Pollutants:

1. Sediment: Soil and other debris that has been eroded and transported by runoff water.
2. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
3. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
4. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
5. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, organic chemicals, and inorganic wastes.

C. Sanitary Wastes:

1. Sewage: Domestic sanitary sewage and human and animal waste.
2. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this Contract. Confine activities to areas defined by the Contract Documents.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Engineer/Architect. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

C. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this Contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.

D. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.

1. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
2. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.

E. Contractor to submit an Excavation Work Plan in accordance with BNYDC standards.

F. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct work to minimize the duration of exposure of unprotected soils. Excavate areas in reasonably sized increments only as needed to use.

1. Manage and control excess material to limit spoil to areas immediately adjacent to excavation and prevent erosion of soil or sediment from entering nearby property, watercourses, drainage facilities or streets.

G. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this Contract.

H. Control movement of materials and equipment during construction to prevent violation of water pollution control standards of the Federal, State, or local government.

I. Monitor water areas affected by construction.

J. Protection of Fish and Wildlife Resources:

1. Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife.

K. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources.

1. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State and Federal emission and performance laws and standards.

2. Maintain ambient air quality standards set by the Environmental Protection Agency and State, for those construction operations and activities specified.

L. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.

M. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinkle, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.

N. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.

O. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

P. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Engineer/Architect. Maintain noise-produced work at or below the decibel levels and within the time periods specified in accordance with OSHA and local ordinances, whichever is more restrictive.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 4:30 p.m. unless otherwise permitted by local ordinance or by the Engineer/Architect.
2. Reduce repetitive impact noise on the property.
3. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this Contract, consisting of, but not limited to, the following:
4. Use shields or other physical barriers to restrict noise transmission.

END OF SECTION 014550

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section supplements the General Conditions.

B. The Work of this Section includes temporary facilities, utilities, and controls to be furnished by the Contractors for this project as it is specified herein.

C. This Section is made a part of all Construction Contracts associated with the project. It contains specific references to the particular Contractor supplying said product or service. If no reference is provided then the requirement applies to all Prime Construction Contractors.

1.02 CARE AND PLACEMENT

A. All temporary and permanent facilities and controls and all other elements on the project site shall meet all standards of the Occupational Safety and Health Act of 1970 and subsequent revisions. Each Contractor shall comply with all requirements of the Act.

B. Contractor shall take every precaution and shall provide such equipment and facilities as are necessary or required for the safety of its employees and persons at the site.

C. In the event of damage to existing and/or temporary facilities then immediately make all repairs and replacements to an equal condition prior to the event.

1.03 QUALITY PERFORMANCE

A. Comply with and perform all work in accordance with the requirements of local authorities and utility companies having jurisdiction, and all applicable codes, regulations and ordinances.

B. Secure approvals from the appropriate jurisdictions and utility companies on all repairs, relocations, connections, disconnections and the Work.

C. All barricades, warning signs, lights, temporary signals and other protective devices shall conform with “Manual on Uniform Traffic Control Devices for Streets and Highways”, US Government Printing Office.

1.04 SUBMITTALS

A. Contractor shall provide a list of contact numbers as follows:

1. Contractor’s superintendent and office project manager (home, cellular, office, fax, trailer, and email address).
2. All subcontractors.
3. All utility companies.
4. Emergency services such as fire department, police, and ambulance.
5. Each Contractor shall also submit the following:
6. Name and qualifications of person or persons who shall be available to render first aid.
7. Names, addresses and telephone numbers of personnel who can be telephoned and act on behalf of Contractor in the event of emergencies or other problems requiring prompt attention during winter shutdown, holidays, nights and other periods when the Contractor’s superintendent may be absent from the project site.

B. The Contractor shall provide a sketch showing routing of temporary water service for construction purposes and for exfiltration tank testing. Provide cuts and plumber's certification for backflow device(s).

1.05 CONTRACTOR'S RESPONSIBILITY

A. Each Contractor shall be responsible for the installation, performance, maintenance, and repair of all temporary facilities and controls specified herein this Section as originally provided.

B. The Owner reserves the right to immediately correct a Contractor caused action, if in the opinion of the Owner, the situation may result in the immediate loss of life, property, and degradation of the environment. The costs for actions taken by the Owner shall be deducted from money due or to become due the Contractor. Amounts in excess shall be paid by the Contractor.

C. If the Contractor caused situation is not deemed immediate, then the Contractor shall, within 24 hours of receipt of written and/or verbal notice, correct the defect or unsatisfactory condition.

D. The Owner may repair, correct, replace, or install temporary facilities to correct the situation if the Contractor fails to perform within the allowed time. The costs to make the corrections shall be deducted from money due or to become due the Contractor. Amounts in excess shall be paid by the Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

A. The Owner may use temporary power lines, pipes, roadways or other facilities that each Contractor furnishes, installs, and maintains (then removes at the completion of the work), during the period of construction.

B. The location of all temporary power lines, roadways, and other necessary temporary facilities shall be subject to the approval of the Engineer, and these shall be located and operated so as not to interfere with the operation of the facilities.

2.02 WATER FOR CONSTRUCTION PURPOSES

A. Contractor shall obtain water from the nearest potable water source as designated by the Owner.

B. The Owner will pay for water usage for general construction activities such as dust control and for sanitary purposes, like hand washing.

C. Potable water, used for pipe exfiltration testing, process tank testing, storage tank testing, or elevated water storage tank testing, will not be paid for by the Owner. The Contractor shall include the costs for water for this purpose in the price as-bid.

D. Contractor shall install his or her own backflow prevention device at the supply point where it is connected to the Owner's system.

1. The water purveyor shall approve the device.
2. The device shall be tested and certified as functioning properly.
3. Post the certification in a location acceptable to the water purveyor.

E. A water meter shall also be installed on any water service lines used to supply water for exfiltration testing.

F. Contractor shall exercise measures to conserve water.

G. Provide insulation and heat tracing to prevent freezing of temporary piping. Drain hoses at the end of each use.

H. All Contractors, subcontractors, and personnel involved in the project shall be permitted to use water for construction purposes as provided under this paragraph.

2.03 SANITARY FACILITIES

A. Contractor shall provide and maintain temporary toilet facilities for use by all contractors.

B. These facilities shall be maintained in a strictly sanitary manner and be screened from the general public.

C. All facilities shall be in accordance with the Occupational Safety and Health Act (OSHA) standards and all other applicable local codes.

D. All applicable codes and regulations regarding the maintenance and method of waste disposal for these facilities will be strictly enforced. These facilities shall be of the portable type.

E. The Owners sanitary facility will not be available for use by any contractor.

F. Comply with the requirements also contained in Section 015719 - Environmental Protection.

G. Contractor shall provide and pay for heating devices and fuel as required to maintain adequate heat for specific construction operations; i.e. painting, application of coatings, etc., where so specified elsewhere in these specifications.

2.04 VENTILATION

A. Contractor shall ventilate enclosed areas to assist in the curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors or gases.

B. The Contractor shall ventilate buildings to safely apply paint in accordance with Section 099100 requirements.

2.05 BARRIERS AND PROTECTION

A. Contractor shall provide railings, barricades, signs, fences, posting of acquired permites, HASP (Health and safety plan), and other protective devices to prevent unauthorized entry to construction areas, to allow for the Owner's safe use of the site and to protect existing facilities and adjacent structures from damage from the work.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing buildings.

C. Provide protection for plant life designated to remain.

D. Protect vehicular traffic, stored materials, public utilities, site and structures from damage.

E. Provide warning signs, detour signs and other traffic control devices to insure the safety of plant operators and to adequately direct traffic around the work. Illuminate barricades, obstructions, and warning signs from sunset to sunrise.

2.06 TEMPORARY FENCING

A. The Contractor is responsible for performance compliance with OSHA standards.

B. Contractor shall provide temporary safety fence around all open excavations or other dangerous conditions on the construction site.

1. All temporary safety fencing shall be designed and erected in compliance with OSHA standards, but in no case less stringent than these specifications for fencing.
2. Fence is to be bright orange in color, a minimum of 4 feet high, and properly secured using 1” diameter steel pipe at 4’-0” on-center as support posts.
3. Stake each support post to a depth of 18” and tamp securely into place.
4. Each post shall be plumb.
5. Secure fencing to posts using heavy-duty 12” long cable ties or tie wire.
6. The fence and supports shall remain the property of the Contractor and be promptly removed at the appropriate time.
7. Post the following sign every 100-ft. along the perimeter of the fence: “RESTRICTED AREA KEEP OUT”.
    a. Each sign shall be commercially printed and be 18” x 36”.
    b. It shall be secured to the fence with heavy-duty tie wraps.

2.07 TEMPORARY HANDRAILS AND SCAFFOLDS

A. All temporary handrailing and scaffolds shall be designed and erected in compliance with OSHA standards. Contractor is responsible for performance compliance with OSHA standards.

B. Handrails shall be securely installed and maintained in accordance with OSHA regulations until the permanent railing or grating has been permanently installed and approved by the Engineer.

C. All scaffolding and platforms shall be erected in a safe and substantial manner complying with OSHA requirements.

D. All temporary handrails and scaffolds shall be designed by a professional engineer licensed in the state where the project is being constructed.

1. The design drawings and details shall be stamped by the licensed engineer and submitted for record purposes.
2. The Contractor’s design engineer shall visit the site to certify that the handrailing and/or scaffolds have been erected pursuant to the stamped design.

E. The Contractor shall protect all openings in building/structures of any type such as shafts, deck openings, and other building related chases.

F. The Contractor shall also install two (2) separate temporary handrailing installations at two (2) separate stages of the construction for all structures where OSHA requires handrailing is to be provided.

1. OSHA approved wooden railing shall be installed at the point where the deck platform formwork is proceeding and before reinforcement steel is placed.

a. Railing shall be installed using the bridge brackets used to construct the cantilevered platforms or other method as selected by the Contractor in compliance with OSHA.
b. Coordinate and advise the Prime Electrical Contractor of the date when the handrailing will be in place so that embedded conduit can be installed.

2. The second installation of railing shall be fabricated of steel structural members with aircraft cable and turnbuckles installed immediately after the deck platform is constructed and the formwork is removed.

2.08 EROSION CONTROL

A. Contractor shall provide measures to keep the ground surface well drained, but avoid erosion of embankments, excavations, the project site, and adjacent areas.

B. Contractor shall comply with all local codes, rules, and regulations concerning soil erosion.

1. Use hay bales or silt fences to control erosion to the satisfaction of the Engineer and regulatory agencies. Use hay bales or silt fences to stop silt and sediment from reaching surface waters, parking lots and roads.
2. Leave erosion control methods in place until ground cover is established or until date of substantial completion.

C. The Contractor shall install erosion control measures as shown on the Drawings.

2.09 DUST CONTROL

A. Contractor shall provide measures to control dust resulting from the work.

B. Control dust at locations and in such quantities and frequencies as required to prevent dust from becoming a nuisance to the surrounding area.

C. In the event the Contractor does not adequately provide for dust control, or should insufficient quantities of dust control agents be placed and Contractor fails to place additional quantities within 4 hours after Engineer's direction, Owner will perform the required work by whatever means deemed expedient and all expenses incurred by Owner will be charged to and paid by Contractor.

D. Take care in selecting and applying dust control agents so as not to make roadways or walkways slippery, muddy or hazardous. Dust control agents shall be acceptable to the Engineer.

E. The Contractor shall provide all roadways with dust control.

2.10 RUBBISH REMOVAL

A. The Contractor shall be responsible for overall rubbish removal.

B. Burning of rubbish and trash will not be permitted.

C. The Contractor shall clean up trash as specified in Section 011400 - Work Restrictions or more often if the trash interferes with the work of others, presents a hazard or if directed by the Engineer.

D. Dispose of rubbish and waste materials in accordance with state regulations and local ordinances.

E. The Contractor shall also place rubbish containers at locations selected by the Engineer.

1. Furnish adequately sized rubbish containers from the date of initial mobilization to the date of final payment.
2. As a minimum, the Contractor shall furnish ten (10) 55-gallon general trash containers. Secure the top of each container to the container.
3. Secure the container itself so that it does not get blown about the site.

F. The Contractor shall be responsible for maintaining the site free of trash.

G. Contractor is responsible in maintaining the site free of trash and debris.

1. It shall be the sole responsibility of the Contractor to prevent trash from being blown about the site.
2. Provide a worker to police the site at least for 1 hour at the end of each day that work is being undertaken by the Contractor.

2.11 SNOW REMOVAL

A. The Contractor shall be responsible for maintaining roads, walkways, sidewalks, and parking areas/lots free of snow. Provide snow plowing during and after each snow fall equal to or greater than 1.0 inch as reported by the local weather service.

B. Any damage resulting from the Contractor's snow clearing operations shall be immediately repaired at no additional cost to the Owner.

2.12 ENCLOSURES

A. Contractor shall provide and maintain temporary enclosures, sheds, or fenced-in areas to accommodate protection for products, material and equipment.

B. Store equipment that cannot be exposed to outdoors in accordance with Section 016500 - Product Delivery, Storage and Handling.

2.13 SECURITY

A. Contractor shall provide security and facilities to protect work from unauthorized entry, vandalism and theft.

B. Coordinate with Owner's security program, if applicable.

C. Contractor has full responsibility for the working area until final acceptance and payment.

D. The Contractor shall maintain the perimeter fence that pre-existed prior to the start of construction. A temporary perimeter fence shall be required at all times during the construction and until the new perimeter fence is installed, or until the project is accepted by the Owner.

E. It shall be the Contractor's responsibility to lock all gates to the site, and on the access road, at the end of each work day.

F. All on-site employees shall bear, at all times, an identification badge, conspicuously worn, which shall include, at a minimum, a passport or similar size photograph, the name of the employee and the name of the company.

G. Any employee working on site without a photo identification badge will be instructed to leave the site.

H. All company vehicles shall be conspicuously identified, through sufficiently sized lettering on both the passenger and driver sides, with the company name, address and telephone number.
   1. All employee owned vehicles shall have an 8-1/2 inch by 11 inch sign with the company name, address and telephone number placed on the dashboard on the driver side.
   2. Vehicles may be subject to search by the Owner or owner's representatives.
   3. Any vehicle that does not have the company name, address and telephone number will not be permitted on the Owners' property.

I. Submit to the Owner a complete listing of all employees that will or might be performing work at the project site.
   1. Furthermore, provide sufficient information as may be required for the Owner to conduct background checks, in accordance with the Fair Credit Reporting Act.
   2. Background checks may be performed at the discretion of the Owner due to the sensitive nature of the work and the extensive, and sometimes unsupervised, access to Owner property and buildings.
   3. The Contractor shall be required, on request from the Owner, at any time prior to or during the work, to provide releases from its employees and officers to the Owner, H2M, and a background search firm, hired by either the Owner or H2M, to conduct background checks in accordance with the Fair Credit Reporting Act and applicable state law.

2.14 PARKING

A. Do not allow heavy construction vehicle parking on existing pavement, if existing pavement is not scheduled for replacement or restoration.

B. Provide and maintain access to fire hydrants, building entrances, process tanks, doors and the work in general.

C. Contractor shall have his or her employees and subcontractors park in areas designated by the Owner/Engineer/Architect.

D. If designated on the Contract Drawings, then only use those areas for parking.

E. Where trades work from their trucks, then coordinate the parking of trucks with other prime contractors.

F. If a Site Utilization Plan has been specified, then parking shall be as sited in the plan.

G. Since the site is limited in space, special transportation may have to be furnished by the respective Contractor to have their employees bused to the site from off-site parking.

2.15 DAMAGES

A. Contractor, with the prior approval of the Owner/Engineer/Architect, shall promptly repair any damage, directly or indirectly caused by the Contractor's operations.

B. All repairs shall be to the complete satisfaction of the Owner and equal in quality to that which pre-existed.

2.16 FIRST AID FACILITIES & EMERGENCY TELEPHONE NUMBERS

A. Each Contractor shall provide and maintain adequately equipped first aid facilities in a location or at locations that are readily accessible to workmen, Engineer and visitors to the site.

B. Provide at least one on-site employee who is properly trained in first aid and who shall be available to render first aid whenever construction is in progress.

C. Provide a list of emergency telephone numbers as specified above.

D. Post the list of emergency telephone numbers as directed by the Engineer.

2.17 POLLUTION CONTROL

A. Do not permit pollutants, such as chemicals, fuels, lubricants, calcium chloride, sewage, water containing sediments and other deleterious, poisonous, toxic or oxygen demanding substances to enter or leach into streams, lakes, wetlands, other surface waters, into groundwater, or into the air.

B. In waters used for public water supply or used for trout, salmon or other game or forage fish spawning or nursery, control measures must be adequate to assure that turbidity in the receiving water will be increased not more than 10 standard turbidity units (s.t.u.) in the absence of other more restrictive locally established limitations, unless otherwise permitted by the State.

C. In no case shall the classification for the surface water be violated, unless otherwise permitted by the State.

D. In water used for other purposes, the turbidity shall not exceed State limits.

PART 3 - EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES AND PUBLIC WORKS

A. Maintain and protect existing utilities and public works including, but not limited to, conduits, sewers, water mains, electric and telephone conductors or conduits, and gas mains encountered during the construction.

B. In the event that it is not possible to cross over, under, around or otherwise avoid the existing utility, the owner of the utility shall be notified that the utility must be altered or moved.

C. In the event that damage shall result to any service pipe for water or gas, or any private or public sewer or conduit, the Contractor shall immediately, and at its own expense, repair same to the satisfaction of the Engineer/Architect.

D. Any contents from the pipes, sewers or conduits shall be immediately removed and disposed in accordance with applicable laws.

3.02 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities and materials, immediately following substantial completion and prior to release of retainage.

B. Remove underground installations to a minimum depth of 2 feet.

C. Regrade site to restore to existing slope and elevation, and restore the surface.

D. Clean and repair damage caused by installation or use of temporary work.

E. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

F. Remove temporary parking and access roads.

G. Regrade area to existing slope and elevation and restore the surface to its existing condition.

H. Final payment will not be processed until all removals have been completed to the satisfaction of the Owner/Engineer/Architect.

3.03 PROTECTION OF EXISTING PROPERTY

A. Protect existing structures and finishes during performance of the work.

B. Protect existing trees and plants during performance of the work.

C. Do not deposit excavated materials or store materials around trees or plants or attach guy wires to trees.

END OF SECTION 015000

SECTION 015210 - OWNER'S AND CONSTRUCTION MANAGER'S FIELD OFFICE **H2M**

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:

1. This Section includes requirements for CONTRACTOR-provided field office, with furnishings, equipment, and consumables, for use by Owner and Construction Manager.
2. Contractor shall provide and maintain field office for Construction Manager's sole use. Provide field office at location shown on the Drawings and as approved by Construction Manager, in reasonable proximity to Contractor's field office.
3. Field office shall be complete and fully functional within 30 days after date on which the Contract Times commence running.
4. Obtain required permits for field offices.

1.02 SUBMITTALS

A. Action Submittals: Obtain approval of the following prior to staging field office to the Site:

1. Field Office Submittal: Submit all of the following as one submittal which shall include:
   a. Site plan indicating proposed location of field office, parking for field office, facilities related to the field office, and material of both field office parking and sidewalk or walkway to field office.
   b. Information on proposed field office size, construction, exterior appearance, interior finishes, and field office security measures.
   c. Proposed layout of field office exterior identifying sign, showing all text, font, colors, and graphics (if any).
   d. Proposed type of Internet service; name of proposed Internet service provider; and product data and technical information on equipment (if any) required for Internet service.
   e. Office Equipment: Product data and technical
2. Health and Safety Plan (HASP)
   a. Must be submitted by contractor. Shall include a dust control plan and waste management plan.

PART 2 – PRODUCTS

2.01 FIELD OFFICE CONSTRUCTION AND SITE REQUIREMENTS

A. Field Office, Minimum Construction: Field office shall comply with the following:

1. Structurally sound foundation and superstructure.
2. Size: Floor area of not less than 672 square feet. Provide "single-wide" trailer approximately 12 feet wide by 60 feet in length or equal adjacent office.
3. Completely weather-tight and insulated, with insulation.
4. Exterior finish to be submitted and approved in advance of mobilization.
5. New interior finishes approved, including resilient floor covering in first-class condition.
6. Field Office Ingress and Egress:
   a. Two doors for ingress and egress for each field office unit, each with landing, stairs, and railing conforming to building codes in effect at the Site. A handicap accessible ramp shall be provided for access at one of the doors as approved.
   b. Landing and stairs shall have slip-resistant walking surfaces, and be metal, fiberglass, or concrete.

c. Railing shall be metal or fiberglass.
d. Door Security:
    1) Doors shall be secure and lockable.
    2) Furnish each door with suitable, lockable security bar. Security bar shall be Master Lock 265DCCSEN Dual-Function Security Bar, or equal.
        (a) Windows:
            (1) Window area equal to not less than ten percent of floor area.
            (2) Windows shall each have insect screen and operable sash.
            (3) Provide each window with lock and exterior security bars approved by Construction Manager.
            (4) One lockable closet for storage.
            (5) Keys:
            (6) Furnish four identical sets of keys suitable for operating all keyed locks, including ingress/egress door locks, security bars for doors, window locks, closets, and office furnishings.
            (7) Permanently label each key to indicate its associated lock.
            (8) Exterior Sign:
            (9) Field office identifying exterior sign, approved by Construction Manager. Sign shall be durable, weatherproof, suitable for long-term exposure to sunlight
        (b) Field Office Optional Construction:
            (1) Provide mobile office trailer in first-class condition approved by Construction Manager, specifically designed for use as construction field office and complying with requirements of this Section.
            (2) Provide skirting around perimeter of each mobile field office trailer.
            (3) Supplier: Provide field office by one of the following:
            (4) Pac-Van, Inc.
            (5) Modular Space Corporation (ModSpace).
            (6) Williams Scotsman, Inc.
            (7) Or equal.

7. FIELD OFFICE UTILITIES
    a. Comply with Section 015000, Temporary Construction Facilities and Controls.
    b. Provide the following for the field office:
        1) Electrical System and Lighting:
            (a) Electric service as required, including paying all costs.
            (b) Interior lighting of not less than 50 foot-candles at desktop height.
            (c) Minimum of eight 120-volt, wall-mounted, duplex convenience electrical receptacles.
            (d) Exterior, wall-mounted lighting at each entrance to field office, not less than 250 watts each.
            (1) Heating, Ventilating, and Air Conditioning System:
            (2) Provide automatic heating to maintain indoor temperature in field office of not less than 65 degrees F in cold weather. Furnish all fuel and pay all utility costs.
            (3) Automatic cooling to maintain indoor temperature in field office of not warmer than 75 degrees F in warm weather.
            (4) Internet Access:
            (5) Obtain and pay for Internet service until removal of the field office, with unlimited (untimed) Internet access, for Construction Manager's use.

(6) Set up system and appurtenances required and verify functionality in the field office.
(7) Internet service shall be one of the following, listed in order of preference; provide a lower type of access only when the next-higher level is unavailable:
(8) Fiber-optic or Cable Provider Service:
(9) Provide service via communication service provider via either cable or fiber-optic service at download speed of not less than 15 megabytes per second (Mbps) and upload speed of not less than 1 Mbps.
(10) Provide appropriate modem, cabling, and appurtenances.
(11) DSL:
(12) Provide service via symmetrical digital subscriber line with download speed of not less than 1.5 Mbps and upload speed of not less than 384 kilobits per second (Kbps).
(13) Provide dedicated telephone line for Internet access.
(14) Provide DSL filters on each non-DSL outlet in the field office telephone system.
(15) Mobile Broadband Wireless:
(16) Provide mobile broadband wireless 4G network by AT&T, Verizon, Sprint, T-Mobile, or equal, with download speed of not less than 37 Mbps and upload speed of not less than 17 Mbps.
(17) Provide mobile broadband wireless router. Product and Manufacturer: Linksys Wireless-G Router for Mobile Broadband, or equal.
(18) Mobile broadband air-card for field office. Product and Manufacturer: Sierra Wireless 597E, Novatel Merlin EX720, or equal.
(19) Router and air-card will remain CONTRACTOR's property upon removal of field office from the Site.
(20) Satellite:
(21) Provide 4G network service with download speed of not less than 12 Mbps.
(22) Provide required equipment, including outdoor unit (dish) and indoor satellite modem equipment, together with required cabling provided.
(23) Provide telephone modem in computer, together with telephone line and service, for file uploading.

(e) Should actions of utility companies delay the complete set up of field office, Contractor shall provide temporary electricity, heat, water supply, sanitary facilities, and telephone service as required at no additional cost to Construction Manager.

8. FURNISHINGS AND EQUIPMENT
   a. Provide the following furnishings and equipment:
      1) Desks: minimum of three - 3-drawer desks for the trailer interior. Each desk shall be five feet long by 2.5 feet wide with not less than one file drawer per desk, suitable for storing 8.5-inch by 11-inch documents.
      2) Desk Chairs: One new or used (in good condition) five-point, high backed, cushioned swivel chair with seat-height adjustment, for each office area/work space indicated on the field office layout plan.
      3) Other Chairs: Four side chairs with arm rests and padded seats and backs, and eight metal folding chairs without arm rests.
      4) Provide adequate shelving in each office and in the common area.

5) Four new or used (in good condition) folding tables each eight feet long by 2.5 feet wide.
6) Two new or used (in good condition) folding tables each four feet long by 2.5 feet wide.
7) Conference Table: One conference table equipped with 6 chairs and suitable to accommodate 6 people.
8) Plan rack(s) and plan sticks to hold not less than eight sets of the Drawings.
9) Two 4-drawer file cabinets.
10) Two 2-door storage cabinet.
11) Polyethylene waste baskets, each with capacity of not less than seven gallons. Furnish one in each office/work space indicated on the field office layout plan; one for the common area; and one for the restroom.
12) Suitable doormat at each exterior ingress/egress door.
13) Cork tack-board, 2.5 feet by three feet, with thumbtacks. Provide one for each office/work space shown on the field office layout plan and one in the common area.
14) One white board for use with dry markers, approximately six feet by four feet, with marker holding tray, installed by CONTRACTOR at location directed by Construction Manager in the field. Furnish supply of colored markers and eraser for the white board.
15) Safety Equipment: Provide the following:
    (a) Fire extinguishers with associated signage.
    (b) Smoke detectors with supply of batteries.
    (c) Carbon monoxide detector with power supply.
    (d) Provide in accordance with Laws and Regulations. For each field office structure, provide not less than two wall-mounted fire extinguishers, three battery operated ceiling-mounted smoke detector, and one carbon monoxide detector, each suitably located and installed in accordance with manufacturer's instructions.
        (1) First-Aid Kit:
        (2) In addition to first-aid stations otherwise required by the Contract Documents, provide for Construction Manager's sole use a first-aid kit in Construction Manager's field office.
        (3) Product and Manufacturer: Zee Medical Service Co., Item 0152, "Medium Four-Shelf Plastic Cabinet", www.zeemedical.com; or equal.
        (4) Temperature and Humidity Monitor:
        (5) Sensor installed outdoors in shade, display installed inside field office. Unit shall display daily minimum and maximum temperature and current temperature, and be capable of displaying daily minimum and maximum relative humidity and current relative humidity, and have audible alarm and adjustable alarm setpoints.
        (6) Manufacturer and Product: Provide Fisher Scientific "Traceable Remote Alarm RH/Temperature Monitor" Catalog No. 14-649-84; or equal.
        (7) Provide batteries for unit as required.
        (8) Personal Protective Equipment for Visitors. Furnish the following:
        (9) Hardhats: Eight, each with full brim, of fiberglass or thermoplastic; each with ratchet suspension; white in color.

(10) Safety Glasses: Eight, each with clear lenses, polycarbonate, anti-fog and anti-scratch coating, two pair suitable to fit over personal eyewear.
(11) Reflective Safety Vest: Eight, each of polyester mesh or other material acceptable to Construction Manager, color to be high-visibility orange, with one-inch-wide reflective tape, one-size-fits-all design.
(12) Earplugs: Supply of foam, disposable earplugs. Promptly resupply when stock is depleted.
(13) Two electric clocks.
(14) One electric coffee maker, Keurig (single pod) with water reservoir.
(15) Bottled water with electric cooler dispenser for five-gallon bottles, with cup dispenser.
(16) Printer/Copier/Scanner:
(17) System Description: Provide one laser printer/copier/scanner with color printing capability.
(18) Manufacturer and Model: Provide one of the following:
(19) HP LaserJet Pro M476dw Color Multifunction Printer with sorter or equal.
(20) Sheet Size: Capable of printing 8.5-inch by 11-inch, 8.5-inch by 14-inch, and 11-inch by 17-inch sheets.
(21) Printing Speed: 20 pages per minute (black and white), 18 pages per minute (color).
(22) Scanning: Capable of scanning to PDF and JPG files, selectable by the user.
(23) Toner Cartridges: Provide all cartridges required for full-color printing, and promptly replace cartridges as needed throughout the Project.
(24) Wireless Router:
(25) Provide two wireless routers (one active and one spare) to be configured by Construction Manager.
(26) Router capacity shall be not less than 54 Bbps.
(27) Manufacturer: Router shall be Linksys, or equal.
(28) Multi-function Color Copier:
(29) One new machine with the following functions: photocopying, network printing, scanning to produce PDF and JPG files, and e-mail.
(30) Products and Manufacturers: Provide one of the following:
(31) Xerox WorkCentre 7220.
(32) Konica Minolta Bizhub C224e
(33) Or equal.
(34) Minimum Memory: 2 GB.
(35) Ten-bin sort capacity, 8.5-inch by 11-inch, 8.5-inch by 14-inch, and 11-inch by 17-inch paper capacity, enlarging and reducing capabilities, stream-feed capability, bypass feeder, stapling capability, and double-sided copying capability. Copier shall produce not less than 20 copies per minute.
(36) Provide necessary cables and appurtenances to enable all functions specified in this Section, including scan-and-email and printing from field office computers. Furnish services of manufacturer's representative to set up and service copier.
(37) Dormitory Style Refrigerator
(38) Provide one Dormitory Style Refrigerator 4.0 Cu.Ft.

(39) Products and Manufacturer: Provide one of the following:
(40) Haier or equal
(41) Microwave Oven model OGZ.1104.1100 WATT or equal.
(42) Toaster Oven. Black & Decker or equal.
(43) Plan Table. Construct one 3' x 8' Plan table out of plywood, 2" x 4"s & Masonite. Locate in Common Area of Trailer.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install field office and related facilities in accordance with Laws and Regulations.

B. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.

3.02 CLEANING, MAINTENANCE, AND SUPPLIES

A. Furnish the following maintenance services:

1. Immediately repair malfunctioning, damaged, leaking, or defective field office structure, site improvements, systems, and equipment.
2. Provide computer supplies and pay for maintenance on Contractor-furnished computer system and copier.
3. Promptly provide snow and ice removal for CONSTRUCTION MANAGER' field office, including parking area, walkways, and stairs and landings.
4. Provide daily maintenance and janitorial service of field office and sanitary facilities. Clean field office not less than once per week, sweep or vacuum field office not less than every other day when site conditions are such that dirt or mud are frequently tracked into field office.
5. Waste Disposal:
   a. Properly dispose of trash and waste as needed, not less than twice per week.
   b. Properly handle and dispose of recyclables. Do not dispose of recyclables as trash. Provide Containers strictly for Recyclables.
   c. Dispose of other waste, if any, as required, to avoid creation of nuisances and adverse environmental effects. Properly dispose of electronic waste, when necessary, at proper waste receiving facility.
      1) Strip and wax all floor surfaces in the field office not less than once per year.
         (a) Consumables: Provide the following consumables as needed:
            (1) Toner and ink cartridges for printers and copier, as required.
            (2) Paper supplies for printer and copier. Always maintain in field office not less than one ream of each size of paper for which printer and copier are capable.
            (3) Dry markers in six colors and white board eraser set. Replace markers when exhausted or lost.
            (4) Bottled water suitable for water dispenser and disposable cups.
            (5) Coffee supplies, including coffee, filters, cups, sugar, creamer, and stir-sticks.
            (6) Hand-soap, paper towels, toilet paper, cleansers, and janitorial implements, including broom.
            (7) Batteries for smoke detector and other battery-powered items furnished by Contractor.

(8) Replace fire extinguishers upon expiration.
(9) Not less-often than monthly, inspect first-aid kit and inventory items consumed or used and remove items that are at or near their expiration date. Promptly replace and restock consumed and expired items.

3.03 REMOVAL

A. Remove field office when directed by Construction Manager, prior to inspection for final completion. Upon removal of the field office structure, the field office will be Contractor's responsibility for disposition.

END OF SECTION

SECTION 015213 - Field Offices and Sheds **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary field offices for use by the Contractor, Construciton Manager and Architect/Engineer with furnishings, equipment and consumables.

B. Temporary field offices for use of Contractor.

1.02 SUBMITTALS

A. Action Submittlas: Obtain approval of the following prior to staging field office on the site:

1. Field Office Submittal - Submit all of the following as one submittal which shall include the following:
    a. Site plan indicating proposed location of field office, parking for field office, facilities related to the field office, and material of both field office parking and sidewalk or walkway to field office.
    b. Information on proposed field office size, construction, exterior appearance, interior finishes, and field office security measures.
    c. Proposed type of Internet service; name of proposed Internet service provider; and product data and technical information on equipment (if any) required for Internet service.
    d. Office Equipment: Product data and technical information for copier, telephones, and other office equipment.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

A. Field Minimum Requirements:

1. Structurally sound foundation and superstructure.
2. Size: Floor area of not less than 672 square feet. Provide “single-wide” trailer approximately 12 feet wide by 60 feet in length or equal adjacent office.
3. Completely weather-tight and insulated, with insulation.
4. Exterior finish to be submitted and approved in advance of mobilization.
5. New interior finishes approved, including resilient floor covering in first-class condition.
6. Field Office Ingress and Egress:
    a. Two doors for ingress and egress for each field office unit, each with landing, stairs, and railing conforming to building codes in effect at the Site. A handicap accessible ramp shall be provided for access at one of the doors as approved.
    b. Landing and stairs shall have slip-resistant walking surfaces, and be metal, fiberglass, or concrete.
    c. Railing shall be metal or fiberglass.
    d. Door Security:
        1) Doors shall be secure and lockable.
        2) Furnish each door with suitable, lockable security bar. Security bar shall be Master Lock 265DCCSEN Dual-Function Security Bar, or equal.
7. Windows:
    a. Window area equal to not less than ten percent of floor area.
    b. Windows shall each have insect screen and operable sash.

c. Provide each window with lock and exterior security bars approved by Construction Manager.

8. One loackable closet for storage.
9. Keys:
   a. Furnish four identical sets of keys suitable for operating all keyed locks, including ingress/egress door locks, security bars for doors, window locks, closets, and office furnishings.
   b. Permanently label each key to indicate its associated lock.
10. Field office identifying exterior sign, approved by Construction Manager. Sign shall be durable, weatherproof, suitable for long-term exposure to sunglight.

2.02 FIELD OFFICE UTILITIES

A. Comply with Section 015000 Temporary Facilities and Controls.

B. Provide the following for the field office:

1. Electrical System and Lighting:
   a. Electric service as required, including paying all costs.
   b. Interior lighting of not less than 50 foot-candles at desktop height.
   c. Minimum of eight 120-volt, wall-mounted, duplex convenience electrical receptacles.
   d. Exterior, wall-mounted lighting at each entrance to field office, not less than 250 watts each.
2. Heating, Ventilating, and Air Conditioning System:
   a. Provide automatic heating to maintain indoor temperature in field office of not less than 65 degrees F in cold weather. Furnish all fuel and pay all utility costs.
   b. Automatic cooling to maintain indoor temperature in field office of not warmer than 75 degrees F in warm weather.
3. Internet Access:
   a. Obtain and pay for Internet service until removal of the field office,
   b. Set up system and appurtenances required and verify functionality in the field office.

2.03 CONTRACTOR FURNISHINGS AND EQUIPMENT

A. Provide the following furnishings and equipment:

1. Desks: minimum of three (3) - 3-drawer desks for the trailer interior.
2. Desk Chairs: One new or used (in good condition).
3. Provide adequate shelving in each office and in the common area.
4. Four new or used (in good condition) folding tables each eight feet long by 2.5 feet wide.
5. Conference Table: One conference table equipped with 6 chairs.
6. Plan rack(s) and plan sticks to hold not less than eight sets of the Drawings.
7. Two 4-drawer file cabinets.
8. Two 2-door storage cabinet.
9. Suitable doormat at each exterior ingress/egress door.
10. One white board for use with dry markers, approximately six feet by four feet, with markers and marker holding tray.
11. Safety Equipment: Provide the following:
    a. Fire extinguishers with associated signage.
    b. Smoke detectors with supply of batteries
    c. Carbon monoxide detector with power supply.
    d. Any other items in accordance with Laws and Regulations.
12. First-Aid Kit

PART 3 EXECUTION

3.01 INSTALLATION

END OF SECTION

SECTION 015719 - TEMPORARY ENVIRONMENTAL CONTROLS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Control of environmental pollution and damage that the Contractor must consider for air, water, and land resources in preparing a bid and while constructing the project. This Section includes management of site aesthetics, noise, solid and liquid waste and wastewater, and other pollutants that may be generated by the Contractor.

B. Include all costs associated with environmental protection as specified herein and as specified in other Sections of these specifications in the total price bid.

1.02 DEFINITIONS

A. Environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which:

1. Adversely effect human health or welfare,
2. Unfavorably alter ecological balances of importance to human life,
3. Impact wetlands,
4. Effect other species of importance to man, or;
5. Degrade the utility of the environment for aesthetic, cultural, and historical purposes.

B. Definitions of Pollutants:

1. Sediment: Soil and other debris that has been eroded and transported by runoff water.
2. Solid Waste: Rubbish, debris, garbage, and other discarded solid materials resulting from industrial, commercial, and agricultural operations and from community activities.
3. Rubbish: Combustible and noncombustible wastes such as paper, boxes, glass and crockery, metal and lumber scrap, tin cans, and bones.
4. Debris: Combustible and noncombustible wastes, such as leaves, tree trimmings, ashes, and waste materials resulting from construction or maintenance and repair work.
5. Chemical Waste: Petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, organic chemicals, and inorganic wastes.

C. Sanitary Wastes:

1. Sewage: Domestic sanitary sewage and human and animal waste.
2. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.03 SUBMITTALS

A. Submit the following under provisions of Section 013300:

1. Environmental Protection Plan / Erosion Control Plan: After the Contract is awarded and prior to the commencement of the work, meet with the Engineer to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to details of environmental protection. Not more than twenty (20) days after the meeting, prepare and submit to the Engineer for approval, a written and/or graphic Environmental Protection Plan including, but not limited to, the following:
   a. Methods for protection of features to be preserved within authorized work areas including trees, shrubs, vines, grasses, ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, and archeological and cultural resources.

b. Permits, licenses, and the location of the solid waste disposal area(s).
c. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.

2. Prepare an Erosion Control Plan describing and showing methods for erosion control that shall be employed by the Contractor to protect adjoining wetlands.
3. Prepare a Work Area Plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan shall include measures for marking the limits of use areas. This plan may be incorporated within the Erosion Control Plan.
4. Approval of the Contractor's Environmental Protection Plan / Erosion Control Plan will not relieve the Contractor of responsibility for adequate and continued control of pollutants and other environmental protection measures.
5. Prepare Health and Safety Plan, which once approved shall be displayed on site.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 PROTECTION OF ENVIRONMENTAL RESOURCES

A. Protect environmental resources within the project boundaries and those affected outside the limits of permanent work during the entire period of this Contract. Confine activities to areas defined by the Contract Documents.

B. Protection of Land Resources: Prior to construction, identify all land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, top soil, and land forms without permission from the Engineer. Do not fasten or attach ropes, cables, or guys to trees for anchorage unless specifically authorized, or where special emergency use is permitted.

C. Work Area Limits: Prior to any construction, mark the areas that require work to be performed under this Contract. Mark or fence isolated areas within the general work area that are to be saved and protected. Protect monuments, works of art, and markers before construction operations begin. Convey to all personnel the purpose of marking and protecting all necessary objects.

D. Protection of Landscape: Protect trees, shrubs, vines, grasses, land forms, and other landscape features shown on the drawings to be preserved by marking, fencing, or using any other approved techniques.

1. Box and protect from damage existing trees and shrubs to remain on the construction site.
2. Immediately repair all damage to existing trees and shrubs by trimming, cleaning, and painting with antiseptic tree paint.
3. Do not store building materials or perform construction activities closer to existing trees or shrubs than the farthest extension of their limbs.

E. Reduction of Exposure of Unprotected Erodible Soils: Plan and conduct earthwork to minimize the duration of exposure of unprotected soils. Clear areas in reasonably sized increments only as needed to use. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.
   1. Temporary Protection of Disturbed Areas: Construct diversion ditches and berms to retard and divert runoff from the construction site to protected wetlands areas as defined in the Clean Water Act and federal, state and local regulations.
   2. Erosion and Sedimentation Control Devices:
      a. Construct or install all temporary and permanent erosion and sedimentation control features as shown or specified in the Contract Documents and as required by the Owner pursuant to direction of the regulatory authority.
      b. Maintain temporary erosion and sediment control measures such as berms, dikes, drains, hay bales, erosion control fencing, sedimentation basins, grassing, and mulching, until permanent drainage and erosion control facilities are completed and operative.
   3. Manage borrow areas on and off Owner property to minimize erosion and to prevent sediment from entering nearby property, watercourses and local streets.
   4. Manage and control spoil areas on and off Owner property to limit spoil to areas shown on the Environmental Protection Plan and prevent erosion of soil or sediment from entering nearby property, watercourses or streets.
   5. Protect adjacent areas from degradation by temporary excavations and embankments.

F. Handle and dispose of solid wastes in such a manner that will prevent contamination of the environment.
   1. Place solid wastes (excluding clearing debris) in containers that are emptied on a regular schedule.
   2. Transport all solid waste off Owners' property and dispose of waste in compliance with Federal, State, and local requirements.
   3. Store chemical waste away from the work areas in corrosion resistant containers and dispose of waste in accordance with Federal, State, and local regulations.
   4. Handle discarded materials other than those included in the solid waste category as directed by the Engineer.

G. Protection of Water Resources: Keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters and sewer systems. Implement management techniques to control water pollution by the listed construction activities that are included in this Contract.

H. Washing and Curing Water: Do not allow wastewater directly derived from construction activities to enter water areas. Collect and place wastewater in retention ponds allowing the suspended material to settle, the pollutants to separate, or the water to evaporate.

I. Control movement of materials and equipment during construction to prevent violation of water pollution control standards of the Federal, State, or local government.

J. Monitor water areas affected by construction.

K. Protection of Fish and Wildlife Resources:

1. Keep construction activities under surveillance, management, and control to minimize interference with, disturbance of, or damage to fish and wildlife.
2. Prior to beginning construction operations, list species that require specific attention along with measures for their protection.

L. Protection of Air Resources: Keep construction activities under surveillance, management, and control to minimize pollution of air resources.

1. Burning is not permitted on the job site. Keep activities, equipment, processes, and work operated or performed, in strict accordance with the State and Federal emission and performance laws and standards.
2. Maintain ambient air quality standards set by the Environmental Protection Agency and State, for those construction operations and activities specified.

M. Particulates: Control dust particles, aerosols, and gaseous by-products from all construction activities, processing, and preparation of materials (such as from asphaltic batch plants) at all times, including weekends, holidays, and hours when work is not in progress.

N. Particulates Control: Maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause a hazard or a nuisance. Sprinkle, chemical treatment of an approved type, light bituminous treatment, baghouse, scrubbers, electrostatic precipitators, or other methods are permitted to control particulates in the work area.

O. Hydrocarbons and Carbon Monoxide: Control monoxide emissions from equipment to Federal and State allowable limits.

P. Odors: Control odors of construction activities and prevent obnoxious odors from occurring.

Q. Reduction of Noise: Minimize noise using every action possible. Perform noise-producing work in less sensitive hours of the day or week as directed by the Engineer. Maintain noise-produced work at or below the decibel levels and within the time periods specified in accordance with OSHA and local ordinances, whichever is more restrictive.

1. Perform construction activities involving repetitive, high-level impact noise only between 8:00 a.m. and 5:00 p.m unless otherwise permitted by local ordinance or by the Engineer.
2. Repetitive impact noise on the property shall not exceed the following dB limitations:
3. Provide sound-deadening devices on equipment and take noise abatement measures that are necessary to comply with the requirements of this Contract, consisting of, but not limited to, the following:
    a. Use shields or other physical barriers to restrict noise transmission.
    b. Provide soundproof housings or enclosures for noise-producing machinery.
    c. Use efficient silencers on equipment air intakes.
    d. Use and maintain efficient intake and exhaust mufflers on internal combustion engines.
    e. Line hoppers and storage bins with sound deadening material.
    f. Conduct truck loading, unloading, and hauling operations so that noise is kept to a minimum.

R. Contractor shall have a copy of the approved Health and Safety Plant (HASP) on display within the Construction Field Office.

END OF SECTION 015719

SECTION 016100 - COMMON PRODUCT REQUIREMENTS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes the general requirements for products that are to be furnished, installed, or otherwise incorporated into the project.

1.02 QUALITY ASSURANCE APPLIES TO ALL PRODUCTS

A. In addition to the Contractor's warrantees and guarantees on materials and equipment required under the General Conditions of the Contract and the Technical Specifications contained hereinafter, the Contractor shall also be responsible for all materials, equipment, and products that have or is planned to be incorporated into the work.
   1. The Contractor shall be responsible for the finished work and that it accurately and completely complies with these Contract Documents.
   2. The Contractor shall be responsible for work performed by subcontractors, equipment suppliers, and material vendors.
   3. The Contractor shall be satisfied as to the product's performance before it is ordered for installation. At the Contractor's option, he/she shall have tested each product to determine compliance with these specifications.

B. The Engineer/Architect may check all or any portion of the work and the Contractor shall afford all necessary assistance to the Engineer/Architect in carrying out such checks.
   1. Such checking by the Engineer/Architect shall not relieve the Contractor of any responsibilities for the accuracy or completeness of the work.
   2. Such checking is a courtesy service being provided by the Owner and does not relieve the Contractor of his/her responsibilities under this Construction Contract.

C. Should a dispute arise as to the quality of workmanship, equipment or material performance, then the final decision regarding acceptability with these Contract Documents shall be that of the Owner.

D. At the request of the Engineer/Architect, the Contractor shall promptly provide the services of a competent representative of the manufacturer at the project site, fully equipped and prepared to answer questions, perform tests, make adjustments and to prove compliance with the Contract Documents free of all additional charges. Proof of compliance shall be the responsibility of the Contractor.

1.03 QUALITY ASSURANCE - EQUIPMENT

A. All material furnished shall be new, and guaranteed free from defects in workmanship, installation, and design.

B. Equipment shall be products of manufacturers who produce evidence of their ability to promptly furnish any and all interchangeable replacement parts as may be needed at any time within the expected life of the equipment.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The Owner reserves the right to reject any material or equipment manufacturer who, although he appears to be qualified and meets the technical requirements, does not provide satisfactory evidence indicating adequate and prompt post-installation repair and maintenance service, as required to suit the operational requirements of the Owner.

B. Whenever it is required that the Contractor furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable on the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required.

C. Perform work in full conformity and harmony with the intent to secure the best standard of construction and equipment of the work as a whole or in part.

D. Items of any one type of material or equipment shall be the product of a single manufacturer.

1. For ease of the Owner in maintaining and obtaining service for equipment and for obtaining spare parts from as few places as possible, to the maximum extent possible, use equipment of a single manufacturer.
2. The Engineer/Architect reserves the right to reject any equipment from various manufacturers if suitable equipment can be secured from fewer manufacturers and to require that source of materials be unified to the maximum extent possible.

E. Substitute equipment shall not be fabricated nor installed until after written decision to accept request is received from the Engineer/Architect.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to work under any Section, carefully inspect the work of all other prime trades and verify that all such work is in conformance with the Contract Documents and is complete to the point where the work under that Section may properly commence.

B. Verify that all work can be installed in strict accordance with the drawings and the approved shop drawings. Immediately report discrepancies to Engineer/Architect.

C. Do not proceed with the work under any Section until these conditions are obtained.

3.02 INSTALLATION

A. Furnish and install materials and equipment in accordance with the instructions of the applicable manufacturer, fabricator or processors, except as otherwise provided in the Contract Documents.

B. All work shall be done in a workmanlike manner and set to proper lines and grades. The work shall be square, plumb and/or level as the case may be.

C. Where performance criteria are specified, do all work necessary to attain the required end results.

3.03 FIELD QUALITY CONTROL

A. Neither observations by Engineer/Architect nor inspections, tests or approvals by other persons shall relieve the Contractor from his obligations to perform the work in accordance with the requirements of the Contract Documents.

B. If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any work to specifically be inspected, tested or approved by some public body, the Contractor shall assume full responsibility therefore, pay all costs in connection therewith, and furnish the Engineer/Architect with the required certificates of inspection, testing or approval.

3.04 UNCOVERING WORK

A. Unless otherwise specified or directed by Engineer/Architect, no work shall be covered until it has been observed, tested, photographed, measured, and authorized to be covered by Engineer/Architect.

B. Tie distances to above ground physical structures as reference points to all underground utilities, conduits, pits, manholes, valves, and pipelines shall be obtained by the Contractor prior to covering the work. Immediately comply with the Engineer/Architect's direction to uncover the work if tie distances were not obtained.

C. If any work has been covered with Engineer/Architect's consent and Engineer/Architect considers it necessary or advisable that covered work be observed or tested, the Contractor, at Engineer/Architect's request, shall uncover, expose or otherwise make available for observation, or testing as Engineer/Architect may require, that portion of the work in question, furnishing all necessary labor, material and equipment.

1. If it is found that such work is defective, the Contractor shall bear all the expenses of such uncovering, exposure, observation, and testing of satisfactory reconstruction, including compensation for additional engineering and architectural services and an appropriate deductive change order shall be issued.

3.05 DEFECTIVE WORK

A. The repair, removal, replacement and correction of defective work is a part of this Contract and shall be promptly performed in accordance with the requirements set forth in the General Conditions or other portions of the Contract Documents. All costs in connection with the correction of defective work shall be borne by the Contractor.

B. Products that fail to maintain the performance or other salient requirements of the Contract Documents, shows undue wear, or other deleterious effects during the maintenance period shall be considered defective.

END OF SECTION 016100

SECTION 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section includes the transportation, handling, storage and protection of products that are to be incorporated into the work.

B. The procedures for turning equipment over to the Owner for installation by others is also included herein.

1.02 GENERAL

A. Items shall be delivered as complete assemblies direct from the manufacturer with all internal components intact except where partial disassembly is required by transportation regulations, protection of components, or where physical constraints may exist or be created for the setting of the item.

B. Coordinate the disassembly and reassembly requirements with the manufacturer. Determine the need and extent of reassembly prior to bid.

1. All labor, material and equipment costs associated with the disassembly and reassembly of the product shall be included in the Contract Price.
2. Where reassembly of equipment is necessary, then the manufacturer shall provide reassembly instruction at the project site.
3. A technician shall be present during the entire reassembly procedure and the manufacturer shall certify, in writing, that the unit was reassembled properly in accordance with instructions provided by the manufacturer and that all as-specified warranties remain in effect.
4. The manufacturer’s reassembly inspection time shall be in addition to the field service time specified and shall be included in the Contract Price. This time shall not be eligible for payment under any cash allowance item.

C. In the case where equipment is to be installed by others, then the supplying contractor shall be responsible for its reassembly. If reassembly is necessary and the unit(s) are to be set inside an enclosure or building, reassemble the equipment inside said enclosure. The equipment once reassembled shall be turned over to the installing contractor as specified below.

1.03 PACKING

A. Transport products in containers, crates, boxes or similar means such that the products are protected against damage that may occur during transportation.

B. All parts shall be packaged separately or in container where parts of similar systems are grouped.

C. Part numbers shall be indicated on the individual part. Use indelible ink to mark part numbers.

D. All equipment shipments shall be included with a parts list showing a description (name) of the part and the manufacturer’s part number.

1. The parts list shall be shipped in a plastic zippered envelope with the words “Parts List” lettered on it in indelible ink.

2. The parts list shall be placed inside the shipping container so that it is on the top of the contents.

E. Equipment shall be shipped with storage, handling and installation instructions.

1. The Engineer reserves the right to withhold payment for equipment delivered to the site until such time as the storage, handling and installation instructions are supplied by the manufacturer.
2. In the case where operation and maintenance manuals have been provided by the manufacturer, which includes the installation instructions, then the installation instructions shall also be included with the equipment shipment.

F. All control panels shall be wood crated.

1. All sides of the control panel shall be covered with 3/4” plywood.
2. The control panel number or name shall be printed on all sides of the crate in 1’ high black lettering.
3. The manufacturer’s name, Contractor’s name and project name shall also be printed on the front of the crate.
4. All control panels and centers shall be packaged with three (3) copies of the approved wiring diagram inside the control panel enclosure in a separate plan holder attached to the inside door. The words “APPROVED FOR CONSTRUCTION” shall be indicated on each page of the wiring diagram.

G. Delicate instruments and devices, reagents, chemicals, and glassware shall be shipped in packaging normally provided by the manufacturer.

H. The Contractor shall require the manufacturer to be responsible for the proper packing of all products.

1.04 SHIPPING AND DELIVERY

A. Product deliveries shall be accompanied with a bill of lading indicating the place of origination and the Contractor’s purchase order number.

B. Inspect shipments immediately upon delivery, to assure compliance with requirements of the Contract Documents and those products are undamaged.

C. Promptly remove damaged material and unsuitable items from the job site.

D. Provide equipment and personnel to handle products by methods to prevent soiling; disfigurement or damage.

1.05 STORAGE

A. Store sensitive products and all spare parts in weather tight, climate controlled enclosures in an environment favorable to product.

B. Store and protect products in accordance with the manufacturer’s instructions.

C. All other products that are to be installed underground or products such as pipe, valves, and fittings shall be stored outdoors but shall be blocked off the ground and covered with impervious sheet coverings.

D. Store fabricated products above the ground on blocking or skids.

E. Store loose granular materials in well-drained areas on solid surfaces to prevent mixing with foreign matter.

F. Provide adequate ventilation to avoid condensation.

G. In accordance with manufacturer's instructions protect bearings, couplings, shafts, rotating components, and assemblies. Protection of said equipment shall be continuous until the time the equipment is placed into permanent service.

H. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage or deterioration.

I. Do not store volatile liquids in any building on site.

J. Storage of products shall be the responsibility of the supplying contractor. The installing contractor shall take all necessary precautions to protect the equipment being furnished by others.

K. Store with seals and labels intact and legible.

1.06 EQUIPMENT INSTALLED BY OTHERS

A. All products, except products noted on the Drawings or specified, shall be furnished and installed under this Contract.
   1. Only noted or specified products shall be furnished under this Contract for installation by others.
   2. If it is not noted on the Drawings or specified, then the product shall be furnished and installed under the Contract.

B. The Contractor shall furnish these products to the Owner. These products shall be stored as specified above.

C. The Owner will then advise the installing contractor that the product(s) are ready for installation.
   1. In the case where the product is stored in a proper enclosure, but not stored inside the building to be constructed under this project, then the installing contractor shall move the product into the building to a location adjacent to the final location shown on the Drawings.
   2. In all cases, the installing contractor shall be responsible for moving from storage, uncrating, anchoring, mounting and installing the product as required by the Contract Documents.

D. The Contractor and installing contractor(s) shall be present at the time the equipment is turned over to the Owner. Immediately thereafter, the Owner will turn the product over to the installing contractor for installation.

E. The Owner, Contractor, Engineer/Architect and the installing contractor shall inspect the condition of the product at this time.
   1. Any defects in the product will be noted and the Contractor will be advised to make all repairs immediately.
   2. The installing contractor shall still be required to install the product if the damage is deemed cosmetic by the Engineer/Architect.
   3. The manufacturer's installation instructions or wiring diagram shall be turned over to the installing contractor at this time by the Contractor.

4. Any damage occurring to the product during moving, setting and mounting the unit(s) shall be the responsibility of the installing contractor.
5. The Contractor is advised to take photographs to document the condition prior to it being turned over to the installing contractor.
6. The installing contractor is advised to take photographs to document the condition prior to its acceptance.

F. The supplied unit(s) remain the property of the Contractor until final acceptance of the work.

G. Any damage caused to the unit(s) due to improper installation, workmanship, and non-compliance with the manufacturer's written installation instructions shall be the responsibility of the contractor who caused said damage. The burden of proof shall rest with the supplying Contractor.

H. In the event the Contractor discovers misuse, abuse or improper installation of the unit(s) by the installing contractor, then he shall immediately notify the Engineer/Architect in writing. The Engineer/Architect will investigate the accusations and make a determination. The Engineer's determination shall be binding and agreed to by both parties.

I. If the Engineer's determination substantiates the accusations of the Contractor, then the Contractor shall install the unit(s), the costs for which will be paid for as extra work. All costs associated with the extra work change order, including engineering and attorney fees of the Owner and Contractor will be deducted from money due the installing contractor.

1.07 PROTECTION OF WORK

A. The Contractor shall protect the installed work. All costs for protection shall be borne by the Contractor. Provide coverings as necessary to protect installed products from damage, from traffic and subsequent construction operations. Remove when no longer needed.

B. Cover and protect equipment from dust, moisture or physical damage. Protect finished floor surfaces prior to allowing equipment or materials to be moved over such surfaces. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.

C. Additional time required to secure replacements and to make repairs will not be considered by the Engineer/Architect to justify any extension in the Contract Time of Completion. In the event of the damage, promptly make replacement and repairs to the approval of the Engineer at no additional costs.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 016500

SECTION 017001 - MAINTENANCE OF BUILDING OPERATIONS **H2M**

PART 1 - GENERAL

1.01 GENERAL

A. The intent of this Section is to have Contractor perform his Work in such a manner that continuous, uninterrupted treatment of the electrical service and all essential building systems and facilities are maintained operational throughout the construction period.

B. Except for the scheduled shutdowns specified in this Section and in other Contracts, the existing building will be maintained in continuous operation by the Brooklyn Navy Yard (BNY) and any other Contractors working within or in the immediate area of the building during the entire construction period under all Contracts. Work under this Contract shall be so scheduled and conducted by Contractor such that it will not impede the operation of any building system or create potential hazards to operating equipment, building personnel, or any other Contractors working on this or other Contract Work. In performing the Work shown and specified, Contractor shall plan and schedule Work to meet both constraints outlined in this Section and building operating requirements.

C. The work covered in the following paragraphs may not be all inclusive of all work which may affect building operations. All operations which involve the demolitions, isolation or tie in to existing building equipment and/or systems will be submitted for approval.

D. Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without additional cost to the County, and provided that it does not require any other Contractor to perform additional work, and provided that all requirements of these Specifications are fulfilled.

E. The Contractor shall not shut off or disconnect any operating system of the Building. All Building equipment operation and equipment shutdowns shall be executed by the BNY. The Contractor shall put in place a Lock Out Tag Out (LOTO) system for the safety of their workers in conjunction with the BNY’s LOTO.

F. This Section of the Specifications contains several references to equipment, piping, ductwork, conduit, cable, material and appurtenances to be removed or reinstalled. The Contractor shall also refer to the Drawings and other applicable Sections for definition of the equipment, piping, ductwork, conduit, cable, material and appurtenances to be removed and turned over to the County and stored on site, or to become the property of the Contractor and removed from the site.

1.02 GENERAL CONSTRAINTS

A. Paragraph 1.05 of this Section specifies the sequence and shutdown duration (where applicable) for Building units which are to be taken out of service. The operational status of new or existing "units", "utility systems", etc. other than the designated "units", "utility systems", etc. shall not be

interrupted by the Contractor during the specified time periods. New "units", "utility systems", etc. may only be used after the specified testing and acceptance of the "units", "utility systems", etc.

B. The following constraints shall be applied to all equipment and appurtenant utility systems on the Building site.

1. Load limits on Access Roads: Existing and new underground facilities such as electrical duct banks, pipelines, etc., in, under and crossing BNY roads have been designed for a maximum wheel load of AASHTO H-20. The Contractor shall not exceed this weight limit.
2. Access to Site: An unobstructed traffic route through all BNY gates must be maintained at all times.
3. Internal Roads Access: Vehicular access to all buildings and facilities must be maintained at all times.
4. Personnel Access: BNY Personnel and other Contractors must have access to all areas that remain in operation throughout the construction period.
5. Potable Water System: The existing potable water system shall be kept in operation at all times.
6. Plumbing Facilities: Sanitary facilities in the existing structures shall be operational at all times for BNY operating personnel and employees. All other building plumbing systems such as roof and floor drains, pumping, etc. shall be maintained for all structures.
7. Storm Drainage: Storm drainage on the site shall be operational at all times.
8. Building Heating and Ventilating: In the Contractor's work areas and areas affected by the Contractor's operations, building heating and ventilating shall be both provided and maintained by the Contractor. Temperatures to be maintained in any area occupied by BNY Personnel or other Contractors such as offices, toilet rooms, etc., shall be at least 65°F. Temperatures to be maintained in all other interior Building areas, whether new, existing or temporary, shall be maintained at a minimum of 55°F.
9. Power, Light and Communication Systems: Electric power, lighting service and communication systems shall be maintained in uninterrupted operation in all areas unless otherwise shown or specified.
10. Pipes:
    a. Unless otherwise specified, the contents of pipes undergoing modifications shall be transferred to the Plant drain sewer system using hoses, piping, or pumps (if hydraulic conditions so require them) by the Contractor whose Work requires the draining. Exception: if contents of pipe not permitted to be discharged to normal drain, Contractor is responsible to contain, collect, and dispose of in a manner acceptable to the local authority having jurisdiction.
    b. If a drain is not available on the pipe to be drained, then a wet tap shall be made by the Contractor using an approved tapping saddle and valve. No uncontrolled spillage of a pipe's contents shall be allowed.
    c. All spillage shall be immediately washed down by the Contractor to the floor drains.
11. Dead End Valves or Pipe: The Contractor shall provide blind flanges on all valves or pipe that dead-end a line on a temporary or permanent basis.
12. Dead End Conduit:
    a. Empty conduit stubbing up from floor shall be cut flush with floor and patched.
    b. Empty conduit (spare or not) above finished floor shall be provided with cap, removable for future use.

1.03 SHUTDOWNS

A. General:

1. Shutdown shall be defined to indicate that a portion of the normal operation of a Building system has to be suspended or taken out of service in order to perform the specified work. For each shutdown, the Contractor shall compile an inventory of its labor and materials required to perform the tasks, an estimate of the time required and a written description of steps required to complete the tasks. The inventory, the estimate and written procedure shall be submitted to the Owner and Owner's Representative for review 30 calendar days prior to the proposed start date of the shutdown. The Contractor shall also request in writing, from the BNY, approval for each shutdown a minimum of fourteen calendar days prior to the proposed date. No shutdown shall be initiated until the list of materials and labor is verified on site at least one week prior to the proposed start date.
2. Work required which will interrupt the normal Building operations shall be accomplished at such times that will be convenient to the BNY and other Contractors on site.
3. The Contractor shall provide 7-day advance notice of needed shutdowns to all BNY Personnel.
4. The Contractor shall also have on hand, located in close proximity to the Work area, all tools, equipment and materials, both temporary and permanent, necessary to complete each work category, without interruption. Adequate numbers of personnel shall be scheduled for each shutdown, so that the work may be accomplished within the specified time frame. Prefabrication of all piping, ductwork and other assemblies shall be completed to greatest degree possible, prior to any shutdowns. The BNY shall be satisfied that the Contractor has complied with these requirements, to the fullest extent possible, before shutdowns will be authorized.

B. Shutdowns of Mechanical and Electrical Systems: The Contractor and the BNY shall each lock out and tag circuit breakers and switches operated by the BNY, and shall check cables and wires to be sure that they are deenergized to ground potential before Work begins and that all mechanical isolation devices are functional. Upon completion of the Work, the Contractor shall remove the locks and tags and advise the BNY that the facilities are available for use. The County will then remove their locks and place facilities back into use.

1.04 OVERTIME

A. Overtime Work by the Contractor necessary to conform to the requirements of this Section and related Sections shall be performed by the Contractor, and the Contractor shall make no claims for extra compensation as a result thereof.

1.05 MAINTENANCE OF BUILDING OPERATIONS (MOBO) AND SEQUENCE OF CONSTRUCTION

A. In order to maintain continuous Building operation during construction, a MOBO Description Section is included after this Section. The category order and item order within each category are not intended as an exact sequence of work or a listing of priorities. However, within each item procedural steps, time constraints and milestone dates may be outlined and are intended to recommend a sequence and timing in order to maintain the continuous operation of the Plant.

B. The Contractor shall note that all necessary shutdowns may not be included in the MOBO Descriptions. As the need for additional shutdowns becomes evident, the Contractor shall notify

the Engineer, who with assistance and approval of the BNY, will arrange for necessary shutdowns.

C. Contractor is advised that work in multiple areas of the Building performed simultaneously may be required in order to complete the entire scope of the Contract within the allotted time.

REFER TO FOLLOWING "DETAILED MOBO DESCRIPTIONS".

SECTION 017423 - CLEANING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Cleaning during the progress of the work

B. Cleaning prior to final payment

1.02 SCHEDULING

A. Perform final cleaning at least five (5) days before the date set for ceremonies to dedicate the new facility wherein the Owner will provide tours to the general public and/or dignitaries. The site shall be clean, organized, and totally free of construction debris, tools, and equipment.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning materials shall be appropriate to the surface and materials being cleaned.

B. Provide pads to protect finished surfaces from cleaning materials.

PART 3 - EXECUTION

3.01 PREPARATION

A. Post signs to advise building occupants if wet and/or slippery floor conditions exist during cleaning operations.

3.02 PROGRESS CLEANING

A. Keep all buildings, enclosures, and confined areas where work is being performed under the Contract free from unattended combustible materials.

B. Remove rust spots as they develop.

3.03 FINAL CLEANING

A. Remove dust, dirt, grease, stains, paint drips and runs, plastic, labels, tape, glue, rope, and other foreign materials from visible interior and exterior surfaces.

B. Do not move dust from spot to spot. Remove directly from the surface on which it lies by the most effective mean such as appropriately treated dusting cloths or vacuum tools. When doing high cleaning, do not allow dust to fall from high areas onto furniture and equipment below.

C. Dismantle and remove all temporary structures, scaffolding, fencing, and equipment. Remove waste materials, rubbish, lumber, block, tools, machinery, and surplus materials.

D. Perform the following prior to final payment:

1. Broom clean all exterior concrete surfaces and vacuum clean all interior concrete surfaces.
2. Dust and spot clean painted and vinyl covered walls.
3. Clean and polish all unpainted metal on doors such as trim, hardware, kickplates and doorknobs.

4. Repair, patch, and touch-up marred surfaces to specified finish and to match adjacent surfaces.
5. Remove foreign material from exterior masonry.
6. Clean and polish all stainless steel surfaces, including control panels supplied under this Contract.
7. Remove all rust spots and stains from new and pre-existing concrete, painted surfaces, and all other surfaces.
8. Inspect interior and exterior surfaces, and all work areas, to verify that the entire work is clean and ready for use by the Owner. The project will not be considered substantially complete until all final cleaning has been performed.
9. Vacuum the inside of all control panels provided under this Contract after the panel has been wired.

END OF SECTION 017423

SECTION 017500 - STARTING AND ADJUSTING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the following:
   1. Starting systems
   2. Testing, adjusting, and balancing
   3. Updating of manufacturer's operations and maintenance manuals and wiring diagrams
B. Work of this Section also includes stipulated man-hours that shall be provided by the **Prime Electrical Construction Contractor** for startup participation of equipment and systems.

1.02 STARTING SYSTEMS

A. The Contractor shall coordinate, schedule, and sequence the start-up of various equipment and systems.
B. Where the start-up of a system or piece of equipment is dependent upon the start-up of other system(s) or equipment, then the Contractor shall schedule and sequence the start-ups to coincide.
C. Notify the Architect/Engineer at least 14 calendar days prior to the start-up of each item or system so that he can schedule the startup with the Owner and utilities.
D. Where applicable, verify that each piece of equipment or system has been checked for proper:
   1. lubrication,
   2. drive rotation,
   3. belt tension,
   4. motor starter heater size,
   5. fuse size,
   6. water pressures,
   7. terminal connections,
   8. control sequence,
   9. for conditions which may cause damage or delay the start-up procedure.
E. Verify that the equipment has been installed in accordance with the manufacturer's requirements.
F. Complete all pre-startup checklists that may be required by the system vendor.
   1. In the event that start-up activities are delayed as a result of the Contractor's failure to properly check the completed installation and a manufacturer's representative is on the job site waiting for corrections to be made, then the Architect/Engineer may, at his/her sole discretion, postpone start-up until such time as the corrections have been made without any extra costs.
   2. The Owner may deduct from money due the Contractor the excess cost of engineering associated with having the Architect/Engineer present during the start-up.
   3. The deduction shall be equal to the Architect/Engineer's effective billing rate times the total number of hours delayed during the start-up activities.
G. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
H. Verify that wiring and support components for equipment are complete and tested.

I. Execute start-up under supervision of applicable Contractor's personnel in accordance with manufacturer's instructions.

J. The Contractor shall have the job site superintendent present during all start-up activities.

K. Provide manufacturer's authorized technician at the site when specified and in accordance with the requirements contained in Section 014500 - Quality Control.

L. Submit manufacturer's start-up reports (MSR's) in accordance with Section 013300.

1.03 STIPULATED STARTUP PARTICIPATION FOR PRIME ELECTRICAL CONSTRUCTION CONTRACTOR

A. The **Electrical Construction Contractor** shall provide the services of the job site foreman or superintendent who shall participate in the startup of equipment or systems that were furnished by others so as to achieve proper and sustained service.

B. The Electrical Construction Contractor shall include in the Contract price **TWO HUNDRED FORTY (240)** man-hours of participation service exclusively dedicated for providing startup services for equipment furnished.

1. The Owner reserves the right to receive a credit for each unused hour at the prevailing wage in effect at the time, said amount not being less than **Seventy Five Dollars ($75)** per hour in any case.
2. This service shall be provided when directed by the Architect/Engineer. Sufficient advance notice will be provided.

C. The **Contractor** shall provide a separate line item in the Schedule of Values for this service.

1. Provide with each requisition for payment, concerning this stipulated amount, a field report documenting the equipment item or system, date(s) of service, name of Contractor's worker(s), hour(s) worked, brief description of work performed during startup, and the prevailing wage rate paid them.
2. The field report shall be signed by the Architect/Engineer's field representative.

D. Requisitions for payment out of this stipulated amount will not be processed without an executed field report unless proof of manhours expended can be proved otherwise.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017500

SECTION 017800 - CLOSEOUT SUBMITTALS **H2M**

PART 1 - GENERAL

1.01 SUBMITTALS

A. Submit the following items to the Engineer/Architect with the final application for payment:
   1. Approved change orders.
   2. Maintenance Bond (period beginning date to match the date of final payment) prepared in accordance with the Contract,
   3. Utility company signoffs and inspection approvals, if applicable.
   4. Federal, state, county, town and local signoffs and inspection approvals, where applicable.
   5. Certified Payroll records with affidavits of labor.

B. All documents shall be complete, signed, dated, and notarized (where applicable) and be subject to the Engineer/Architect's acknowledgment of receipt or approval.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 017800

SECTION 017823 - OPERATING AND MAINTENANCE DATA **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the requirements for Operations and Maintenance Manuals required to be prepared by system suppliers and equipment manufacturers.

B. The Contractor shall submit Operations and Maintenance Manuals for all equipment.

C. Where the technical specifications call for the submission of manuals, said manuals shall be prepared in accordance with the requirements contained herein. It being understood that manuals shall be submitted for all equipment even if it is not specifically called out in the specifications.

1.02 MANUAL CONTENTS AND FORMAT

A. All Operations and Maintenance Manuals shall be as specified hereinafter.

B. The binder shall be 8 1/2” x 11”, metal hinge, vinyl, large capacity by National or Equal. It shall show the name of the manufacturer or supplier and project name on the spine of the binder.

C. A cover shall be provided showing the names of the Owner, Engineer/Architect, Contractor, and Manufacturer.

1. It shall show the Contractor’s order number and manufacturer’s project number.
2. The address of the manufacturer, service station telephone number, project title, contract number, and year shall also be shown.

D. Provide tabbed color dividers for each separate product and system.

1. The name of the product shall be typed on the tab.
2. A separate tab shall also be provided for information such as troubleshooting instructions, spare parts list, etc.

E. An index shall be provided in the back of the binder, with a separate tab, providing a quick way for the operator to find key and important topics contained in the manual.

F. A separate listing for all charts, graphs, tables, figures and shop drawings shall be provided directly following the table of contents.

G. Each manual shall contain one (1) copy of all shop drawings deemed in compliance with the Contract Documents by the Engineer submitted for the equipment or system for which the manual is prepared.

1. Only these shop drawings shall be included in the manual.
2. All shop drawings larger than 8 1/2” x 11” shall be folded and placed in a heavy duty, top loading plastic sheet protector with the title of the drawing showing; one (1) drawing per protector page.

H. For systems being furnished with control panels, each manual shall contain a catalog cut for every electrical device installed inside the control panel or motor control center.

I. Where emergency generator(s) are included as work of this Contract, the manufacturer's standard manual will be allowed if the manual clearly shows the instructions for the particular model of generator. Cross out chapters and paragraphs that do not apply to the Owner's generator.

J. Where manuals are prepared for treatment systems for water or wastewater, a process chapter, written in plain language for the operators, shall be prepared by the manufacturer providing the following:

1. A general discussion regarding the theory of the process.
2. A specific discussion relating the theory to the project as designed and constructed. Provide capacities, sizes, loading rates, application criteria, design values, and design assumptions.
3. Provide model numbers for equipment comprising the system.
4. Provide figures, tables, and graphs to assist the operator in understanding the operation of the treatment system.
5. Where operator interfaces are provided, provide step-by-step instructions for changing a process control variable such as set points.
    a. The instructions shall be numbered and written such as "press", "hold" "scroll", etc.
    b. Each operator interface instruction sheet shall be laminated and placed in the binder.
    c. Another laminated sheet shall be provided and placed inside the control panel.

K. Each manual shall contain the following as a minimum:

1. Table of contents
2. Final version of the warranty statement approved by the Engineer/Architect
3. Nameplate data of each component, year of installation, contract number and specification number
4. Name, address and telephone number of the manufacturer and the manufacturer's local representative(s)
5. Installation instructions
6. Operation instructions including adjustments, the interrelation of components and the control sequence describing break-in, start-up, operation and shutdown
7. Emergency operating instructions and capabilities
8. Maintenance requirements include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing, and checking instructions
9. Troubleshooting guide and corrective maintenance (repair) procedures for all electrical and mechanical equipment. These guides shall list the most frequent and common problems, together with the symptoms, possible causes of the trouble, and remedies
10. Drawings (pictures or exploded views) which clearly depict and identify each part, suitable for assembly and disassembly of entire system and each component
11. Wiring and control diagrams, if applicable
12. Panelboard circuit directories including electrical service characteristics, if applicable
13. Part list with current prices; ordering information; and recommended quantities of spare parts to be maintained in storage
14. Charts of valve tag numbers, with location and function of each valve, keyed to the process and instrumentation diagram prepared as part of the Contract Documents
15. Name, address, and telephone number of nearest parts supply house and nearest authorized repair service center.
16. List of recommended spare parts and the recommended number of each per unit and per group of units.

17. Approved shop drawings, submittals and product data.

L. Submit two (2) copies of a preliminary draft manual at least fourteen (14) calendar days prior to the date set for start-up.
   1. The Engineer/Architect will review the manual for content and compliance with these specifications.
   2. Written comments will be provided, but the manual will not be returned.
   3. One (1) manual will be used at start-up, to record changes that should be made to the final manual.
   4. This copy of the manual will be retained on the site until such time as the final, updated manual is provided.

M. Two (2) weeks after the date the unit was placed into service and the Owner has gained beneficial use, submit two (2) paper and two (2) electronic copies of the final updated Operations and Maintenance Manual. Refer to Section 017500 - Starting and Adjusting for requirements related to updating the manual(s).

N. Where installation instructions are not included with the manual, they shall be shipped at least ten (10) days prior to the date the equipment is scheduled for installation.

1.03 RETAINAGE

A. The Engineer will retain from payment due the Contractor, for failure to submit manuals as specified, an amount equal to 5% of the scheduled value for the equipment or system for which the manual applies. This Contract requirement only applies when a manual is specified to be provided in the Technical Specifications for a particular system or piece of equipment.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes:
   1. Maintenance of documents
   2. Recording of record information
   3. Submission of record documents
B. Work of this section also includes the furnishing of underground pipeline documentation.

1.02 PLANS AND SPECIFICATIONS FURNISHED TO THE CONTRACTOR

A. Two (2) complete sets of Contract Documents (plans, specifications and addenda) will be furnished to the Contractor upon request.
B. Additional sets will be furnished to the Contractor at $300 per set.

1.03 MAINTENANCE OF DOCUMENTS

A. The Contractor shall maintain at the site one (1) set of the following: drawings, specifications, addenda, change orders, approved shop drawings, test reports, operations and maintenance manuals, and shop drawing log.
B. The Contractor shall make these documents available for use by the Owner, Engineer/Architect, regulatory agencies and other parties designated by the Owner.
C. Provide a drawing rack for storage of plans.
D. Maintain these documents in a clean, dry, legible condition throughout the entire contract period.
E. This field set of documents shall returned to the Engineer/Architect for scanning.

1.04 RECORDING OF RECORD INFORMATION

A. The Contractor shall include a lump sum amount in the bid amount for preparation of record drawings.
   1. Stipulated amount in the bid item will be released when the record drawings have been accepted by the Engineer.
   2. Satisfactory evidence shall be provided by the Contractor demonstrating compliance with these specifications and said drawings have been delivered and deemed in compliance with the specifications by the Engineer/Architect.
   3. Progress payments will be allowed against the line item in the Schedule of Values only if record documents are considered accurate and up-to-date by the Engineer.
B. The contractor shall be required to keep accurate record drawings, in hard copy format, as well as Autocad 2020 or newer digital format, of the work actually performed which is in accordance with the contract documents and that which deviates from them.
C. As work progresses, the contractor shall maintain an on the field set of hard copy drawings, a complete and accurate set of field notes clearly delineating all work as it is actually installed. This set of drawings shall be available at all times for the Engineer/Architect to review and shall be examined at all jobsite meetings.

D. Do not permanently conceal any work until required information has been recorded.

E. Final record drawings shall be hard copy format and AutoCad 2020 or newer digital format, 24” x 36”, completed by a competent draftsman or CAD operator with the following information as a minimum:

1. A dimensioned drawing of all equipment installed.
2. Field changes of dimension and detail.
3. Changes made by Change Order.
4. Clarification plans not on original contract.

F. At final contract closeout Engineer/Architect will review preliminary set of final record drawings. After approval of this submission, the contractor will be required to submit one (1) set of hard copy, 24” x 36” drawings and one (1) digital DVD disc including all as-built drawings in AutoCad 2020 or newer format as detailed above. No portion of the line item bid amount in the proposal for the record drawings will be released until final record drawings have been submitted and approved. No exceptions.

1.05 SUBMITTAL OF RECORD DOCUMENTS

A. At completion of project prior to the final project close-out meeting, deliver marked-up record documents to the Engineer.

B. Accompany submittal with transmittal letter, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each record document.
5. Certification that each document as submitted is complete and accurate.
6. Signature of Contractor or its authorized representative.

C. Upon completion of the work, Contractor shall prepare and furnish the Engineer/Architect a set of marked up prints of the as-built drawings for review, with all changes conspicuously circled or otherwise emphasized.

D. Prior to final payment, Contractor shall conform the drawings to the comments made by the Engineer/Architect and then provide the Owner a complete reproducible set of as-built drawings on 24” x 36” paper and a set in digital CD-ROM AutoCad 2020 or newer format.

E. As-built drawings shall be the same size as the contract drawings, with 1/2 inch margins space on three sides and a 2 inch margin on the left side for binding. Each drawing shall bear the legend “AS-BUILT” and the name of the Contractor in heavy black lettering 1/2 inch high and be certified as complete and accurate.

F. As a convenience, Engineer/Architect will make available to the Contractor electronic media of the contract drawings for the sole purpose of the Contractor preparing as-built drawings. Electronic media made available is without guarantee of compatibility with the Contractor’s software or hardware. If the Contractor wishes to take advantage of this offer, the Contractor will

be required to execute an indemnification and hold harmless agreement with the Engineer/Architect and pay the Engineer/Architect $150.00 per contract set to cover the cost of providing electronic media. Payment shall be by check, payable to H2M architects +engineers, in advance of picking up the requested materials. Electronic media shall be returned to the Engineer/Architect upon acceptance of the as-built drawings by the Owner.

1.06 RELATED DOCUMENTS

A. Provide certificate of release of liens if requested by the Engineer.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION 017839

SECTION 017843 - SPARE PARTS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Section includes the requirements for delivering spare parts specified to be furnished under the provisions of the Contract Documents.

1.02 QUALITY ASSURANCE

A. Spare parts shall be delivered as complete assemblies direct from the manufacturer such that the part is fully functional and ready to be installed.

1.03 DELIVERY, STORAGE AND HANDLING OF SPARE PARTS

A. Comply with the requirements of Section 016500 for packing, delivery, storage and handling requirements for all parts delivered to the site of the work.

B. All spare parts required to be furnished under a Section of the Specifications shall be packaged in one separate box, crate or container with the words "SPARE PARTS" lettered on all sides of the container.

C. The equipment name or system name for which the spare parts are being provided shall also be lettered on the container.

D. A separate packing list for the spare parts shall be included in the container.

E. The Contractor shall store all spare parts indoors immediately upon delivery of the spare parts to the site. Spare parts will not be accepted by the Owner/Architect/Engineer if the spare parts have been stored outdoors for more than 8 hours upon delivery to the site.

F. The storage location shall be secure.

1.04 TURN OVER OF SPARE PARTS

A. Spare parts shall be turned over to the Owner/Engineer approximately two (2) weeks prior to the Architect/Engineer's preparation of the Final Punch List.

1. The Certificate of Substantial Completion will not be issued until all spare parts are delivered.

B. The following procedure shall be followed:

1. The Contractor shall provide a formal letter of transmittal listing the name or description of the part, part number, model number, manufacturer (or supplier), and system component name and the Section where it was specified to be provided.
2. Two (2) counterparts of the letter shall be provided.
3. The Contractor shall turn each part individually over to the Owner/Architect/Engineer.
4. The Owner/Architect/Engineer will initial next to the part description on each counterpart of the transmittal letter.
5. The initials represent that the part was received.
6. One transmittal counterpart will be returned to the Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017843

SECTION 017900 - DEMONSTRATION AND TRAINING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Work of this Section includes the requirements for demonstrating and training of installed systems, equipment, and products.

B. Manufacturer field services and the credit for unused service time is also included herein.

1.02 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections require field services to be provided, said services shall be provided by qualified, authorized and factory trained representative(s) of the manufacturer (supplier).

B. Field services shall generally consist of:

1. installation supervision,
2. verify terms of the manufacturer's warranty,
3. equipment and system calibration,
4. startup supervision,
5. and operation and maintenance instructions to the Owner's employees.

C. Such services do not include service time to correct a factory fault, correct problems resulting from a factory wiring or control logic error, or errors caused by poor or improper installation by the Contractor.

D. Sale representatives are not acceptable.

E. The time specified to be provided under the specification sections shall be exclusive of travel time to and from the facility or site. For the purposes of this Contract, one (1) day shall be defined as eight (8) hours exclusive of breaks or mealtime.

F. The times specified to be provided by the manufacturer does not relieve the manufacturer from providing sufficient service time to place the equipment or systems into satisfactory operation and to obtain the specified performance. The manufacturer shall provide, as a minimum, the times specified in the Specification Sections.

G. If for any reason, the specified service days are not used, then the Owner shall receive a credit equal to [**$500.00 (FIVE Hundred Dollars and Zero Cents)**] for each unused field service day specified. The Contractor shall include, as a minimum, [**$20,000 (twenty thousand dollars and zero cents)**] in the amount bid for manufacturer supplied field service for equipment furnished and installed under Contract G. Said amount of [**$20,000**] being equal to [**40**] days of service at [**$500**] each day.

H. A change order to the Contract reducing the Contract Price, by the dollar amount equivalent to the unused field service days, will be issued.

I. Submit manufacturers' startup reports (MSR's) in accordance with the requirements contained in Section 013300 - Submittals.

1.03 SUBMITTALS

A. The Contractor shall prepare a list of all manufacturer specified field time required by the technical specifications. Compile this summary listing and submit it to the Engineer for review in accordance with the requirements contained in Section 013300.

B. Manufacturer's Startup Reports

1.04 QUALITY CONTROL

A. The Contractor shall adhere to all instructions provided by the manufacturer's authorized representative.

B. All verbal instructions necessary to satisfy performance of the equipment or the system shall be immediately provided by the Contractor. The manufacturer shall document all verbal orders in writing at a time suitable to the Contractor.

C. All written instructions provided in operation, maintenance, and installation guides and manuals, provided by the manufacturer of such equipment and or system, shall be complied with by the Contractor.

D. The Contractor shall comply with all manufacturer requirements such that written or implied warranties remain in full force during the time period so specified elsewhere in the technical specifications.

E. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

F. Actions and/or non performance by the Contractor that may void manufacturer warranties shall not constitute a release of the specified warranty, and all warranty claims made by the Owner shall be paid for by the Contractor as if the manufacturer's warranty was still in effect.

1.05 SCHEDULING - FIELD SERVICES

A. The Contractor shall arrange field service on dates acceptable to the Owner and Architect/Engineer.

B. The service visits shall be scheduled at least 2 weeks in advance so that the Owner and Architect/Engineer can adequately staff the date.

C. Operator training will not be allowed until such time as the Manufacturer's Operation and Maintenance Manuals have been supplied and approved by the Architect/Engineer.

1. The field service technician shall review the contents of the manual with designated employees of the Owner.
2. Field services will not be deemed provided until the MSR is provided.

1.06 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner's personnel prior to date of Substantial Completion.

B. Utilize manufacturer's and vendor's Operation and Maintenance Manuals as basis for instruction. Review contents of the manual with the Owner's personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of the equipment or of the system.

D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

E. The Contractor shall arrange to have the manufacturer's Operation and Maintenance Manuals updated with information that has been added during start-up activities.

F. The final manual shall contain the most recent information and reflect all operational and maintenance aspects of the final installed and functioning system or equipment component of the system.

G. Any changes to control panel wiring diagrams or interconnection wiring schematics shall be made and new prints provided as an update to previously approved manuals.

H. Manufacturer field time shall be as specified in individual Sections of the Technical Specifications.

I. For control panels, explain the control sequence, timing structure, and safety precautions when working inside the panel, terminal wiring system, PLC program, if applicable, operator interface(s) and control logic.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 017900

PART 3 EXECUTION

1.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with requirements in Section 017000.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Protect existing structures and other elements to remain in place and not removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

E. Minimize production of dust due to demolition operations. Do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Dismantle existing construction and separate materials.
2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

1.02 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.

1. Verify construction and utility arrangements are as indicated.
2. Report discrepancies to Architect/Engineer before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from areas that remain occupied.

1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure, except for interruptions required for replacement or modifications; prevent water and humidity damage.

D. Remove existing work as indicated and required to accomplish new work.

1. Remove items indicated on drawings.

E. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.

1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. Verify that abandoned services serve only abandoned facilities before removal.
4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.

1. Prevent movement of structure. Provide shoring and bracing as required.
2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch to match new work.

1.03 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 033000 - CAST-IN PLACE CONCRETE **H2M**

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   4. Concrete toppings.
   5. Concrete fill for metal pan stairs and bollards.
   6. Underslab vapor retarder.

1.02 REFERENCES

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

C. ACI 301 - Specifications for Structural Concrete.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

F. ACI 305R - Guide to Hot Weather Concreting.

G. ACI 306R - Guide to Cold Weather Concreting.

H. ACI 308R - Guide to External Curing of Concrete.

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

J. ACI 347R - Guide to Formwork for Concrete.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

L. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

M. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.

N. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.

O. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

P. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete.

Q. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.

R. ASTM C150/C150M - Standard Specification for Portland Cement.

S. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

T. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.

U. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

V. ASTM C192/C192M - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

W. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.

X. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

Y. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

Z. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

AA. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete.

BB. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

CC. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

DD. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

EE. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

FF. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars.

GG. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

HH. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

II. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications.

JJ. ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction.

KK. ASTM E1155/E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers.

LL. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

MM. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

NN. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel.

OO. PS 1 - Structural Plywood.

PP. ACI 350 - Concrete Sanitary Engineering Structures.

QQ. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

1.03 ACTION SUBMITTALS

A. The contractor shall comply with the requirements of Division 01 Specification of the Project Manual, Section 013300 - SUBMITTALS.

B. Product Data: For each type of product indicated.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Submit mix design mixtures for each type of concrete to be used on the Project at least 30 calendar days prior to the first scheduled concrete pour. The Contractor's testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with ACI 301 and these specifications. The costs associated with development of the design mix and testing of samples shall be included in the bid price.
3. Submit the following:
    a. Name, address, and telephone number of Contractor's laboratory.
    b. Mix proportions.
    c. Source of cement, type, brand, and certified copies of mill reports, including physical and chemical analysis.
    d. Sources of fine aggregates and results of test made in accordance with ASTM C33/C33M and ASTM C40.
    e. Source of coarse aggregates and results of tests made in accordance with ASTM C33/C33M.
    f. Catalog cuts of all admixtures.
    g. Furnish test results of slump, air entrainment and water-cement ratio for each mix design.
4. For each mix proposed, make and cure four (4) standard 6 inch concrete test specimens to the laboratory in accordance with ASTM C192/C192M. Furnish compression test results made in accordance with ASTM C39/C39M. Break two (2) cylinders at seven (7) days and two (2) at 28 days.
5. If the concrete is intended to be pumped, design mix accordingly and submit certification that it has been tested for pumping.
6. If adopted mix fails to produce concrete meeting the requirements for strength and placibility, the Architect may order additional cement or adjustments to mix proportions at no extra cost to the Owner.

D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, spacing, locations, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement including steel bars and wire fabric.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer licensed in the state where the project is located; detailing fabrication, assembly, and support of formwork. Shop drawings shall bear the signature and seal of the same licensed Professional Engineer.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal
2. Shop drawings shall indicate formwork dimensioning, materials and arrangement of joints and ties.
3. Manufacturer's instructions: Indicate installation procedure and interface required with adjacent work

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect, if not shown on the drawings.

G. Samples: For waterstops and vapor retarder.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, provided by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Bonding agents.
7. Adhesives and Vapor retarders.
8. Semi rigid joint filler.
9. Joint-filler strips.
10. Repair materials.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

G. Furnish transit-mix delivery slips to Owner's Representative.

1.05 QUALITY ASSURANCE

A. Comply with Referenced Standards specified in Division 01 Section "References" in addition to ACI 301.

B. Perform testing under the provisions of Division 01 Section "Quality Requirements" and the "FIELD QUALITY CONTROL" Article of Part 3 listed in this specification.

C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

E. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.

1. The contractor shall provide an adequately sized, insulated curing box to house concrete cylinders at the discretion of the Architect, for the 48-hour period between concrete pour and sample collection pick-up by the Testing Laboratory (ASTM C31/C31M). As directed by the Architect, the contractor shall cure additional cylinders in the same fashion as the in-place concrete.
2. Curing box shall be located away from the main construction area and shall be blocked up off the ground.
3. A log sheet shall be provided in a waterproof sheet protector to log in the placement and removal of the concrete test samples by the testing laboratory.
4. Minimum information to be logged for each pour date shall include: date of pour, date of pick-up, weather conditions at the time of pour, testing

F. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer. To further insure consistency, coloration, finish and quality; all aggregates, cement, water and other ingredients shall each be secured from the same source for the duration of the project.

1. The batching plant and raw materials may be subject to inspections and test performed by the Architect.

G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

H. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete", Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
3. ACI 304R - "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".

I. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

J. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
2. Review special inspection and testing and inspecting agency procedures for field quality control, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor

rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Store cement off the ground in a dry, weatherproof, adequately ventilated structure with provisions to prevent the absorption of water.

C. Transport dry concrete batches from the central plant to the site in approved truck mixers conforming to the requirements of the Truck Mixer Manufacturer's Agitating Standards. Each truck shall contain a plate stating the capacity, drum speeds and be provided with a revolution counter.

D. Packaged material shall be delivered and stored in the original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected.

E. Protect all materials from freezing.

1.07 COORDINATION

A. Coordinate work under provisions of Division 01 Specification of this Project Manual.

B. The Contractor shall provide at least five (5) working days advance notice prior to formwork closure to the Architect.

C. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

D. Notify Architect a minimum of three (3) working days prior to commencement concrete pours.

1.08 REGULATORY REQUIREMENTS

A. Conform to ACI 304R and all applicable codes for placement of concrete and related work.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when the ambient temperature is below 40 deg. F. or when the concrete temperature exceeds 85 deg. F. Under certain circumstances, the Engineer may approve the placement of concrete under the above conditions, provided that the procedures of ACI 305R and ACI 306R are strictly adhered to.

B. Do not place concrete when the conditions may adversely affect the placing, curing or finishing of concrete, or its strength.

C. Comply with the requirements contained in Section 016500 - NON-PENETRATING ROOFTOP SUPPORT SYSTEMS.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.
   2. Steel forms: Minimum 16 gage thick, stiffened to support weight of concrete with minimum deflection.
   3. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      a. Douglas Fir Species, solid one side grade and sound

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum unless indicated otherwise on the drawings.

C. Form-Release Agent: Commercially formulated, colorless, water based, non-toxic, V.O.C. compliant, environmentally safe material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by DAYTON SUPERIOR or equal. Agent shall not be detrimental to the environment.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. For Concrete Tanks: Furnish snap-ties with 1 inch plastic cone and waterseal washer.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Galvanized Reinforcing Bars: ASTM A615/A615M, Grade 60; ASTM A706/A706M, deformed bars; ASTM A767/A767M, Class II zinc coated after fabrication and bending.

C. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 ; ASTM A706/A706M, deformed bars, assembled with clips.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
   2. Provide load bearing pad on bottom to prevent vapor barrier puncture.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
   2. Provide load bearing pad on bottom to prevent vapor barrier puncture.

D. Mechanical Splicing Systems: Components for field splices using taper threaded splices designed for use with specified grades of reinforcing to facilitate standard bar-to-bar connections, pre-caging applications, hooked bar applications, closure pours, precast connections, rebar terminations and anchorages, transition splices, segmental construction and connections to structural steel.
   1. Manufacturer:
      a. nVent LENTON
      b. Engineer approved equivalent.
   2. Systems:

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C150/C150M, Type IA, gray. Supplement with the following:
      a. Fly Ash: ASTM C618, Class F or C.
      b. Ground Granulated Blast-Furnace Slag: ASTM C989/C989M, Grade 100 or 120.
   2. Silica Fume: ASTM C1240, amorphous silica.
   3. Normal-Weight Aggregates: ASTM C33/C33M, No. 57 or 67 crushed stone coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
      a. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
      b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
   4. Lightweight Aggregate: ASTM C330/C330M, 3/4 inch, nominal maximum aggregate size.
   5. Water: ASTM C94/C94M, clean and not detrimental to concrete.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260/C260M.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
   2. Retarding Admixture: ASTM C494/C494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E1745, Class C or polyethylene sheet, ASTM D4397 not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400
      b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120
      c. Insulation Solutions, Inc.; Viper VaporCheck 10.
      d. Meadows, W. R., Inc.; Perminator 10 mil.
      e. Reef Industries, Inc.; Griffolyn 10 mil Green.
      f. Stego Industries, LLC; Stego Wrap 10 mil Class A.
      g. Or approved equal.

B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C33/C33M for fine aggregates.
   1. Depth Requirements:
      a. Slab on grade: 6 inches (unless otherwise noted in the Geotechnical Report).
      b. Footings: 12 inches (unless otherwise indicated in the Geotechnical Report).

2.07 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 4 sieve.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dayton Superior Corporation; Emery Tuff Non-Slip
      b. Lambert Corporation; EMAG-20
      c. L&M Construction Chemicals, Inc.; Grip It
      d. Metalcrete Industries; Metco Anti-Skid Aggregate

2.08 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 8 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet weighing approximately 8 oz. / sq. yd. bonded to prevent separation during use.

C. Membrane curing compound: Moisture Retention complying with ASTM C309. Products: EUCOCURE VOX by Euclid Chemical Company or equal.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
   1. Products: Eucocure VOX as manufactured by Euclid Chemical Company or approved equal.

2.09 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, 1/2" asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: three-component, solvent-free, moisture tolerant, epoxy modified cementitious product.

1. Product: Armatec 110 EpoCem as manufactured by Sika Corporation or specifically approved equal.
2. Types I and II, non-load bearing Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Non-Shrink Grout: Premixed compound, free of chlorides, with non-metallic aggregate, cement water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi at 48 hours and 7000 psi at 28 days. Grout shall be suitable for contact with potable water. For equipment bases and pipe supports, use non-shrink grout by Master Builders, Embeco 636, Unisorb V-1 or equal.

E. Reglets: Fabricate reglets of galvanized-steel sheet not less than 26 gauge material; in the longest lengths possible with alignment splines for joints; secure to formwork; Type CO as manufactured by Fry Reglet or approved equal. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inches (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

G. Extrudable Strip Waterstop: One part polyurethane, extrudable swelling waterstop to create a compression seal; SikaSwell S-2 as manufactured by Sika Corp. or specifically approved equal.

H. Field Applied Waterstop Grout: Krystol Waterstop Grout, crystalline grout to be applied in accordance with the manufacturer's specifications at joints and penetrations. Manufacturer: Kryton International Inc. (800)267-8280 or approved equal.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C39/C39M.

2.11 PARGING

A. Parge exterior faces of above-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a beveled return concealed at the bottom edge.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 211.1 and ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent Portland cement minimum, with fly ash or Pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
8. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: Pier, Mat and Spread Footings; foundation walls, slab on grade and slab on metal deck: 4000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50 for all concrete building elements.
3. Slump Limits (Conventional Mix):
   a. Slabs: 3 inches plus or minus one inch.

b. Piers, Foundation Walls and Footings: 4 inches plus or minus one inch.

4. Slump Limits (Pump Mix):
   a. Final slump (Slabs): 6 1/2 inches plus or minus one inch.
   b. Final Slump (Foundation, walls and footings): 7 1/2 inches plus or minus one inch
5. Air Content:
   a. Piers, Mats and Spread Footings: 5.5 percent, plus or minus 1.0 percent. at the point of delivery.
   b. Slabs: 3 percent, plus or minus 1.0 percent at point of delivery. Do not allow air content of trowel finished concrete floors to exceed 3 percent.
6. Large Aggregates: 3/4" crushed stone; ASTM C33/C33M, No. 67.
7. Use Admixtures only when approved by the Engineer.
8. Mix Grout in accordance with the manufacturer's instructions and specifications.

B. All concrete for the clear-well and backwash waste tank construction shall include Krystol Internal Membrane (KIM)® integral water repellent admixture as manufactured by Kryton or specifically approved equal. Admixture shall be added at a rate as recommended by the approved manufacturer.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and measurements before proceeding with formwork. Ensure that dimensions agree with the plans.

B. Inspect the formwork and reinforcing that it has been properly set and secured and that all items to be embedded, built-in or pass through concrete are at their proper locations and elevations.

C. The General Construction Contractor shall verify that all other prime contractors have installed concrete inserts, sleeves, and embedded elements of the project, such as conduit, and their work has been totally completed and inspected by the Architect.

D. Ensure that all points of contact with new grout are free from oil, grease and scale.

3.02 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class B, 1/4 inch for rough-formed finished surfaces.
      a. Hand trim sides and bottom of earth forms and remove loose soil to the satisfaction of the Architect.
      b. Remove water from forms and excavations and divert water flow to avoid washing over, under or though freshly placed concrete.

D. Construct forms tight enough to prevent loss of concrete mortar. Align form joints.

E. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer: Provide 3/4" inch chamfer on all exterior horizontal and vertical corners and edges of permanently exposed concrete.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.

N. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-metallic/ non-shrink grout.

O. Prepare previously placed concrete by cleaning with steel brush and apply a Bonding Agent in accordance with the manufacturer's specifications and instructions.

3.03 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.
4. Ensure that all inserts and embedded items are not disturbed during concrete placement.

3.04 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.05 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.06 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturers recommended tape.

B. Granular Course: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.07 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Use reinforcing splices at minimum of locations and only at locations of minimum stress. Review locations of splices with Architect. Splice locations shall be approved during shop drawing review phase. Rebar splice overly shall be the minimum length as per ACI 318.

1. Weld reinforcing bars according to AWS D1.4/D1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced t minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Take necessary measures to ensure that reinforcement is not disturbed during the placement of concrete.

3.08 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated or at 20' o.c. maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction / Control Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/16"-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 - METAL BUILDING SYSTEMS are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

F. Ensure joint fillers and devices are not disturbed during placement of concrete.

G. Install all joint fillers and devices in accordance with the manufacturer's instructions and specifications for floor and wall finish.

H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.

I. Install joint covers in one-piece length when adjacent construction activity is complete.

J. Apply sealants in joint devices in accordance with the manufacturer's specifications and instructions.

3.09 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
2. Place concrete with the aid of mechanical vibrators which are capable of transmitting to the concrete not less than 3,000 impulses per minute. Maintain at least three (3) vibrators in good working condition, ready for use when concrete placement begins in any one area.
3. Do not interrupt successive placement. Do not permit cold joints to occur.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and ACI 305R and as follows:
   1. Maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
   3. Maintain records of concrete placement. Record date, locations, quantity, air temperature and test samples taken.
   4. In areas with floor drains, maintain floor elevations at walls; pitch surfaces uniformly to the drains maintaining a 1% slope.
   5. Cure floor surfaces in accordance with ACI 308R.
   6. Apply curing compound in accordance with the manufacturer's specifications and instructions in two (2) coats with the second coat at right angles to the first.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch 6 mm in one direction.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots.

Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E1155/E1155M, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, F (F) 30; and of levelness, F (L) 20; with minimum local values of flatness, F (F) 24; and of levelness, F (L) 15; for suspended slabs.
3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. This surface shall be used for interior and exterior walking surfaces unless noted otherwise. Finish edges of exterior walkway flags with steel tooled radius edge.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, equipment pads, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb. /100 sq. ft. of dampened slip-resistive over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. All exposed horizontal and vertical wall and slab corners shall have a ¾" wide chamfered edge.

D. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12 inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt inserts into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

E. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

F. Grout: Install grout in accordance with the manufacturer's specifications and instructions. Moisten concrete and grout surfaces and allow drying until damp. Remove all standing water. Pump or inject grout into tight spaces to ensure intimate contact with the existing grout. Cure grout with an appropriate membrane in accordance with the manufacturer's specifications and instructions.

3.13 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 and ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308R and ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

F. Liquid sealer/hardener to be applied on exposed concrete cured with moisture retentive or absorptive covers. The following materials provide varying levels of protection, sealant and hardness. Review products for project appropriateness.

1. Euclid: Euco Diamond Hard (Liquid Sealer and Hardener)
2. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
3. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
4. Midwest Floor Care: Structure Formula (Liquid Sealer and Hardener)
5. Or approved equal.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Immediately remove all rust spots that have developed during the construction period as soon as directed by the Architect. Remove all rust spots that have formed by the use of temporary handrails.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and/or qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Contractor is responsible to notify the Owners representative at least 72 hours prior to the scheduled work that requires inspection / testing. The presence of the Inspector engaged by the Owner does not relieve the contractor of Quality Control Requirements.

B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:
   1. Steel reinforcement placement.
   2. Headed bolts and studs.
   3. Steel reinforcement welding.
   4. Concrete placement, including conveying and depositing.
   5. Curing procedures and maintenance of curing temperature.
   6. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172/C172M shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. Frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
      b. One (1) additional test cylinder shall be taken during cold weather and be cured under the same conditions as the concrete it represents.
   2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C173/C173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Compression Test Specimens: ASTM C31/C31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
      b. Cast and field cure two Insert number sets of two standard cylinder specimens for each composite sample.
   7. Compressive-Strength Tests: ASTM C39/C39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E1155/E1155M within 72 hours of finishing.

END OF SECTION

SECTION 036000 - GROUTING **H2M**

PART 1 GENERAL

1.01 SUMMARY

A. Related Documents:
   1. Drawings and general provisions of the Subcontract apply to this Section.
   2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. Section Includes:
   1. Grout for uses other than masonry.
   2. Pressure Grouting.

C. Related Sections:
   1. Division 01 Section "General Requirements."

1.02 REFERENCES

A. General:
   1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
   2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
   3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.

B. ASTM International:
   1. ASTM C33 Concrete Aggregates
   2. ASTM C40 Organic Impurities in Fine Aggregates for Concrete
   3. ASTM C88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
   4. ASTM C117 Material Finer Than 75µm Sieve in Mineral Aggregates by Washing
   5. ASTM C136 Sieve Analysis of Fine and Coarse Aggregates
   6. ASTM C150 Portland Cement
   7. ASTM C289 Potential Reactivity of Aggregates (Chemical Method)
   8. ASTM C494 Chemical Admixtures for Concrete
   9. ASTM C881 Epoxy-Resin-Base Bonding Systems for Concrete
   10. ASTM D2419 Sand Equivalent Value of Soils and Fine Aggregate
   11. ASTM E329 Inspection and Testing Agencies for Concrete, Steel, Bituminous Materials as Used in Construction

1.03 SUBMITTALS

A. Submit under provisions of Section 013300 - SUBMITTALS.

B. Manufacturer's data shall be provided for bonding compounds, dry pack , nonshrink, pressure grout, retardants, epoxy grout, and polymer concrete.

C. Test reports, accompanied by a manufacturer's statement that previously tested material is of similar type, quality, and manufacture as that which is proposed for use on this projects, shall be submitted for:

1. Cement.
2. Aggregates.
3. Retardants.
4. Bonding compounds.
5. Epoxy resin.

D. The subcontractor's testing laboratory shall provide evidence of the most recent inspection of its facilities by the Cement and Concrete Reference Laboratory of the National Bureau of Standards and evidence of correction of deficiencies noted in the inspection report before materials specified in this section are delivered to the job site.

1.04 QUALITY ASSURANCE

A. Conformance with the specified requirements will be demonstrated testing performed by an independent testing laboratory retained by the Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: Portland cement shall be ASTM C150/C150M, Type II or Type V, containing less than 0.6 percent alkali.

B. Aggregate:

1. General: Aggregate shall be non reactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the material from the new source prior to commencing grout work.
2. Fine Aggregate: Fine aggregate shall be sand or crushed stone conforming to ASTM C33/C33M as modified herein. When tested in accordance with ASTM C136/C136M, gradation shall be such that 100 percent by weight passes a standard No. 8 sieve and not less than 45 percent by weight pass a standard No. 40 sieve. Variation from the specified gradation in individual tests will be accepted if the average of three consecutive tests is within the following variation:

Standard Sieve	Permissible variation in individual test
No. 30 or coarser	2 percent by weight
No. 50 or finer	0.5 percent by weight

C. Admixtures:

1. Water Reducing Retarder: Water reducing retarder shall comply with ASTM C494/C494M, Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment or approved equal.
2. Lubricant: Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or approved equal.

D. Water:

1. Waste for washing aggregate, for mixing and for curing shall be potable, shall not contain more than 1000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO4, and shall not contain impurities which may change the setting time by more than 25 percent or a reduction of more than 5 percent of the compressive strength of the grout at 14 days when compared to the results for grout made with distilled water.

2.02 GROUT

A. Drypack Grout:

1. Drypack grout shall be one of the following:
   a. a mixture of approximately one part cement, 1-1/2 parts sand, water reducing retarder and sufficient water to make a stiff workable mix.
   b. W.R. Meadows Wedjroc Dry Pack.
   c. Euclid Chemical Dry Pack.
   d. or approved equal.

B. Cement Grout:

1. Cement grout shall be a mixture of one part cement, two parts sand proportioned by volume admixtures for pressure grouting and sufficient water to form a workable mix.

C. Nonshrink Grout:

1. Nonmetallic aggregate nonshrink grout shall be one of the following:
   a. U.S. Grout Five Star grout.
   b. Master Builders Masterflow 713.
   c. Burke Company Non-Ferrous, Non-Shrink Grout.
   d. or approved equal.

D. Epoxy Grout for Crack Repair and Dowel Anchorage:

1. Except for applications involving pressure grouting or crack injection, epoxy shall be a high modulus, moisture insensitive, two component, 100 percent solids, thermosetting modified polyamide epoxy compound. The material shall conform to ASTM C881/C881M, Type I, Grade 3 such as Sika Corporation Sikadur Hi-Mod series, Adhesive Technology Corporation Solidbond 200, or approved equal which is capable of not sagging in horizontal or overhead anchoring applications.
2. Epoxy for applications involving pressure grouting or crack injection, shall be a high modulus, moisture insensitive, two component, injection grade, 100 percent solids blend of epoxy resin compounds. The material shall conform to ASTM C881/C881M, Type I, Grade 1 such as Sika Corporation Sikadur 52, Adhesive Technology Corporation SLV 300 series, or equal which is capable of achieving complete penetration of hairline and larger cracks.

E. Polymer Concrete for Resurfacing and Patching:

1. Polymer concrete shall consist of a liquid binder and dry aggregate mixed together to make a flowable mortar. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two component epoxy resin compound. The binder material shall conform to ASTM C881/C881M, Type 3, Grade 1 such as Sika Corporation Sikadur Lo-Mod series, Adhesive Technology Corporation 400 series, or equal with a consistency similar to light weight oil for proper mixing with the aggregate. The aggregate shall be oven dry, kept in sealed packages until the time of mixing and be of size and consistency compatible with recommendations of the manufacturer of the liquid binder for the intended application.

F. Adhesive Resin for Dowel Anchorage:

1. ICC approved, structural epoxy; prepackaged in cartridges for manually or pneumatically operated caulk gun and automatically mixed at nozzle. Subject to compliance with current ICC evaluation report provide one of the following: HIT RE500-SD Adhesive Anchoring System, Hilti, Inc. (ICC ESR-2322), HIT-HY 200 MAX-SD Adhesive Anchoring System, Hilti,

Inc. (ICC ESR-3013), SET-XP Adhesive Anchoring Systems, Simpson Strong-Tie Co. (ICC ESR-2508).

2.03 PRESSURE GROUTING EQUIPMENT

A. Pressure grouting equipment shall include a mixer and holdover agitator tanks designed to place grout at pressures up to 50 psi (0.345 MPa). Gauges indicating grouting pressure shall be provided and the mixer shall be equipped with a meter capable of indicating to within 1/10 cubic foot (0.003 m^3) the volume of grout placed.

PART 3 EXECUTION

3.01 GENERAL

A. Bonding compounds for use with grout is specified in Section 033000 - CAST-IN PLACE CONCRETE. Primer, if required for polymer concrete, is to be provided and installed per the manufacturer's recommendations.

3.02 DRYPACK GROUT

A. Drypack grout is to be used for built-up surfaces, setting miscellaneous metal items and minor repairs.

B. Surfaces required to be built-up with drypack grout are to be roughened by brushing, cleaned and coated with the bonding compound before application of grout. The grout is to be applied to the required thickness and cured in accordance with Section 033000 - CAST-IN PLACE CONCRETE.

3.03 CEMENT GROUT

A. Cement grout is to be used for filling nonbearing portions of equipment pads and pressure grouting.

B. Except for the specialized requirements for pressure grouting, grout is to be mixed and placed in the same manner as cast-in-place concrete. Grout is to be mixed for at least one minute and diluted grout is to agitated until placed.

3.04 NONSHRINK GROUT

A. Nonshrink, nonmetallic aggregate grout is to be used under equipment, bearing plates and column base plates. Nonshrink, metallic aggregate grout is to be used under rotating equipment where high strength and fatigue are of concern, to grout anchor bolts and to grout reinforcing steel. Grout is to be placed and cured in accordance with the manufacturer's recommendations.

B. Holes required for grouting shall be blown clean with compressed air and are to be free of dust or standing water. Horizontal holes for grouting are to be drilled at a slight downward angle and with the inserted dowel or bolt bent to match.

3.05 EPOXY GROUT

A. Epoxy grout shall be used for repairing cracks by pressure grouting or gravity, repairing structural concrete and may be used for setting dowels or bolts in holes. Concrete is to be primed in accordance with the grout manufacturer's recommendations.

B. The use of epoxy grout must comply with the following restrictions:
   1. Limited to areas where exposure, on an intermittent or continuous basis, to acid, chlorine gas or to machine or diesel oils, is extremely unlikely.
   2. Limited to applications where exposure to fire or to concrete temperatures above the product heat deflection temperature or 120 deg F (40 deg C)(whichever is less) is extremely unlikely. Overhead applications are not allowed.
   3. Holes for the anchors shall be drilled (not cored), shall be blown clean with compressed air and shall be free of dust or standing water.
   4. The anchor type, size and embedment depth shall be as shown on the drawings and the anchor must be installed in accordance with the manufacturer's recommendations.
   5. The anchor must not be loaded until after the full curing period has elapsed.

3.06 PRESSURE GROUTING

A. Prior to grouting, cracks and holes to be grouted shall be washed clean. Washing is not required for grouting soil voids. Once started, grouting shall be continuous until completed. In case of a mechanical failure or other stoppage of the work, the grout equipment shall be washed out sufficiently to ensure that fresh only grout is pumped when the work is restarted.

3.07 FIELD QUALITY CONTROL

A. The Testing Laboratory will:
   1. Special Inspect installation of anchors in accordance with applicable ICC Evaluation Report, where special inspection is indicated on Contract Documents or where Subcontractor's design engineer has used ICC anchor capacities that require Special Inspection.
   2. Subcontractor will reimburse Owner for cost of Special Inspection, where anchors are sized by Subcontractor's design engineer using ICC Special Inspection values.
   3. Develop and utilize an effective method of field marking anchor and dowel test locations and results.

B. Testing of grout mixes for conformance to manufacturer’s specified strength: The Owner's independent testing laboratory shall take four test samples of each day's grout mix and test grout mix samples at 7 and 28 days. Test reports shall be submitted to the Owner / Architect for review under the provisions of Division 01 Section "General Requirements."

C. Test 25 percent of reinforcing steel dowels installed with adhesive resin on a given day in tension using pullout procedure. Test to 80% of specified yield strength of the dowel or 150% of the ICC rated static capacity whichever is the lesser with special inspection. Dowels specifically noted on the drawings as “No test required” do not require tension testing.

D. If the failure rate of dowels exceeds 10 percent, testing will be increased to 100 percent of that day’s installation of similar anchors or dowels. Testing will be reduced to 25 percent of that day’s installation when the failure rate is reduced to 10 percent or less. Failed dowels will be replaced at no additional cost to the Owner . Subcontractor will reimburse Owner for cost of additional

testing. The testing agency will produce daily reports of all testing activities: copies of daily reports will be submitted to the Owner / Architect in a timely manner.

END OF SECTION

SECTION 040511 - Masonry Mortaring and Grouting **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 042000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS

A. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

B. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

C. ASTM C270 - Standard Specification for Mortar for Unit Masonry.

D. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

E. ASTM C476 - Standard Specification for Grout for Masonry.

F. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

1.06 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. Mortar Mix Designs: ASTM C270, Property Specification.

1. Exterior, Loadbearing Masonry: Type N.
2. Exterior, Non-loadbearing Masonry: Type N.
3. Interior, Loadbearing Masonry: Type N.
4. Interior, Non-loadbearing Masonry: Type O.

B. Grout Mix Designs:

1. All Masonry Grout: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.

2.02 MATERIALS

A. Mortar Aggregate: ASTM C144.

B. Grout Aggregate: ASTM C404.

C. Water: Clean and potable.

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
B. Maintain sand uniformly damp immediately before the mixing process.
C. Do not use anti-freeze compounds to lower the freezing point of mortar.
D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.
B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

END OF SECTION

SECTION 042200 - CONCRETE UNIT MASONRY **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Masonry Lintels.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Cavity Drainage System.
9. Miscellaneous masonry accessories.
10. Installation of Door Frames, Lintels and items furnished by other sections.

1.03 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.04 PERFORMANCE REQUIREMENTS

A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

B. Fire Rated Assemblies: Tested in accordance with ANSI/UL 263 "Fire Tests of Building Construction and Materials" conforming to UL Assembly No. U906 .

1.05 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C140/C140M for compressive strength.
2. Mortar Test (Property Specification): For each mix required, according to ASTM C109/C109M for compressive strength, ASTM C 1506 for water retention, and ASTM C91/C91M for air content.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C780 for compressive strength.
4. Grout Test (Compressive Strength): For each mix required, according to ASTM C1019.

5. Prism Test: For each type of construction required, according to ASTM C1314.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Colored mortar.
2. Weep holes/vents.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
3. Accessories embedded in masonry.

1.07 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.
   a. Include data on material properties material test reports substantiating compliance with requirements.
   b. For masonry units, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C 1506 for water retention, and ASTM C91/C91M for air content.

2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 402/602.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

B. In accordance with the Statement of Special Inspections, the Special Inspector shall provide, and coordinate inspections and verifications as noted on Contract Drawings.

C. Special Testing Inspections: Owner shall employ a Special Inspection Agency to provide required inspections in accordance with current Building Code of New York State.

D. The Special Inspector shall submit copies of reports to Architect, Engineer, Owner's Site Representative and Contractor on day that tests are made. Include date of testing, weather conditions, building location and test location.

E. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

F. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

G. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 402/602 unless modified by requirements in the Contract Documents.

1. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
2. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
3. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between - 30 C and 30 C with a Vitreous Silica Dilatometer.
4. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry.

H. Mock-up Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014500 - QUALITY CONTROL for mockups.

1. Build sample panels for typical exterior wall in sizes approximately 72 inches long by 48 inches high by full thickness.

2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
3. Protect approved sample panels from the elements with weather-resistant membrane.
4. Approval of sample mock-up panel is for the following items:
    a. Color, texture, and blending of masonry units;
    b. Relationship of mortar and sealant colors to masonry unit colors;
    c. Tooling of joints;
    d. Aesthetic qualities of workmanship;
    e. Reinforcing, flashing, control joint and sealant installations;
    f. Other material and construction qualities specifically requested by Architect in writing.
5. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
    1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
    1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
    2. Protect sills, ledges, and projections from mortar droppings.

3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 402/602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 402/602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 CONCRETE MASONRY UNITS

A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the Project site.

B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners unless otherwise indicated.

C. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
   a. Products : Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) ACM Chemistries, Inc.; RainBloc.

2) BASF Group; MasterPel 240
3) Grace Construction Products, W. R. Grace & Co.; Dry-Block.

D. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi(19.3 MPa).
2. Exposed Faces: Provide color and texture matching the range represented by Architect's sample or as indicated on the drawings.
3. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.03 MASONRY LINTELS

A. General:

1. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
2. Steel Lintels: Install multiple Steel angle lintels as indicated on the drawings. Provide Hot-dip galvanized lintels for exterior installations.

2.04 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

C. Hydrated Lime: ASTM C207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.

E. Masonry Cement: ASTM C91/C91M.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Essroc, Italcementi Group; Brixment or Velvet.
   b. Holcim (US) Inc; Mortamix Masonry Cement.
   c. Lafarge North America Inc.; Magnolia Masonry Cement.
   d. Lehigh Cement Company; Lehigh Masonry Cement.

F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Davis Colors; True Tone Mortar Colors.
   b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
   c. Solomon Colors, Inc.; SGS Mortar Colors.

G. Colored Cement Product: Packaged blend made from Portland cement and hydrated lime or mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

H. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

I. Grout: ASTM C476. 2,000 psi minimum

1. Fine aggregate: sand.
2. Coarse aggregate: 3/8" chip gravel

J. Aggregate for Grout: ASTM C404.

K. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Euclid Chemical Company (The); Accelguard 80.
   b. Grace Construction Products, W. R. Grace & Co.; Morset.
   c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.

L. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. ACM Chemistries, Inc.; RainBloc for Mortar.
   b. BASF Aktiengesellschaft; MasterPel 240MA Mortar Admixture.
   c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.

M. Water: Potable.

2.05 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).

B. Epoxy coated reinforcement shall conform to ASTM A775/A775M.

C. Masonry Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.

7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

D. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.06 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A153/A153M, Class B-2 coating.
   2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
   3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.
   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch (25 mm)of masonry face, made from 0.187-inch diameter, hot-dip galvanized steel wire.

C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
   1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch thick, steel sheet, galvanized after fabrication 01.05-inch thick, steel sheet, galvanized after fabrication.
      a. 0.108-inch thick, galvanized sheet may be used at interior walls unless otherwise indicated.
   2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch diameter, hot-dip galvanized steel wire.
   3. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 01.05-inch thick, steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.

D. Partition Top anchors:
   1. PTA type, Model 420 by Hohmann & Barnard, Inc. or approved equal, 0.105-inch thick metal plate with 3/8-inch diameter stainless steel rod, Type 304, 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Use in conjunction with NS Neoprene Sponge to allow for vertical expansion and contraction.
   2. PTA type, Model 422, by Hohmann & Barnard or approved equal, 12 gauge thick with 7/16 inch holes. Fabricate from steel, Hot-dip galvanized after fabrication. Use in conjunction with NS Neoprene Sponge to allow for vertical expansion and contraction.
   3. PTA Type, Model 364, by Hohmann & Barnard or approved equal, 12 gauge by 7 inches long (T-shape to engage Gripstay Channel), Type 304 Stainless Steel with PTA Rectangular Clear Butyrate Tube, ASTM D696, with compressible filler to allow for vertical deflection of construction above. Use this PTA with lateral shear resistance in conjunction with H & B Gripstay Channels and NS Neoprene Sponge as a complete assembly prior to grouting.

E. Rigid Anchors for intersecting walls: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.

2.07 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034-inch, galvanized steel sheet.

C. Anchor Bolts: L-shaped steel bolts complying with ASTM A307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A153/A153M, Class C; of dimensions indicated.

D. Post-installed Anchors: chemical anchors.

1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5 unless otherwise indicated.
3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 A1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.08 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
2. Fabricate through-wall metal flashing embedded in masonry from copper, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
   a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      1) Cheney Flashing Company; Cheney 3-Way Flashing (Sawtooth).
      2) Keystone Flashing Company, Inc; Keystone 3-Way Interlocking Thruwall Flashing.
      3) Sandell Manufacturing Co., Inc; Mechanically Keyed Flashing.
3. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
4. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
5. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
6. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: Use the following unless otherwise indicated:

1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
   a. Products: Subject to compliance with requirements, provide the following:

1) Mortar Net USA, Ltd.; Total Flash.
2) CavClear Masonry Mat; MasonPro, Inc.
3) Or approved equal.
4) Monolithic Sheet: TPO Elastomeric thermoplastic flashing, 0.040 inch thick with integral stainless steel drip edge, drainage matrix, integral weeps, stainless steel termination bar and #14 x 2 Stainless fasteners spaced 6" apart.
5) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 - QUALITY CONTROL.
1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Solder for Copper: ASTM B32, Grade Sn96, 96 percent tin and 4 percent silver.
3. Elastomeric Sealant: ASTM C920, chemically curing urethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.09 MASONRY DRAINAGE MAT

A. Manufacturer and Type: CavClear Masonry Mat as manufactured by Archovations, Inc., 701 Second Street, Hudson, WI 54016, (715) 381-5773 or approved equal.
1. Description: Full-height Air Space Maintenance and Cavity Drainage Mat. The masonry drainage mat shall be specifically designed for masonry cavities to prevent mortar from contacting the backup and ensure water management. The masonry drainage mat shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100% recycled plastic with binder fibers. Masonry drainage mat is to be a non-woven textile product in random pattern and have voids no greater than 1/4" in diameter. Masonry mat is to be designed for substantially continuous installation behind the full-height of all masonry.
2. Masonry Drainage Mat Thickness: Select masonry mat thickness of as indicated on the drawings inches to allow no more than 3/8 inch tolerance between the masonry mat and masonry wythe.
3. Sizes: 16 inch high by 8 foot length pieces and/or 8 inch high by 8 foot long pieces as needed to accommodate building components.

2.10 WEEP VENTS

A. Manufacturer and Type: CavClear Weep Vents as manufactured by Archovations, Inc., 701 Second Street, Hudson, WI 54016, (715) 381-5773 or approved equal.

1. Description: Non-woven mesh with notched bottom.
2. Color: as selected by the Architect from the manufacturer's full color offering to match mortar.
3. Size: 3/8 inch by size to match masonry unit dimensions.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

E. Single Wythe Cavity Weep units: Provide continuously in base joint of single wythe masonry installations. Units shall be Cavity Weep TM CV 5010 as manufactured by MTI or approved equal.

F. Grout Stop: Provide Hohmann & Barnard, Inc. - HGS Mortar / Grout Screen or approved equal; ASTM D5034, non-corrosive, high strength 1/4 inch mesh polypropylene monofilament screening in widths conforming to CMU units. Cut away as required to allow grout flow at reinforced core locations.

2.12 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use Portland cement-lime masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use Portland cement-lime masonry cement mortar.
4. For reinforced masonry, use Portland cement-lime masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a pre-blended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type N.
4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior non-load-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of Portland cement by weight.
2. Mix to match Architect's sample.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Architectural CMUs.
   b. Cast stone trim units.

E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.

1. Mix to match Architect's sample.
2. Application: Use colored aggregate mortar for exposed mortar joints with the following units:
   a. Architectural CMUs.
   b. Cast stone trim units.

F. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 402/602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi(14 MPa).
3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.03 TOLERANCES

A. Dimensions and Locations of Elements:
   1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch .
   2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
   3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
   1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
   2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet or 1/2 inch maximum.
   4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
   5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
   6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:
   1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch with a maximum thickness limited to 1/2 inch.
   2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
   3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
   4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. 3 mm.

3.04 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond unless indicated otherwise on the Contract Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

H. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 - INSULATING SHEATHING.

3.05 MORTAR BEDDING AND JOINTING

A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.06 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.07 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
   1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.08 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:
   1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
   2. Install preformed control-joint gaskets designed to fit standard sash block.
   3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
   4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

C. Control Joint Locations:
   1. At major changes in wall height.
   2. At changes in wall thickness.
   3. At control joints in foundations, roofs and floors.
   4. At chases and recesses for piping, columns, fixtures, etc.
   5. At one side of wall openings less than 6 feet unless indicated otherwise.
   6. At both sides of wall opening exceeding 6 feet.
   7. At or near wall intersections.

8. Near return wall angles in L, T, and U shaped structures.
9. All other cases, maximum spacing between joints shall not exceed 30 feet.

3.09 LINTELS

A. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
4. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 - JOINT SEALANTS for application indicated.
5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 DRAINAGE MAT INSTALLATIONS

A. Install masonry drainage mat continuously throughout full-height of all exterior masonry cavities during construction of exterior wythe; follow manufacturer’s installation instructions. Verify that air space width is no more than 3/8 inch greater than masonry mat thickness. Install horizontally

between joint reinforcement. Stagger end joints in adjacent rows. Use multiple layers at bottom of wall and above through-wall flashings when air space depth exceeds masonry mat thickness by more than 3/8 inch. Extend extra mat at least to top of base flashing. Butt adjacent pieces to moderate contact. Fit to perimeter construction and penetrations without voids.

3.12 WEEP VENT INSTALLATIONS

A. Place weep vents in head joints at exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24 inches on center, unless otherwise shown. Leave the side of the masonry units forming the vent space unbuttered and clear of mortar. Install with notched side down. Slide vent material into joint as the two masonry units forming the weep vent are placed.

3.13 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 402/602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. Comply with requirements in ACI 530.1/ASCE 6/TMS 402/602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 60 inches.

D. Steel reinforcement bars, unless otherwise detailed on plans, shall be placed as follows:
   1. Install #5 bar, vertically at all corners and at door and window jambs and 32" o.c. typical in all 10" walls.
   2. Install #5 bar, vertically at all corners and at door and window jambs and 48" o.c. typical in all 12" walls.
   3. Fill all concrete masonry unit cells containing reinforcement bars solid with mortar.
   4. Remove pre-molded insulation from block cores containing vertical reinforcing bars.
   5. Reinforcement Bars shall be lapped at splices as follows:

Bar Size	**Min. Lap Distance**
#4	24 inches
#5	30 inches
#6	36 inches
#7	42 inches

3.14 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections: Level 1 special inspections according to the Building Code of New York State.
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140/C140M for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

I. Prism Test: For each type of construction provided, according to ASTM C1314 at 28 days.

3.15 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.16 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.17 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312323 - FILL.
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Grout.
   3. Base Plates.

B. Related Requirements:
   1. Division 01 - "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Section 053100 - "Metal Decking" for field installation of shear connectors through deck.
   3. Section 055000 - "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame not defined as structural steel.
   4. Section 055100 "Metal Stairs".
   5. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and for surface-preparation and priming requirements.

1.03 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:
   1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches (38 mm).
   2. Welded built-up members with plates thicker than 2 inches (50 mm).
   3. Column base plates thicker than 2 inches (50 mm).

1.04 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.05 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Shop drawings and required calculations shall bear the seal and signature of a registered Professional Engineer licensed in the state in which the project is located. Structural steel shop drawings will not be reviewed without said seal and signature.
   a. A full set of engineered calculations for all beam to column moment connections shall be submitted to the engineer of record for approval. The steel fabricator drawings shall not be reviewed without said engineering calculations affixed with a seal and signature of a professional engineer licensed in the state in which the project is located.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate profiles, sizes, spacing and locations of structural members, openings, attachments, fasteners, connections, cambers, holes and other pertinent data. Include locations of structural members, openings, attachments and loads.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
7. For structural steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer / fabricator.

B. Welding certificates: Submit certificates certifying that welders employed in the work have met AWS qualifications within in the previous 12 months.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties. Indicate structural strength, destructive and non-destructive test analysis.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Non-shrink grout.

1.08 QUALITY ASSURANCE

A. Fabricator shall have a minimum of five (5) years documented experience with performing the work of this section.

B. Installer Qualifications: A qualified installer specializing in performing the work of this section with a minimum of three (3) years of documented experience.

C. Delegated Connection Designer: Connections not fully detailed on the contract drawings shall be designed under the direct supervision of a professional structural engineer experienced in the design of this work and licensed in the state in which the work is located. The shop drawings shall bear the seal and signature of same professional engineer.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
2. Welders who are welding structural members fabricated in the shop or in the field, in the five boroughs must have a NYCDOB issued welder licence.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC Code of Standard Practice for Steel Buildings and Bridges - AISC 303.
2. AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings - AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts."

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products to/at the site under the supervision of Division 01 of this Project Manual.

B. Schedule deliveries of materials to the site at intervals which will ensure uninterrupted progress of the work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and experience. who bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F1852 fasteners and for retesting fasteners after lubrication.

1.10 COORDINATION

A. Coordinate the work under Division 01 specification of this Project Manual.

B. Coordinate the selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturer's recommendations to ensure that shop primers and topcoats are compatible with one another.

C. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.

D. Coordinate the work of this section with utility installations and all other adjacent work.

E. Coordinate the work of this section such that general progress of the Work in not interrupted.

1.11 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on the plans and approved shop drawings.

B. The contractor is responsible for the proper location and elevations of the work.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated where beam end reactions are not shown on drawings. Connection designer shall design shear connections to resist the reaction resulting from the maximum allowable uniform load of the beam found in the AISC Specification being applied along its full length.

1. Select and complete connections using AISC 360.
2. Use Load and Resistance Factor Design; data are given at factored-load level.

B. Moment Connections: Type FR, fully restrained. Provide design and details of moment connections to resist forces shown on the contract drawings.

C. Construction: Moment frame and Braced frame.

2.02 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. W-Shapes: ASTM A 992/A 992M.

C. Channels, Angles, M-Shapes: ASTM A 36/A 36M.

D. Plate and Bar: ASTM A 36/A 36M.

E. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C, seamless structural tubing.

F. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

1. Weight Class: as indicated on the contract documents.
2. Finish: Black except where indicated to be galvanized.

G. Welding Electrodes: Comply with AWS requirements.

2.03 BOLTS, CONNECTORS, AND ANCHORS

A. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
   1. Finish: Hot-dip zinc coating.
   2. Direct-Tension Indicators: ASTM F959/F959M, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.

C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490 (A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers with plain finish.
   1. Direct-Tension Indicators: ASTM F959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

E. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Anchor Bolts: ASTM A307, Grade C for non-moment resisting anchor rods. ASTM F1554, 36 and 55 ksi yield strength for moment resisting anchor rods.
   1. Nuts: ASTM A563 heavy-hex carbon steel.
   2. Plate Washers: ASTM A36/A36M carbon steel.
   3. Washers: ASTM F436/F436M, Type 1, hardened carbon steel.
   4. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

G. Threaded Rods: ASTM A 36/A 36M.
   1. Nuts: ASTM A563 ASTM A563M heavy-hex carbon steel.
   2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
   3. Finish: Plain.

H. Clevises: Made from cold-finished carbon steel bars, ASTM A108, Grade 1035.

I. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1030.

J. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A108, Grade 1018.

2.04 PRIMER

A. Primer: Comply with Division 09

B. Primer: SSPC-Paint 15, Type I, red oxide.

C. Ensure primer is compatible with required topcoat.

D. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.05 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

B. Grout shall consist of a premixed compound with cement, water reducing and plasticizing additives capable of developing a minimum compressive strength of 7000 psi at 28 days.

2.06 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A6/A6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. All wide flange structural steel members shall be fabricated in accordance with ASTM A992/A992M. All miscellaneous steel members including channels, angles, S, HP, and M shapes shall be fabricated in accordance with ASTM A36/A36M.
6. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
7. All shop connections shall be welded or high strength bolted.
8. Bearing surfaces shall be planed true to provide full bearing over the entire surface.
9. Continuously seal joined members by intermittent welds and plastic filler. Grind welds smooth where exposed or where interference with other building materials is encountered,
10. Splicing is not permitted unless indicated on the Contract Documents or accepted on the final approved Shop Drawings.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces. Mechanically thermal cut bolt holes shall not be permitted unless prior approval by the Architect is obtained in writing.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning." or SSPC-SP 3, "Power Tool Cleaning." unless a more stringent cleaning method is required for selected primers and / or other coatings.

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Shop prime non-exposed steel members after fabrication in accordance with SSPC- PA. Do not prime surfaces that will be fireproofed, field welded or are in contact with concrete or high strength bolts.

H. Paint exposed structural steel members in accordance with the applicable Division 09 Specification section.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning unless approved by the Architect in writing.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.07 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened unless otherwise shown on the contract documents or required by the connection designer.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.08 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5

mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.09 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
   1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
   2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
   1. Inspection and Tests will not relieve the contractor of responsibility for providing materials, fabrication and erection procedures in compliance with the specified requirements. The contractor shall verify that all materials meet or exceed the requirements specified in these specifications, Contract drawings and related references. Materials not in compliance with the specified requirements will be rejected and required to be removed from the site.
C. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M , Grade A325 or Grade A490 Bolts."
D. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M type required for materials being welded and the following inspection procedures, at testing agency's option:
   1. Liquid Penetrant Inspection: ASTM E165/E165M.
   2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   3. Ultrasonic Inspection: ASTM E164.
   4. Radiographic Inspection: ASTM E94.
E. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other drawings for compliance with requirements.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other drawings showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
   2. Clean bearing surfaces and other surfaces which will be in permanent contact with the work.

3.03 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Proceed with the installation only after unsatisfactory conditions have been corrected. Commencement of installation will indicate that the erector accepts the conditions which exist.

C. Allow for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.

D. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates.

E. Erect all components in accordance with the approved shop drawings.

F. Field weld components and shear studs as indicated on approved shop drawings and in accordance with AWS D1.1/D1.1M.

G. Do not field cut or alter structural members without written approval of the Engineer.

H. Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

5. Coordinate placement of anchors in concrete or masonry construction for securing base plates.

I. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

J. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

K. Splice members only where indicated.

L. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

M. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

N. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

O. Erect all components in accordance with approved shop drawings. After erection, prime welds, abrasions and surfaces not shop primed or galvanized as required, except surfaces to be in contact with concrete.

P. Field weld components and shear studs as indicated on the approved shop drawings and in accordance with AWS D1.1/D1.1M.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened Pretensioned unless specifically identified as pretensioned or slip-critical on the. contract documents or calculations by the Delegated Connection designer.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
4. Connections and abrasions shall be cleaned, prepared and finished in the same manner and with the same materials used in shop finishing.

3.05 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Verify structural-steel materials and inspect steel frame joint details.
   2. Verify weld materials and inspect welds.
   3. Verify connection materials and inspect high-strength bolted connections.
B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
C. Bolted Connections: Inspect and test high strength bolted connections according to RCSC's "Specification for Structural Joints Using ASTM F3125/F3125M, Grade A325 or Grade A490 Bolts."
D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E165/E165M.
      b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E164.
      d. Radiographic Inspection: ASTM E94.
E. Post Installed Mechanical Anchors, Adhesive Anchors and Screw Anchors: Comply with 2020 New York State Building Code Table 1705.3.
   1. The special inspection shall include the verification of compliance with approved construction documents and standards established by the Commissioner pursuant to Section 28-113.2.2 of the Administrative Code.
F. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
G. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 TOLERANCES

A. All members shall be installed within AISC tolerances and as follows:
   1. Maximum variation from plumb: 1/4" (6mm) per story, non-cumulative.
   2. Maximum offset from true alignment: 1/4" (6mm).

3.07 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780/A780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming as specified in Division 9 "High-Performance Coatings" or compatible primer established at the fabricators shop to be compatible with the final finish.

3.08 ADJUSTING

A. All misfits due to errors in location, fabrication, inaccuracies in the setting of anchor bolts or other items of attachment or support shall be immediately reported to the Engineer and corrected in a manner subject to the approval of the Engineer.

B. Submit method of correction to the Architect under Division 01 Specification provisions.

C. Proceed with corrective work only after receiving written approval from the Architect.

D. All corrections shall be made at no additional cost to the Owner.

END OF SECTION

SECTION 053100 - STEEL DECKING **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Roof deck and accessories.
   2. Composite floor deck.
   3. Non-composite form deck and accessories.
   4. Formed steel cant strips.
   5. Pourstop angles, cell closures and end forms to contain wet concrete.
   6. Bearing plates and angles
   7. Framing for openings up to and including 18 inches.
   8. Closure panels for cell voids.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated provide deck profile characteristics and dimension, structural properties and finish.
   1. Include a statement indicating costs for each product having recycled content.

B. Shop Drawings:
   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Indicate temporary shoring of decking where required. Indicate welded connections using standard AWS A2.0 welding symbols and indicate net weld lengths.

1.04 INFORMATIONAL SUBMITTALS

A. Submit under the provisions of Section 013300 - SUBMITTALS.

B. Welding certificates.

C. Product Certificates: For each type of steel deck by product manufacturer.

D. Manufacturer's instructions: indicate special installation sequence and special instructions required for proper installation.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.

F. Research/Evaluation Reports: For steel deck.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Installer: Company specializing in performing the work of this section with a minimum of three (3) years of documented experience.

C. Design deck layout, spans, fastening and joints under the supervision of a Professional Structural Engineer experienced in the design of this work and licensed in the State in which the project is located.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

E. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

G. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

H. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

1.06 PERFORMANCE REQUIREMENTS

A. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members.

B. Lateral deflection of diaphragm shall not exceed 1/500 of the story height. Maximum vertical deflection shall not exceed L/240 of the span length.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Cut plastic wrap to encourage ventilation.

C. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

D. Do not handle products in a manner which will distort or damage materials.

E. Do not store decking directly on the ground.

F. Store materials in a manner which will permit ease of access for inspection and identification.

G. Schedule delivery of the materials to the site at intervals which will ensure uninterrupted progress of the work.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

1.08 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on the contract drawings and approved shop drawings as required by the manufacturer.

B. The contractor is responsible for the proper locations and elevations of the work of this section.

1.09 COORDINATION

A. Coordinate the work under provisions of Section 013100 - PROJECT MANAGEMENT AND COORDINATION.

B. Coordinate the work of this section with utility installations and all other adjacent work.

C. Coordinate the work such that the general progress of the work is not interrupted.

1.10 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Metal decking design shall be in accordance with SDI Design Manual for Composite Decks, Form Decks, and Roof Decks. Substitutions shall be designed to meet or exceed published section properties of the specified materials. Section properties shall be computed in accordance with the American Iron and Steel Institute Specification for the Design of Cold Formed Steel Structural Members

C. Lateral deflection of diaphragm shall not exceed 1/500th of the story height. Maximum vertical deflection shall not exceed L/240th of the span length.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

PART 2 - PRODUCTS

2.01 METAL ROOF DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Nucor Corp.; Vulcraft Division.
   2. Canam.
   3. New Millennium Building Systems.
   4. Substitutions shall be permitted only after receiving approval from the Architect/Engineer.

B. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
   1. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Minimum 33 Ksi yield strength, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

a. Color: Manufacturer's standard.
2. Deck Profile: Type B or as indicated on the drawings.
3. Profile Depth: 1-1/2 inches (38 mm) or as indicated on the drawings.
4. Design Uncoated-Steel Thickness: 20 gauge unless otherwise indicated.
5. Span Condition: Simple span.
6. Side Laps: Overlapped.

2.02 COMPOSITE FLOOR DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Nucor Corp.; Vulcraft Group.
2. Canam.
3. New Millennium Building Systems.
4. Architect/Engineer approved equivalent.

B. Composite Form Deck: Fabricate ribbed-steel sheet composite form-deck panels to comply with "SDI Specifications and Commentary for Composite Steel Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 80 (550) minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
a. Color: Manufacturer's standard.
2. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
a. Color: Gray.
3. Profile Depth: As indicated on the contract drawings.
4. Design Uncoated-Steel Thickness: As indicated on the contract drawings.
5. Span Condition: Simple span.
6. Side Laps: Overlapped.

2.03 NON-COMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Nucor Corp.; Vulcraft Group.
2. Canam.
3. New Millennium Building Systems.
4. Architect/Engineer approved equivalent.

B. Non-composite Form Deck: Fabricate ribbed-steel sheet no composite form-deck panels to comply with "SDI Specifications and Commentary for Non-composite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 80 (550) minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
a. Color: Manufacturer's standard.
2. Galvanized and Shop-Primed Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
a. Color: Gray.

3. Profile Depth: 1-5/16 inch. or as indicated on the contract drawings..
4. Design Uncoated-Steel Thickness: 24 gauge, 0.0239 inch (0.61 mm).
5. Span Condition: Simple span.
6. Side Laps: Overlapped.

2.04 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Welded Materials: AWS D1.1/D1.1M.

C. Primer: Flexible, Rust inhibitive.

D. Touch-up Primer: Red Oxide Type.

E. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

F. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

G. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber. one inch thick profile to fit tight to decking in compression.

H. Shear Connectors: 3/4 inch diameter, 4 1/2" inch long welded headed studs. locate as indicated on the contract drawings.

I. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material, gauge and finish as deck; of profile indicated or required for application.

J. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

K. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

L. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

M. Recessed Sump Pans: Single-piece steel sheet, 14 gauge or 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch (76-mm) wide flanges and sloped recessed side pans of 1-1/2inch (38-mm) minimum depth below deck surface. For drains, cut holes in the field.

N. Galvanizing Repair Paint: ASTM A780/A780M.

O. Bearing Plates and Angles: ASTM A36/A36M steel, unfinished.

P. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

Q. Closure Panels: Neoprene Blend-FR as manufactured by Carrington Specialty Products, Inc., or approved equal.

1. Fire-rated Neoprene-blend formed to match profile of deck at each location.
2. Install compatible backer rod and sealant to seal all edge conditions airtight.
3. Physical Characteristics:

a. Nominal Density: 5 to 7 pcf.
b. Tensile Strength: 50 psi.
c. Elongation: 150% to break.
d. Compression Set: 50% of original thickness.
e. Compression Strength: 2 to 5 psi (at 25% deflection).
f. Working Temperature: -40 to 160 degrees F.
g. Water Absorption by Weight: 5% maximum.
h. Flammability: HF-1 as per UL 94.

2.05 SOURCE QUALITY CONTROL

A. Testing and analysis of components will be performed under provisions of Section 014500 - QUALITY CONTROL.

B. Inspection and tests will not relieve the Contractor of responsibility for providing materials and fabrication and erection procedures in compliance with specified requirements. The Contractor is to verify that all materials meet or exceed the requirements specified in these specifications.

C. Materials not in compliance with the specified requirements will be rejected

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Beginning of installation means that the installer accepts the existing conditions.

3.02 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Clean all bearing surfaces of debris and foreign matter.

E. Verify bearing surface is smooth and flat.

F. Bear decking on steel supports with 1 1/2 inch (38 mm) minimum bearing.

G. Provide decking free of amounts of lubricants or oils which would impair the adhesion of spray on fireproofing or painting.

H. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

I. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

J. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

K. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

L. Fasten deck to steel support members at ends and intermediate supports with fusion welds at 12 inches on center maximum, parallel with the deck flute and at each transverse flute. Weld washers are to be used only with decks 24 gauge or thinner.

M. Mechanically fasten male/female side laps at 24 inches on center maximum for decking thinner than 20 gauge. Weld male/female side laps at 18 inches on center maximum for decks 20 gauge and heavier.

N. Reinforce steel deck openings from 6 to 18 inches (150 to 460 mm) in size with 2 inches x 2 inches x 1/4 inch (50 mm x 50 mm x 6 mm) steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

O. Install 6 inch (150 mm) minimum wide sheet steel cover plates, of same thickness as decking, where deck changes direction. Fusion weld 12 inches (300 mm) on center maximum.

P. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.

Q. Install single row of foam flute closures above walls and partitions perpendicular to deck flutes.

R. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

S. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:

1. Weld Diameter: 3/4 inch (19 mm), nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches (305 mm) apart in the field of roof and 6 inches (150 mm) apart in roof corners and perimeter based on roof-area definitions in FMG Loss Prevention Data Sheet - FM DS 1-28.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (457 mm), and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.

3. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds where deck is thicker than 20 gauge.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
   1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck flutes. Space welds not more than 6 inches apart with at least one weld at each corner.
   1. Install reinforcing channels or zees in ribs to span between supports and weld .

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

F. Place metal cant strips in position and fusion weld.

G. Install sheet steel closures and angle flashings to close openings between deck and walls, columns and openings.

3.04 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
   1. Weld Diameter: 3/4 inch (19 mm), nominal.
   2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches (305 mm) apart, but not more than 18 inches (457 mm) apart.
   3. Weld Spacing: Space and locate welds as indicated.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as follows:
   1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
   2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds where deck is thicker than 20 gauge.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
   1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated. Where steel angles are not utilized, install stops at floor edge upturned to the top surface of the slab to contain wet concrete. Provide stop of sufficient strength to remain in place and stationary without distortion.

E. Floor deck closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and deck.

F. Position floor drain pans with the flanges bearing on the top surface of deck. Fusion weld at each deck flute.

G. Install piercing hanger tabs at 14 inches (355 mm) apart in both directions, within 9 inches (228 mm) of walls at ends, and not more than 12 inches (305 mm) from walls at sides unless otherwise indicated.

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field welds will be subject to inspection.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.06 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054000 - COLD-FORMED METAL FRAMING **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Pitched roof rafters.
2. Stud wall framing.
3. Flat ceiling and attic floor joist framing.
4. Joist framing.
5. Collar ties.
6. Parapet framing and bracing.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
3. The design of the cold-formed steel framing shall be the responsibility of the contractor’s fabricator. The sizes (depth) of the steel studs shall be as shown on the contract drawings. Unless specifically indicated on the construction documents, it shall be the responsibility of the design engineer to size the spacing and gauge of the element as well as the total depth of the member in the case of header and sill design.
4. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. The contractor’s fabricator shall provide a full set of engineering calculations as well as a complete set of shop drawings affixed with a New York State Professional Engineer’s sign and seal. The design of the cold-formed steel elements shall be in conformance with the information shown on the contract documents and shall be in accordance with the 2020 Building Code of New York State.

C. Fabrication Drawings:

1. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.
2. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ClarkDietrich Building Systems, LLC.
   2. MarinoWARE
   3. Architect/ Engineer approved equivalent.

2.02 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
   1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft.

2.03 COLD-FORMED STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: ST33H.
   2. Coating: G90 or equivalent.

C. Steel Sheet for Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: 50, Class 1 or 2.
   2. Coating: G90.

D. All studs and/or joists and accessories shall be the type, size, gage, and spacing shown on the plans. Studs, runners (track) bracing, and bridging shall be manufactured per ASTM C955.

E. All galvanized studs, joists, and accessories shall be formed from steel that conforms to the requirements of ASTM A653/A653M, as set forth in Section 1.02 of the AISI specification for design of cold-formed steel structural members.

F. All galvanized studs joists and accessories shall have a minimum G60 coating.

G. Minimum steel gauges shall be 18 gauge for all structural elements subject to gravity and/or lateral wind forces.

H. Minimum steel gauge for interior elements subject to partition loadings shall be 20 gauge.

I. All section properties shall be calculated in accordance with the AISI specification for the design of cold-formed steel structural members (latest edition).

J. Facing materials may not be substituted for bridging. Horizontal bridging must be installed prior to loading the wall and/or floor/roof joists.

K. The physical and structural properties published by approved supplier will be accepted; otherwise these properties must be substantiated by calculations for loading stresses and deflections of the designed framing sealed by a professional engineer licensed in the State of New York.

L. Prior to fabrication submit fabrication and erection drawings for review and approval by the architect/ engineer. Indicate component details, framing for openings, bearing anchorage, temporary bracing, welds or type and location of mechanical fasteners and accessories or items required of other work for complete installations. Included manufacturer's instructions for securing studs to tracks and for other framing connections.

2.04 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.033 inch, 20 gauge.
   2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with un-stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
   2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. ClarkDietrich Building Systems, LLC.
      b. MarinoWARE
      c. Steel Network, Inc. (The).

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; un-punched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge.
   2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2.05 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0428 inch, 18 gauge or as indicated on the construction documents..
   2. Flange Width: 2 inches, minimum.

2.06 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Stud kickers and knee braces.
7. Hole reinforcing plates.
8. Backer plates.

2.07 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

G. Column Flange Grip Clips: Pre-manufactured Column/Beam connectors for rapid installation of board type materials to Steel Column and Beam Flanges. ASTM A1003/A1003M Structural Grade 33 (230) Type H, ST33H (ST230H): 33ksi (230MPa) minimum yield strength, 45ksi (310MPa) minimum tensile strength, 27mil minimum thickness (22 gauge, 0.0283” design thickness) with ASTM A653/A653M G60 (Z180) hot dipped galvanized coating. Manufacturer: The Steel Network, Inc. Unit connection box measures 1 inch deep, 2 inches wide and 2 1/2 inches long with a spring clip depth of 2.375 inches and a curved clip spring clearance of .2 inches.

1. Install as indicated on the drawings. Maximum spacing 24 inches on center.

2.08 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, and non-leaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.09 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Welds may be butt, fillet, spot or groove type. The appropriateness of which shall be determined by and within the design calculations. All welds shall be touched-up using zinc -rich paint to galvanized members and paint similar to that used by the manufacturer for painted members.
    b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

G. Install insulation, specified in Section 072100 - THERMAL INSULATION in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

J. Wire tying in structural applications is not permitted.

3.04 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches unless indicated otherwise.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to infill studs and anchor to building structure.
4. Connect drift clips to cold formed metal framing and anchor to building structure

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   a. Install solid blocking at centers indicated on Shop Drawings.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.05 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. All members shall be checked for proper alignment, bearing, completeness of attachments, proper placement and reinforcing.

D. Testing agency will report test results promptly and in writing to Contractor and Architect.

E. Remove and replace work where test results indicate that it does not comply with specified requirements.

F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.06 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

3.07 TOLERANCES

A. Vertical alignment (plumbness) of studs shall be within 1/8 inch in 4 feet of the span.

B. Horizontal alignment (levelness) of walls shall be within 1/8 inch in 4 feet of their respective lengths.

C. Spacing of studs shall not be more than +1/8 inch from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

END OF SECTION

SECTION 055050 - METAL FABRICATIONS **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Steel framing and supports for applications where framing and supports are not specified on other sections.
   2. Aluminum framing and supports for applications where framing and supports are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:
   1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.03 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
   1. Provide templates for anchors and bolts specified for installation under other sections.
   2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by a Qualified Professional Engineer responsible for their preparation.

1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.06 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on the shop drawings.

1. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond with established dimensions.
2. Provide allowance for trimming and fitting at the site.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum fabrications.

2.02 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.03 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners. (ASTM F 1941M)

B. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

D. Post-Installed Anchors: Torque-controlled expansion anchors and/or chemical anchors.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.04 MISCELLANEOUS MATERIALS

A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.05 FABRICATION, GENERAL

A. Shop Assembly: Pre-assemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form exposed work with accurate angles and surfaces and straight edges.

D. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

F. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.06 SHELF ANGLES

A. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.07 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.08 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12 or as selected by the architect from manufacturer's full color range.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

END OF SECTION

SECTION 055100 - Metal Stairs **H2M**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 055213 - Pipe and Tube Railings: Metal handrails for the stairs specified in this section.

B. Section 099123 - Interior Painting: Paint finish.

1.02 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel.

F. NAAMM AMP 510 - Metal Stairs Manual.

G. NAAMM MBG 531 - Metal Bar Grating Manual.

H. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual.

1.03 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in New York, or personnel under direct supervision of such an engineer.

B. Fabricator Qualifications:

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Prefabricated Metal Stairs:

1. Lapeyre Stair, Inc: www.lapeyrestair.com/#sle.
2. Pacific Stair Corporation: www.pacificstair.com/#sle.
3. Precision Ladders, LLC; Aluminum Alternating Tread Stairs: www.precisionladders.com/#sle.

2.02 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.

1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
2. Dimensions: As indicated on drawings.

3. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
4. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
5. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:

1. Industrial: All joints made neatly.
   a. Welded Joints: Welded on back side wherever possible.
   b. Welds Exposed to Touch: Ground smooth.
   c. Bolts Exposed to Touch in Travel Area: No nuts or screw threads exposed to touch.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.03 METAL STAIRS WITH GRATING TREADS

A. Jointing and Finish Quality Level: Industrial, as defined above.

B. Risers: Open.

C. Treads: Steel bar grating.

1. Grating Type: Welded.
2. Bearing Bar Depth: 3/4 inch (19 mm), minimum.
3. Top Surface: Standard.
4. Nosing: Checkered plate.
5. Nosing Width: 1-1/4 inch (32 mm), minimum.
6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.

D. Stringers: Rolled steel channels.

1. Stringer Depth: 10 inches (250 mm).
2. End Closure: Sheet steel, 14 gauge, 0.075 inch (1.9 mm) minimum; welded across ends.

E. Railings: Steel pipe railings.

F. Finish: Galvanized after fabrication.

2.04 HANDRAILS AND GUARDS

A. Guards:

1. Top Rails: Round pipe or tube rails unless otherwise indicated.
   a. Outside Diameter: 1-1/4 inch (32 mm), minimum, to 1-1/2 inches (38 mm), maximum.
2. Infill at Pipe Railings: Pipe or tube rails sloped parallel to stair.
   a. Outside Diameter: 1 inch (25 mm).
   b. Material: Steel pipe or tube, round.
   c. Vertical Spacing: Maximum 4 inches (100 mm) on center.
   d. Jointing: Welded and ground smooth and flush.
3. End and Intermediate Posts: Same material and size as top rails.
   a. Horizontal Spacing: As indicated on drawings.
   b. Mounting: Welded to top surface of stringer.

2.05 MATERIALS

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.

C. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.

D. Gratings: Bar gratings that comply with NAAMM MBG 531 or NAAMM MBG 532, whichever applies based on bar sizes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

E. Obtain approval prior to site cutting or creating adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 055305.11 - METAL GRATINGS **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Metal bar gratings.
   2. Metal frames and supports for gratings.

1.03 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
   1. Floors: Uniform load of 125 lbf/sq. ft. (6.00 kN/sq. m) or concentrated load of 2000 lbf (8.90 kN), whichever produces the greater stress.
   2. Floors: Uniform load of 250 lbf/sq. ft. (11.97 kN/sq. m) or concentrated load of 3000 lbf (13.40 kN), whichever produces the greater stress.
   3. Walkways and Elevated Platforms Other Than Exits: Uniform load of 60 lbf/sq. ft. (2.87 kN/sq. m).
   4. Walkways and Elevated Platforms Used as Exits: Uniform load of 100 lbf/sq. ft. (4.79 kN/sq. m).
   5. Sidewalks and Vehicular Driveways, Subject to Trucking: Uniform load of 250 lbf/sq. ft. (11.97 kN/sq. m) or concentrated load of 8000 lbf (35.60 kN), whichever produces the greater stress.
   6. Limit deflection to L/360 or 1/4 inch (6.4 mm), whichever is less.

C. Seismic Performance: Provide gratings capable of withstanding the effects of earthquake motions determined according to ASCE 7.

1.04 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Pressure Locked Galvanized Metal Gratings.
   2. Clips and anchorage devices for gratings.
   3. Paint products.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.06 QUALITY ASSURANCE

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual" and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.08 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 FERROUS METALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Bars for Bar Gratings: ASTM A36/A36M or steel strip, ASTM A1011/A1011M or ASTM A 1018/A 1018M.

D. Wire Rod for Bar Grating Crossbars: ASTM A510/A510M.

E. Uncoated Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30 (Grade 205).

F. Galvanized-Steel Sheet: ASTM A653/A653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating.

G. Expanded-Metal Carbon Steel: ASTM F1267, Class 1.

H. Expanded-Metal Galvanized Steel: ASTM F1267, Class 2, Grade A.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 2 (A4).

C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

E. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

F. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.03 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Primers: Provide primers that comply with Section {\ch\#2} and Section 099123 - ASPHALT SHINGLES and Section 099600 "High-Performance Coatings."

D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.04 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
   1. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
   2. Fabricate toeplates for attaching in the field.
   3. Toeplate Height: 4 inches (100 mm) unless otherwise indicated.

2.05 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Barnett Bates Corporation.
   2. Borden Metal Products (Canada) Limited.
   3. IKG Industries; a division of Harsco Corporation.
   4. Ohio Gratings, Inc.

B. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
   1. Bearing Bar Spacing: 15/16 inch (24 mm) o.c.
   2. Bearing Bar Depth: As required to comply with structural performance requirements.
   3. Bearing Bar Thickness: As required to comply with structural performance requirements.
   4. Crossbar Spacing: 4 inches (102 mm) o.c.
   5. Grating Mark: As indicated.
   6. Traffic Surface: Serrated.
   7. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. (550 g/sq. m) of coated surface.

C. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.

1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
2. Provide no fewer than four saddle clips for each grating section composed of rectangular bearing bars 3/16 inch (4.8 mm) or less in thickness and spaced 15/16 inch (24 mm) or more o.c., with each clip designed and fabricated to fit over two bearing bars.
3. Provide no fewer than four weld lugs for each grating section composed of rectangular bearing bars 3/16 inch (4.8 mm) or less in thickness and spaced less than 15/16 inch (24 mm) o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
4. Provide no fewer than four flange blocks for each section of aluminum I-bar grating, with block designed to fit over lower flange of I-shaped bearing bars.
5. Furnish threaded bolts with nuts and washers for securing grating to supports.
6. Furnish self-drilling fasteners with washers for securing grating to supports.
7. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.
    a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
        1) Kee Industrial Products, Inc.; Grating Clip.
        2) Lindapter North America, Inc.; Grate-Fast.

D. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

E. Do not notch bearing bars at supports to maintain elevation.

2.06 GRATING FRAMES AND SUPPORTS

A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

B. Galvanize steel frames and supports in the following locations:

1. Exterior.
2. Interior, where indicated.
3. Carrier angles for Galvanized Steel Grate treads and toeplates.

2.07 STEEL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish gratings, frames, and supports after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Attach toeplates to gratings by welding at locations indicated.

F. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

G. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.02 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.

C. Attach non-removable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.03 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 - EXTERIOR PAINTING and Section {\ch\#2}.
C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

PART 2 PRODUCTS

1.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

1.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

1.03 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

B. Water-Resistive Barrier: See Section 072500.

1.04 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

END OF SECTION

SECTION 072100 - Thermal Insulation **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation and integral vapor retarder at over roof deck.

B. Batt insulation and vapor retarder in exterior wall and floor construction.

1.02 REFERENCE STANDARDS

A. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

F. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.04 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.
2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

B. Insulation over Roof Deck: Polyisocyanurate board.

2.02 FOAM BOARD INSULATION MATERIALS

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.

1. Classifications:

a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
   1) Class 1 - Faced with glass fiber reinforced cellulosic facers on both major surfaces of core foam.
   2) Compressive Strength: Classes 1-2-3, Grade 1 - 16 psi (110 kPa), minimum.
   3) Thermal Resistance, R-value (RSI-value): At 1-1/2 inch (38.1 mm) thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum, at 75 degrees F (24 degrees C).

2. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
3. Board Thickness: 1.5 inch (37.5 mm).
4. Tapered Board: Slope as indicated; minimum thickness 1.5 inch; fabricate of fewest layers possible.
5. Products:
   a. GAF; EnergyGuard Polyiso Insulation: www.gaf.com/#sle.

2.03 ACCESSORIES

A. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil, 0.010 inch (0.25 mm) thick.

B. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
   1. Application: Sealing of interior circular penetrations, such as pipes or cables.
   2. Width: Are required for application.

C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

A. Board Installation Over Roof Deck, General:
   1. See applicable roofing specification section for specific board installation requirements.
   2. Fasten insulation to deck in accordance with roofing manufacturer's written instructions and applicable Factory Mutual requirements.
   3. Do not apply more insulation than can be covered with roofing on the same day.

3.03 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

END OF SECTION

SECTION 074113 - Metal Roof Panels **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulated metal roof panel system of preformed steel panels.

B. Metal roof panel system of preformed aluminum panels.

1.02 RELATED REQUIREMENTS

A. Section 051200 - Structural Steel Framing: Roof framing and purlins.

B. Section 074213 - Metal Wall Panels: Preformed wall panels.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).

B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

C. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

E. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

F. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

G. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Storage and handling requirements and recommendations.
2. Installation methods.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.

1. Show work to be field-fabricated or field-assembled.

D. Test Reports: Indicate compliance of metal roofing system to specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.

1. Accredited by IAS in accordance with IAS AC472.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design:

B. Architectural Metal Roof Panel Manufacturers:

1. Metl-Span, a Nucor Company; LS-36: www.metlspan.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:

1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
3. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
4. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

2.03 STRUCTURAL METAL ROOF PANELS

A. General: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Insulated Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:

1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length(L) when tested in accordance with ASTM E1592.
   a. Dead Loads: Weight of roofing system.
   b. Live Loads: As required by ASCE 7.
   c. Green Roof Loads: 27-29lbs/sq.ft.
2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

4. Thermal Performance: Provide thermal resistance through entire system, R-value (RSI-value) of 15 deg F hr sq ft/BTU; 2 inch thick (2.6 K sq m /W; 50.8 mm thick), when tested in accordance with ASTM C1363.

C. Structural Insulated Metal Panels: Factory-formed panels with factory-applied finish.

1. Type: Double-skin, factory assembled with foamed-in-place polyurethane insulation.
2. Texture: Smooth.
3. Width: Maximum panel coverage of 16 inches (406 mm).

D. Metal Soffit Panels:

1. Profile: Style as indicated, with venting provided.

2.04 METAL ROOF PANELS

A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Metal Panels: Factory-formed panels with factory-applied finish.

1. Texture: Smooth.
2. Width: Maximum panel coverage of 24 inches (610 mm).

2.05 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.06 FABRICATION

A. Panels: Provide factory or field fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.07 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as selected by Architect from manufacturer’s standard line.

2.08 ACCESSORIES

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

1. Downspouts: Open face, rectangular profile.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

C. Sealants:

1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
3. Seam Sealant: Factory-applied, non-skinning, non-drying type.

D. Underlayment: Self-adhering polymer modified sheet; 20 mil (0.51 mm) total thickness; with strippable siliconized release film on bottom side and slip resistant and UV-stable facing on top side.

1. Water Vapor Permeance: 30 perm (1716 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M, Desiccant Method A.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof will be free of leaks.

B. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.

C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.

D. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Overall: Install roofing system in accordance with metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.

B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.

END OF SECTION

SECTION 074213.19 - Insulated Metal Wall Panels **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Factory-assembled metal panel system for walls, with trim, related flashings and accessory components.

1.02 RELATED REQUIREMENTS

A. Section 051200 - Structural Steel Framing: Structural steel building frame.

B. Section 074113 - Metal Roof Panels.

C. Section 074213 - Metal Wall Panels: Field-assembled wall panel system.

D. Section 076200 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

A. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Manufacturer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store pre-finished material off ground with weather protection to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Insulated Metal Wall Panels:

1. Metl-Span, a Nucor Company; CF Light Mesa: www.metlspan.com/#sle.

2.02 PERFORMANCE / DESIGN CRITERIA

A. Metal Panel System: Factory-assembled metal panel system, with trim, related flashings and accessory components.

1. Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
2. Accommodate tolerances of building structural framing.

B. Performance Requirements:
   1. Thermal Performance: Provide thermal resistance through entire system; R-value (RSI-value) of 26.2, minimum.
   2. Structural Performance: Design and size to withstand all dead loads and wind loads caused by positive and negative wind pressure acting normal to plane of panel.
      a. Verify structural performance in accordance with ASTM E330/E330M, using test pressure 1.5 times design wind pressure, with 10 seconds duration of maximum load.
   3. Movement: Accommodate the movement caused by the following without damage to system, components, or deterioration of seals:
      a. Normal movement between system components.
      b. Seasonal temperature cycling.
      c. Deflection of structural support framing,

2.03 COMPONENTS

A. Wall Panels: Exterior and interior metal sheet skin, factory-assembled, with foamed in place insulation; exterior and interior sheet interlocking at edges, fitted with continuous gaskets.

B. Soffit Panels: Same as wall panels.

C. Trim, Closure Pieces, Expansion Joints, Caps, Flashings, Fascias, Infills, and Gutters & Leaders: Same material, thickness and finish as exterior sheets; factory-fabricated to required profiles; fabricated in longest practicable lengths.

2.04 MATERIALS

A. Foamed-in-Place Insulation: Urethane type.

2.05 ACCESSORIES

A. Support for Cladding and Continuous Insulation: Continuous thermal Z-girts.
   1. Fiberglass reinforced plastic (FRP) girts that provide cladding attachment support for exterior wall cladding, brick veneer, CMU veneer, metal wall panels, and siding.
   2. Fasteners: As recommended by clip manufacturer.

B. Concealed Sealants: Non-curing butyl sealant or tape sealant.

C. Fasteners: Manufacturer's standard type to suit application; hot-dip galvanized steel with soft neoprene washers; provide with fastener cap same color as exterior panel.

PART 3 EXECUTION

3.01 EXAMINATION

3.02 INSTALLATION

A. Install panel system on walls and soffits in accordance with manufacturer's instructions.

B. Permanently fasten panel system to structural supports; aligned, level, and plumb, within specified tolerances.

C. Locate panel joints over supports.

D. Use concealed fasteners unless otherwise approved by Architect/Engineer.

E. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

END OF SECTION

SECTION 076200 - Sheet Metal Flashing and Trim **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, and exterior penetrations.

B. Sealants for joints within sheet metal fabrications.

C. Precast concrete splash pads.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

D. CDA A4050 - Copper in Architecture - Handbook.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Flashing and Trim:

1. ALUCOBOND by 3A Composites USA; ALUCOBOND AXCENT: www.alucobondusa.com/#sle.
2. Fairview Architectural LLC: www.fairview-na.com/#sle.
3. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
4. OMG Roofing Products: www.omgroofing.com/#sle.
5. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
6. Tamlyn; XtremeColor Flashing: www.tamlyn.com/#sle.
7. Taylor Metal Products: www.taylormetal.com/#sle.

2.02 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
B. Form pieces in longest possible lengths.
C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.
F. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

2.04 GUTTERS AND DOWNSPOUTS

A. Gutters: SMACNA (ASMM) Rectangular profile.
B. Downspouts: Rectangular profile.
C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
D. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.
E. Seal metal joints.

2.05 FLASHING

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.06 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.
B. Primer Type: Zinc chromate.
C. Concealed Sealants: Non-curing butyl sealant.
D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
E. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

3.03 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Apply plastic cement compound between metal flashings and felt flashings.

C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

D. Secure gutters and downspouts in place with concealed fasteners.

E. Set splash pads under downspouts.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION

SECTION 077273 - VEGETATED ROOF SYSTEMS **H2M**

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

A. CSA A123.24 - Standard Test Method for Wind Resistance of Vegetated Roof Assembly.

1.02 SCOPE

A. Provide equipment, materials, tools, and labor to install vegetated roofing modules. Modules to include growth media and plants. This work shall also include edge treatments, custom shaping of modules, and installing paver stones or ballast, slip sheet/root barrier and irrigation system, if specified.

1.03 SUBMITTALS

A. Product data for vegetated roofing systems.

B. To provide evidence of wind and fire safety, demonstrate video evidence of firespread testing and high speed wind resistance testing (minimum of 110 mph), and report of full scale dynamic wind uplift testing results. Provide green roof system wind uplift rating according to "Standard test method for wind resistance of modular vegetated roof assembly (CAN/CSA A123.24-15)."

C. Planting mix design indicating species and density of accent plants.

D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner’s name and registered with manufacturer.

E. Project-specific operation manual for inclusion in owner’s manuals.

1.04 QUALITY ASSURANCE

A. No deviation should be made from this specification. Installer assumes liability for any deviations from specification.

B. Only LiveRoof Certified Installer personnel shall complete all work. ???Specifiers: For Quality Assurance, consider listing approximately 5 approved bidders/Installers here. Contact LiveRoof NorthEast , 425 Greenfield Rd Deerfield , MA 01342 ((413) 773-7860) for specific for experienced contractor recommendations.???

C. Prior to installing LiveRoof modules, the following procedures are to be conducted:

1. The building Owner, Architect, or Engineer shall verify that the roof is properly designed and constructed to adequately support the load of the LiveRoof system.
2. The roof is to be flood tested for water tightness for 24 hours. Water testing shall be witnessed and confirmed in writing by Owner’s Representative and/or Design Professional, Waterproofing Contractor, Membrane Manufacturer, and Installation Contractor.
3. Slip sheet/root barrier to be properly installed, seams overlapped and bonded, in accord with architect’s and manufacturer’s specifications.
4. The roof is to be inspected and determined ready to accept the LiveRoof modules by a Technical Representative of the Installer.

D. During the LiveRoof installation and afterward, an inspection is to be conducted by a Technical Representative of the installer to verify that the LiveRoof modules have been installed tight

against each other, in straight rows, corners aligned, properly oriented, and tight against the edging.

1.05 PRE-INSTALLATION MEETING

A. Installer to convene one week before starting work of this section. Review LiveRoof Installation Standardized Procedures with supervisory staff and installation team.
B. Schedule certified installation personnel to supervise entire green roof installation.
C. Ensure that the slip sheet material meets membrane and green roof manufacturer specifications.
D. Ensure that edging is perforated at the bottom to allow water to drain freely and is installed between modules and stone ballast or wherever parapet or paver is of insufficient height/thickness to contain the soil from the subterranean green roof modules.
E. Ensure that soil and debris will be swept clean before placing each module.
F. Configure installation to minimize or eliminate walking on the plants during installation.

PART 2 - PRODUCTS

2.01 VEGETATED ROOFING MANUFACTURER

A. Provide vegetated roofing systems from the following LiveRoof Licensed Grower. Project must be bid with LiveRoof system, no alternates accepted.

LiveRoof NorthEast
425 Greenfield Rd
Deerfield, MA 01342
(413) 773-7860

B. 100 mil (2.54001 mm). thick (sidewall) recycled polypropylene and colored black or gray with dimensions of 1' x 2' x 3¼" for the Standard System. The LiveRoof Soil Elevator™, the insert collar that allows for growing soil above the container edge, is approximately 3½" tall for the Standard System, 16mil thick for the Standard System, and composed of recycled polyethylene or suitable biodegradable material. Each module is to be filled to the top of the Soil Elevator. Soil height from container bottom is approximately 4¼" elevation for the Standard System, although normal settling is to be expected and will reduce this height somewhat.
C. Saturated weight with mature vegetation: approximately 27-29 lbs/ft² for the Standard System.
D. Module clearance above roof deck: ½ inch.
E. LiveRoof® Licensed Grower to execute the following:
    1. LiveRoof Soil Elevator is to be properly inserted into fasteners inside LiveRoof module.
    2. LiveRoof module is to be filled with LiveRoof soil and appropriately settled either by mechanical vibration or flooding with water. Any settled soil is to be replaced so that LiveRoof soil extends to top of Soil Elevator at time of planting.
F. LiveRoof module is to be planted with green roof plants specified in Section 2.3. Plants are to be grown to maturity (appx. 95%+ soil coverage).

2.02 GROWING MEDIUM

A. Growing medium is an engineered blend of inorganic and organic components based upon German FLL granulometric guidelines and to contain ecologically sustainable levels of organic content.

2.03 PLANTS

A. Be sure to speak with your LiveRoof representative to select correct plants for your design intent.

B. Project must be bid with the specified plant varieties at the specified densities.

2.04 SLIP SHEET (ROOT BARRIER / PROTECTION LAYER)

A. Provided by Membrane Manufacturer. Confirm compatibility of slip sheet and waterproofing membrane with manufacturer.

B. Conventional Membrane Roof Assembly

1. Minimum 0.04 inch (1 mm) thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil during installation. Examples of commonly used slip sheets include the following. Installer to confirm compatibility of slip sheet and waterproofing membrane with waterproofing membrane manufacturer.
   a. Welded Seam Types - 0.04 inch (1 mm) or greater thickness
      -TPO, with seams heat welded
      -PVC, with seams heat welded
      -Polypropylene, with seams heat welded
      -HDPE, with seams heat welded
   b. Glued Seam Types - 0.04 inch (1 mm) or greater thickness
      -EPDM, with seams overlapped a minimum of 2.95 inch (75 mm) and glued with roll out adhesive or double sided tape adhesive of the type that is impervious to and not affected by moisture, and recommended by the manufacturer.
   c. Low profile drain board of appx. 0.02 inch (0.5 mm) thickness, with edges overlapped 2.95 inch (75 mm) and glued with manufacturer approved adhesive.

C. Do not use duct tape or adhesive for seaming that is not approved by the membrane manufacturer.

D. Never use moisture holding fabric, such as needle-punched / non-woven polyethylene or felt, under the green roof system with "conventional" (non-inverted) membrane roof assemblies. Such materials may trap aggregates and are impossible to sweep during installation and stay wet and encourage root growth and root penetration, which is especially detrimental if woody plants become established as such plants have woody root systems and may potentially cause roof leaks. This could lead to impeded drainage and compromise plant health.

E. In cases where electronic leak detection may be desired, a fiber-backed drainboard may be used. Fiber-backed drainboards are only recommended when electronic leak detection is desired, and only when vegetated with Sedums or Sempervivums, or other succulents, as these plants are sparsely-rooted and not prone to rooting into the fiber of the drainboard.

2.05 ACCESSORIES

A. RoofEdge Aluminum Edge Restraint

1. Provide RoofEdge aluminium edge restraint as manufactured by:
   LiveRoof Global, LLC
   PO Box 533, Spring Lake, MI
   (800) 875-1392
2. Aluminum, L-Shaped Edge restraint to be 4.25" x 3.25" for the Standard System, 8.5" x 3.25" for the Standard System with RoofBlue with a minimum thickness of .085" for the Standard System.
3. Edge restraint to be perforated to allow for drainage of 186 liters per minute per lineal meter.
4. Edge restraint to be bronze anodized
5. Edging design must allow for sliding connector to be used to transition from Standard to Deep and/or Maxx LiveRoof modules. Edge pieces to be connected with aluminum sliding connectors. For the Deep System, Maxx System, two sliding connectors must be used at each connection point.
6. Edging must be certified as extruded and stamped in the USA.
7. Corners to be prefabricated by the manufacturer, or may be bent or welded by the contractor.
8. Edging required at perimeter of green roof when exposed, or adjacent to stone ballast or conventional pavers.
9. Edging installations that are not surrounded by stone ballast or pavers should be secured to the green roof modules to ensure it is held in place. Edging should be fastened using 3/16" diameter wide-domed blind rivets into 0.192"-0.196" (drill size #11) holes on 12” centers.

B. WindDisc™

1. To enhance wind uplift resistance, system to be interconnected using WindDisc module connectors.
2. 1-3/4" diameter by 0.l" thick plastic discs to be inserted horizontally into slots at corners of each module. A ratio of approximately 1 WindDisc module connector to LiveRoof module is appropriate for most designs.

2.06 SLOPED APPLICATIONS

A. See Slope in A & E section of LiveRoof website. Slope force containment may need to be specified. LiveRoof has suggested methods and prepared slope force loading tables available on the Resources for Architects and Engineers section of the LiveRoof website. Determine need for containment, and specify method for containment.

PART 3 - EXECUTION

3.01 LIVEROOF INSTALLATION MUST BE CONDUCTED BY LIVEROOF CERTIFIED INSTALLER

A. Installer must provide current proof of certification from LiveRoof, LLC through a through a certificate dated for the current year.

3.02 PREPARATION OF ROOF SURFACE

A. Slip sheet/root barrier, specified by architect and approved by LiveRoof and membrane manufacturer, of 1-0.06 inch (1.5 mm) thickness with overlapped and effectively bonded seams to ward against root penetration and to keep waterproofing layer safe and clean from soil during installation.

1. Do not use duct tape or adhesive for seaming that is not approved by the membrane manufacturer.
2. Never use moisture holding fabric, such as needle-punched polyethylene or felt, under the green roof system.

B. Experienced Contractor to install slip sheet/root barrier in accordance with manufacturer's recommendations.

C. All surfaces to be smooth, free of debris, soil, and grit prior to placing modules. All materials to be tested water tight and free draining prior to module placement.

D. All surfaces to be maintained clean and free of debris, soil, and grit during installation process via use of broom. Never walk upon such materials as they may damage membranes.

3.03 INSTALLATION SEASON

A. Module Installation to be conducted when plants are:

1. Properly adapted and acclimatized to local weather conditions.
2. When weather is above 33° F and there is no ice on the roof and LiveRoof soil is unfrozen.
3. No later or earlier than the cut off date required by the green roof system provider's warranty terms. In areas of cold-winter temperatures, installation season is typically April 1 to November 15.
4. When plants cover 95% or more of soil surface.
5. When the Owner and General Contractor can ensure that, during and after the green roof installation, no foot traffic will be allowed on the plantings. If the Owner or GC cannot guarantee that modules will not experience late fall, winter or early spring foot traffic, the green roof installation should not occur until the following spring when other trades have finished their work.

3.04 DELIVERY, STORAGE, HANDLING, PROTECTION

A. LiveRoof modules are to be delivered in good condition free from shipping damage.

B. Keep LiveRoof modules out of sun on job site if plastic wrapped to avoid overheating.

C. LiveRoof modules are to be installed on the roof top within 4 hours of delivery.

D. On the job site, LiveRoof modules are to be handled to prevent damage to the modules themselves and all roofing components.

E. To ensure optimum plant condition and safety, modules must be conveyed to the roof using Hoppits or similar rack designed specifically for this use and constructed according to engineer approved and stamped plans. DO NOT stack modules during conveyance to rooftop or installation.

F. LiveRoof modules are to be conveyed to roof surface with equipment that is designed to carry the collective load of the LiveRoof modules and transport vehicle or Hoppit®. Account for decreasing load limits when boom (of crane or fork lift) is extended. Use crane stabilizers and take all necessary precautions to protect building and personnel.

G. Never exceed the load capacity of the roof deck when placing LiveRoof modules on the roof.

H. When suspending LiveRoof modules and conveyance vehicle or Hoppit® above deck, take precautions to stabilize vehicle and prevent twisting of conveyance vehicle or Hoppit®. Two layers of Styrofoam or 4 to 8 tires laid on the deck are recommended.

I. Surround area below conveyance vehicle and/or crane with caution/stay clear tape to prevent potential injury.

J. During installation, protect the roof deck and membranes with appropriate material such as plywood sheeting. Never scrape or puncture slip sheet or membranes. Keep roof surfaces free of soil, grit, or debris at all times with broom not blower. Never set LiveRoof modules on top of soil, dirt or grit.

K. LiveRoof Roll-a-Roof® conveyor to be used for optimum efficiencies when moving modules about rooftop.

L. Transport carts to have pneumatic tires, to be wheeled about only upon protective plywood sheeting, and to be loaded so as not to exceed weight capacity of roof deck.

3.05 SAFEGUARDING SYSTEM INTEGRITY

A. Before working on roof, all Installers and Laborers to be:

1. Properly instructed in safety procedures and provided LiveRoof Guide to Standardized Installation Procedures.
2. Instructed to keep all work surfaces clean and debris free.
3. To report immediately any damage to membranes, protective sheeting, or drain elements to supervisor, and to make appropriate repairs before proceeding.
4. Instructed in proper methods of LiveRoof installation by certified representative of installation company.

3.06 LAYING (PLACING) MODULES

A. LiveRoof module installation to follow behind installation of slip sheet/root barrier, irrigation system, pavers, ballast, and edging.

B. LiveRoof installation to be conducted in strict accordance with LiveRoof installation guidelines. Surface to be swept clean and free of soil, dirt, stones or grit before placing each module. Rows to be straight, modules to be tight against each other with edges overlapping and arranged in proper directional orientation. As soon as one row of modules is surrounded completely by the parapet, RoofEdge™ L-shaped edging, RoofStone pavers, or other LiveRoof modules, pull all of the LiveRoof Soil Elevators out of the modules in the surrounded row. NOTE: If biodegradable Soil Elevator is used, then Soil Elevator is left in place. Pull the Soil Elevators while standing on the slip sheet and avoid walking or kneeling on the plants.

C. As each row of modules is installed tightly together, insert WindDisc module connectors in module slots facing the installer. Line up the next row of modules and slide into place so that the WindDisc module connectors each hold four module corners together.

D. LiveRoof module installation to be conducted in accordance with green roof design.

E. LiveRoof modules to be placed over RoofBlue risers atop appropriate slip sheet/root barrier.

F. It is recommended that any custom cutting/fitting be oriented on the high side (top), or sides of the roof. It is recommended that the cut side of the module be set tight against the edging or toward the side of an intact module so as to prevent soil spillage. If custom cutting must be done on the low, draining, side of the roof, it is imperative that no filter cloth be inserted as it could impede drainage. It is best to orient the cut side against another module, facing upstream.

G. After installing modules, they should be immediately watered so as to thoroughly moisten the media from top to bottom. Water shall be of suitable quality for plant growth and irrigation system or hoses and sprinklers may be used for such purpose. Note: it takes approximately 1 inch (25.4 mm) of water for the Standard System, or 1 ¼ gallons per module for the Standard System to moisten each module thoroughly.

H. First maintenance visit to be conducted two (2) weeks after installation is completed and continued according to Section 3.8.Maintenance visits performed by Installer/ Owner/ hired Maintenance Contractor. Installer to perform first six months/ 12 months / 2 years maintenance commencing completion of green roof system installation.???

3.07 WARRANTY

A. 50 Year Module Limited Warranty: Green Roof system manufacturer shall provide limited fifty (50) year guarantee that product will be free of material defects and against photodegradation.
   1. Installer shall complete and submit warranty registration form and post-installation punch list to manufacturer within 60 days of delivery to complete warranty registration.

B. 15 Year Aluminum Edge Restraint Warranty Manufacturer shall provide limited fifteen (15) year guarantee against material defects.

C. 50 Year Riser Limited Warranty: Blue Roof Riser manufacturer shall provide limited fifty (50) year guarantee that product will be free of material defects and against photodegradation.

D. Overburden Removal/Replacement Limited Warranty: If overburden is desired and not offered by the roof membrane manufacturer for this project, warranty coverage may be provided by LiveRoof Global, LLC for terms up to twenty years. Call LiveRoof Global, LLC for terms and pricing, 800-875-1392.

3.08 MAINTENANCE

A. Documentation
   1. Upon email request, LiveRoof, LLC shall provide twice monthly informational email maintenance protocol, free of charge, that shares current best maintenance practices, seasonal topics related to plant care, and chronologically guides the maintenance contractor though the various steps of the maintenance protocol beginning March 15 and ending Nov. 1 of each year.
   2. Record all green roof maintenance events. Include name of person, date and activity.
      a. If soil test, record lab, test, and results
      b. If fertilizer, record type and amount applied per 1000sf

c. Record time needed for bi-weekly weed walk and drain inspection
d. If irrigation, record duration and quantity

B. Foot Traffic: Limit foot traffic to a random path a couple times per week by one person. Avoid walking in a single path, standing in one place, or trampling plants. If parapet or adjoining wall must be serviced, plants may be covered with plywood or foam sheeting for up to 4 hours intermittently, provided foliage is not wet or frozen and conditions are not too hot or sunny.

C. Spring Maintenance (March to June)

1. Soil Testing and Fertilization. Approximately 2-3 weeks before spring "growth flush," administer an annual soil test for PH and fertility levels. Growth flush varies by region, consult biweekly maintenance protocol email for specific recommended testing date in project's region.
2. Maintain pH in the range of 6.5 to 8.0. In the event that pH falls below 6.0, consult the testing lab for appropriate recommendations to increase alkalinity. If the soil is above 8.0, it can be made more acidic with elemental sulphur or an application of acidifying fertilizer.
3. Maintain fertility in the normal range using a typical field soil fertility test as provided by A&L labs or equivalent testing lab. Evaluate the various nutrient levels such as Nitrogen (N or NO3N), Potassium (K), Phosphorus (P). If the soil contains a low (L) amount of these nutrients, conduct a single application of controlled release fertilizer, such as Nutricote® or Osmocote®, at the lab recommended rate. Ensure that the chosen fertilizer contains NO Herbicides or Pesticides. Follow the fertilizer labeled directions for application rate and use a rotary spreader to ensure even fertilizer application. Runoff potential does exist and should be evaluated by the applicator in accord with the site specifics; the greater the runoff sensitivity, the lower the application rate. All applications of fertilizer are the sole responsibility of the applicator.
4. Mowing (optional)
   a. If desired, conduct a single annual mowing in early April. Set the mower blade just above the foliage in order to remove dried seed heads. Do not bag the clippings; instead, blow them into the green roof so that they can decompose and nourish the soil.
   b. Be safe, use protective equipment, including harnesses if required. Make sure the roof is free of frost or other slipping hazards.
5. Conduct Biweekly Inspections
   a. Weed Walk: Pull and dispose of all weeds before they flower and set seed. NEVER allow any woody plant to establish in a green roof system, as they have deep root systems which can damage roofing membranes.
   b. Displaced Soil: Nesting birds may displace soil. Replace lost soil using only LiveRoof brand engineered green roof soil.
   c. Drainage Inspection: Inspect roof drains for any debris, pebbles or leaves and remove to ensure proper drainage.
   d. Debris Removal: Remove any debris blown onto the roof immediately to ensure no damage to plants.
   e. Pest Control: Monitor pest presence, as most pest problems are the result of an imbalance in the relationship of pest organism and its natural biological controls and these problems may self-correct. If pest problems are persistent, use organic and natural biological control agents to restore balance. Pesticide use is discouraged and should always be considered secondary to cultural and biological control measures, as pesticides can contaminate runoff water and cause environmental damage. Pesticides

shall only be applied by qualified and licensed applicators, and only as required. All applications of pesticides are the sole responsibility of the applicator.

D. Summer Maintenance (June to September)

1. Conduct Biweekly Inspections
2. Irrigation
    a. When planted with drought tolerant succulents, irrigation recommended as a temporary management tool during prolonged hot dry weather to prevent plant thinning or death. Prolonged hot dry weather is generally defined as periods of 75° F weather with less than 1" of rainfall persisting for 2 weeks for the Lite system and 4 weeks for all other systems. This time period will be less if the temperatures are hotter, the climate warmer, on sloping roofs, and roofs exposed to persistent winds or reflected sunlight. Such conditions can dry out the soil and can cause plant dormancy or, in extreme cases, death.
    b. There are no absolutes when it comes to irrigation. Check the plants for wilting in the afternoon. Water thoroughly to runoff to remoisten entire soil profile if the plants show signs of wilting.
    c. Shaded areas require less irrigation.

E. Fall Maintenance (October to November)

1. Conduct Biweekly Inspections, unless ice or frost is present.
2. Do Not Fertilize during the fall. It may stimulate tender growth and compromise the cold hardiness of the plant material.
3. Do Not Water Period: For the northern temperate zone, LiveRoof recommends that you do not water within 4 weeks of the expected average frost date. Normally, there is plenty of moisture this time of year, and adding additional water may compromise the durability of the plants to endure winter's cold. For this reason, watering during the winter is also not recommended.
4. Rake, bag and remove fallen and matted leaves. These can smother the green roof plants.

F. Winter Maintenance

1. Northern Temperate Climates
    a. Watering is not recommended.
    b. Avoid walking on frozen plants and roof surfaces as they are slippery and dangerous.
    c. If clear pathways are needed, avoid using salt and other deicing chemicals, which may kill plants and damage pavers. Instead, use sand or cat litter as an anti-slip agents. Consider use of heat strips with pavers, provided they can be applied without damage to the roofing membrane.
    d. Avoid piling the snow in a single place. Disperse snow evenly over the green roof plantings as excess snow piling can potentially damage plants by insulating the plants and keeping them warm and wet, thereby triggering fungal diseases.
2. Warm Climates
    a. Conduct Biweekly Inspections, unless ice or frost is present.

3.09 ACCEPTANCE

A. Conduct post installation inspection to determine acceptance of modules. Inspection to be made by General Contractor's Representative or by Owner's Representative upon General Contractor's request; five working days notice required.

B. Installer is responsible to complete requirements to obtain confirmation of warranty from the green roof systems manufacturer.

C. Installer is responsible to ensure proper module/plant maintenance until work has been accepted by representative of Owner or General Contractor.

D. Upon acceptance, Owner assumes responsibility for module/plant maintenance unless otherwise specified.

3.10 CLEAN UP

A. Throughout installation, keep all work surfaces clean and free of grit, dirt, or debris. Use broom not blower, do not sweep soil under modules or slip sheet. Following installation, remove all excess materials and tools from job site. Ensure that any damage that occurs as a result of installation is appropriately and immediately repaired.

END OF SECTION 077273

SECTION 078400 - Firestopping **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

C. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.

D. ITS (DIR) - Directory of Listed Products.

E. FM (AG) - FM Approval Guide.

F. UL 1479 - Standard for Fire Tests of Penetration Firestops.

G. UL (FRD) - Fire Resistance Directory.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:

1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
2. Hilti, Inc: www.hilti.com/#sle.
3. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: www.tremcosealants.com/#sle.

2.02 MATERIALS

A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.

2.04 FIRESTOPPING FOR PERIMETER CONTAINMENT

A. Perimeter Joint Systems That Have Not Been Tested For Movement Capabilities (Static-S):

1. 2 Hour Construction: UL System CW-S-0002; Specified Technologies Inc. AS200 Elastomeric Spray.

B. Perimeter Joint Systems That Have Movement Capabilities (Dynamic-D):

1. 2 Hour Construction: UL System CW-D-2014; RectorSeal MetaCaulk 1200 Spray.

2.05 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.

1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

END OF SECTION

SECTION 079200 - Joint Sealants - DOW Silicones Corporation **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

C. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants.

E. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

C. Executed warranty.

1.05 QUALITY ASSURANCE

A. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.

1. Adhesion Testing: In accordance with ASTM C794.
2. Compatibility Testing: In accordance with ASTM C1087.
3. Allow sufficient time for testing to avoid delaying the work.
4. Deliver sufficient samples to manufacturer for testing.
5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

1.06 WARRANTY

A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Joint Sealants:

2.02 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
2. Do not seal the following types of joints:
   a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   c. Joints where installation of sealant is specified in another section.
   d. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use nonsag silicone sealant, unless otherwise indicated.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.

2.04 NONSAG JOINT SEALANTS

A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.

2.05 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

END OF SECTION

SECTION 079513 - Expansion Joint Cover Assemblies **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for wall surfaces.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Exterior Wall Joints Subject to Thermal Movement:

1. Manufacturers:
   a. Balco, Inc; Exterior Wall, Elastomeric Face Seal System (FCWW): www.balcousa.com/#sle.
   b. Construction Specialties, Inc; Exterior Wall Covers: www.c-sgroup.com/#sle.
   c. Sika Emseal; _____: www.emseal.com/#sle.
   d. SITURA Inc; _____: www.situra.com/#sle.

2.03 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.

1. Joint Dimensions and Configurations: As indicated on drawings.
2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

END OF SECTION

SECTION 081113 - Hollow Metal Doors and Frames **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

A. Section 087100 - Door Hardware.

B. Section 088000 - Glazing: Glass for doors and borrowed lites.

C. Section 099113 - Exterior Painting: Field painting.

D. Section 099123 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. ASCE: American Society of Civil Engineers.

C. HMMA: Hollow Metal Manufacturers Association.

D. NAAMM: National Association of Architectural Metal Manufacturers.

E. NFPA: National Fire Protection Association.

F. SCIF: Sensitive Compartmented Information Facility.

G. SDI: Steel Door Institute.

H. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.

D. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.

E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).

F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

J. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

K. ASTM C476 - Standard Specification for Grout for Masonry.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities.

M. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames.

N. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.

O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
2. De La Fontaine Inc: www.delafontaine.com/#sle.
3. De La Fontaine Inc: www.delafontaine.com.
4. De La Fontaine Inc: www.delafontaine.com.
5. Republic Doors: www.republicdoor.com.
6. Steelcraft, an Allegion brand: www.allegion.com/#sle.
7. Technical Glass Products; SteelBuilt Window & Door Systems: www.tgpamerica.com/#sle.
8. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
   a. Level 2 - Heavy-duty.
   b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
   c. Model 1 - Full Flush.
   d. Door Face Metal Thickness: 18 gauge, 0.042 inch (1.0 mm), minimum.
2. Door Thickness: 1-3/4 inches (44.5 mm), nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Full profile/continuously welded type.

1. Weatherstripping: Separate, see Section 087100.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.

2.06 ACCESSORIES

A. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches (102 mm) as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

B. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

C. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.07 FINISHES

A. Primer: Rust-inhibiting, complying with {\rs\#1}, door manufacturer's standard.

B. Factory Finish: Complying with {\rs\#1}, manufacturer's standard coating.

C. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch (1.6 mm).

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install prefinished frames after painting and wall finishes are complete.

C. Install fire rated units in accordance with NFPA 80.

D. Coordinate frame anchor placement with wall construction.

E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

F. Install door hardware as specified in Section 087100.

1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.

G. Comply with glazing installation requirements of Section 088000.

H. Coordinate installation of electrical connections to electrical hardware items.

I. Touch up damaged factory finishes.

3.04 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

PART 2 PRODUCTS

1.01 MANUFACTURERS

A. Overhead Coiling Metal Doors:

1. C.H.I. Overhead Doors; Model 6180: www.chiohd.com/#sle.

1.02 COILING DOORS

A. Exterior Coiling Doors Type F-265: Steel slat curtain.

1. Capable of withstanding positive and negative wind loads of 30 psf (1410 Pa) without undue deflection or damage to components.
2. Guide, Angles: Galvanized steel.
3. Hood Enclosure: Manufacturer's standard; primed steel.
4. Mounting: As indicated on drawings.
5. Locking Devices: Slide bolt on inside.

1.03 MATERIALS

A. Metal Curtain Construction: Interlocking slats.

1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
2. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
3. Curtain Bottom for Panel-Slat Curtains: Extruded aluminum.
4. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
5. Smoke Seals: Provide brush or gasket type weatherstripping seals to prevent passage of smoke and hot gases in compliance with UL 1784 testing requirements.
6. Steel Slats: Minimum thickness, 24 gauge, 24 inch (610 mm); ASTM A653/A653M galvanized steel sheet.

B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.

1. Hot-dip galvanized in compliance with ASTM A123/A123M.

D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

E. Lock Hardware:

1. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
2. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.

PART 3 EXECUTION

2.01 EXAMINATION

A. Verify that adjacent construction is suitable for door installation.

B. Verify that electrical services have been installed and are accessible.

C. Verify that door opening is plumb, header is level, and dimensions are correct.

D. Notify Architect/Engineer of any unacceptable conditions or varying dimensions.

E. Commencement of installation indicates acceptance of substrate and door opening conditions.

F. Verify that opening sizes, tolerances and conditions are acceptable.

2.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install smoke door assemblies in accordance with NFPA 105.

C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

F. Install enclosure and perimeter trim.

END OF SECTION

SECTION 087100 - Door Hardware **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for hollow metal doors.

B. Thresholds.

C. Weatherstripping and gasketing.

1.02 REFERENCE STANDARDS

A. BHMA A156.1 - American National Standard for Butts and Hinges.

B. BHMA A156.3 - American National Standard for Exit Devices.

C. BHMA A156.4 - American National Standard for Door Controls - Closers.

D. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders.

E. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000.

F. BHMA A156.16 - American National Standard for Auxiliary Hardware.

G. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots.

H. BHMA A156.18 - American National Standard for Materials and Finishes.

I. BHMA A156.21 - American National Standard for Thresholds.

J. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems Sponsor.

K. UL (DIR) - Online Certifications Directory.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Provide door hardware products that comply with the following requirements:

1. Applicable provisions of federal, state, and local codes.

2.02 HINGES

A. Hinges: Comply with BHMA A156.1, Grade 1.

1. Self Closing Hinges: Comply with BHMA A156.17.

2. Provide hinges on every swinging door.
3. Provide ball-bearing hinges at each door with closer.
4. Provide non-removable pins on exterior outswinging doors.
5. Provide following quantity of butt hinges for each door:
    a. Doors From 60 inches (1.5 m) High up to 90 inches (2.3 m) High: Three hinges.

2.03 FLUSH BOLTS

A. Flush Bolts: Comply with BHMA A156.16, Grade 1.

1. Flush Bolt Throw: 3/4 inch (19 mm), minimum.

2.04 EXIT DEVICES

A. Exit Devices: Comply with BHMA A156.3, Grade 1.

1. Lever design to match lockset trim.
2. Provide cylinder with cylinder dogging or locking trim.
3. Provide exit devices properly sized for door width and height.
4. Provide strike as recommended by manufacturer for application indicated.
5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.05 LOCK CYLINDERS

A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.

1. Provide cylinders from same manufacturer as locking device.
2. Provide cams and/or tailpieces as required for locking devices.

2.06 MORTISE LOCKS

A. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.

1. Latchbolt Throw: 3/4 inch (19 mm), minimum.
2. Deadbolt Throw: 1 inch (25.4 mm), minimum.
3. Backset: 2-3/4 inch (70 mm) unless otherwise indicated.
4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
    a. Finish: To match lock or latch.

2.07 CLOSERS

A. Closers: Comply with BHMA A156.4, Grade 1.

1. Type: Surface mounted to door.
2. Provide door closer on each exterior door.

2.08 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.

1. Provide stop for every swinging door, unless otherwise indicated.

2.09 KICK PLATES

A. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.

1. Size: 8 inch (203 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.

2.10 DOOR HOLDERS

A. Door Holders: Comply with BHMA A156.16, Grade 1.

1. Type: Lever, or kick down stop, with rubber bumper at bottom end.
2. Material: Aluminum.

2.11 WALL STOPS

A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.

1. Type: Bumper, concave, wall stop.
2. Material: Aluminum housing with rubber insert.

2.12 THRESHOLDS

A. Thresholds: Comply with BHMA A156.21.

1. Provide threshold at each exterior door, unless otherwise indicated.
2. Type: Flat surface.
3. Material: Aluminum.
4. Threshold Surface: Fluted horizontal grooves across full width.
5. Field cut threshold to profile of frame and width of door sill for tight fit.
6. Provide non-corroding fasteners at exterior locations.

2.13 WEATHERSTRIPPING AND GASKETING

A. Weatherstripping and Gasketing: Comply with BHMA A156.22.

1. Head and Jamb Type: Adjustable.
2. Door Sweep Type: Encased in retainer.
3. Material: Aluminum, with brush weatherstripping.

2.14 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.

1. Primary Finish: 625; bright chromium plated over nickel, with brass or bronze base material (former US equivalent US26); BHMA A156.18.
2. Secondary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
    a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

D. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

END OF SECTION

SECTION 099123 - Interior Painting **H2M**

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Floors, unless specifically indicated.
6. Glass.
7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

C. SSPC-SP 1 - Solvent Cleaning.

D. SSPC-SP 6/NACE No.3 - Commercial Blast Cleaning.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.04 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 fc (860 lux) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes from the same manufacturer to the greatest extent possible.

B. Paints:

1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, and galvanized steel.
   1. Two top coats and one coat primer.
   2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, 141, or 142.
      a. Products:
         1) Sherwin-Williams Scuff Tuff Interior Waterbased Enamel, Flat, S22-150 Series.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:
   1. Two top coats and one coat primer.
   2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
      a. Products:
         1) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.

C. Paint I-OP-MD-WC - Medium Duty Vertical and Overhead: Including gypsum board, concrete, concrete masonry units, and galvanized steel.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
      a. Products:
         1) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.

D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, and galvanized piping.
   1. Shop primer by others.
   2. One top coat.
   3. Top Coat: Alkyd Dry Fall; MPI #55, 89, or 225.
      a. Products:
         1) Sherwin-Williams Dryfall Flat. (MPI #55)

E. Paint I-OP-FL - Concrete Floors to be Painted.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Latex Floor Paint, Low Gloss; MPI #60.
      a. Products:
         1) Sherwin-Williams Tread-Plex Acrylic Floor Coating. (MPI #60)

F. Paint I-TR-C - Transparent Finish on Concrete Floors.

1. 1 coat stain.
2. Stain: Semi-Transparent Stain for Concrete Floors; MPI #58.
   a. Products:
      1) Behr Premium Semi-Transparent Concrete Stain [No.850]. (MPI #58)
3. Sealer: Water Based Sealer for Concrete Floors; MPI #99.
   a. Products:
      1) Sherwin-Williams H&C Clarishield Water-Based Wet-Look Concrete Sealer. (MPI #99)

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
   1. Alkali Resistant Water Based Primer; MPI #3.
      a. Products:
         1) Sherwin-Williams Loxon Water Blocking Primer/Finish.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Concrete:
   1. Clean concrete according to ASTM D4258. Allow to dry.

F. Masonry:

G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

I. Galvanized Surfaces:

J. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning in accordance with SSPC-SP 6/NACE No.3. Protect from corrosion until coated.

3.02 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

SECTION 101423 - SIGNAGE **H2M**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Room and door identification signs.
   2. Life Safety Signage.

1.03 RELATED REQUIREMENTS:

A. Section 015000 - TEMPORARY FACILITIES AND CONTROLS for temporary Project identification signs and for temporary information and directional signs.

1.04 DEFINITIONS

A. Accessible: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and {\rs\#1} for signs.

1.05 ACTION SUBMITTALS

A. See Section 013300 - SUBMITTALS.

B. Product Data: For each type of product. Include Manufacturer’s construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

C. Shop Drawings: For panel signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
   1. Include representative Samples of available typestyles and graphic symbols.
   2. Provide manufacturer's full color palette in the form of a color deck or actual samples for selections by the Architect.

E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years of documented experience.

C. Single Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

D. Handle products in accordance with Manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Field Measurements: Verify locations of signage and field mounting surfaces in the field before fabrication, and indicate measurements on Shop Drawings.

B. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

C. Maintain this minimum temperature during and after installation of signs.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within manufacturers specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of finishes beyond normal weathering.
   b. Deterioration of embedded graphic image.
   c. Separation or delamination of sheet materials and components.
2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANEL SIGNS, GENERAL

A. Regional Materials: Panel signs shall be manufactured within 500 miles (800 km) of Project site.

2.02 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

2.03 INTERIOR SIGNAGE

A. Manufacturer: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. ASI Sign Systems, Inc.
   a. ASI, 8181 Jetstar Drive, Suite 100, Irving, Texas 75063; (214) 352- 9140; telephone; (214) 352-9741 facsimile; (800) ASI-SPEC [274-7732]
2. Best Sign Systems Inc.
3. Mohawk Sign Systems.
4. Precision Signs.

B. Room Identification and Panel Signage: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profile.

C. Life Safety Signage: Sign with smooth, uniform surfaces; with message and characters and graphics having uniform faces, sharp corners, and precisely formed lines and profile.

1. Provide the following signage as indicated on the drawings and as required by the AHJ:
   a. Area of Refuge with additional Instructional and Two-Way Communication Signage.
   b. In Case of Fire - Use Stairways.
   c. Stairwell Identification signage at each level.
   d. Tactile Floor Level Signage.
   e. Fire Door signage - "Do Not Block" / "Keep Closed"
   f. Handicap Accessible Exit directional signage.
   g. No Exit signage.
   h. Push Until Alarm Sounds.
   i. Evacuation Map signage (located as directed by AHJ and based on a scale floor plan graphic for each building level) with the following graphics:
      1) "You are Here"
      2) Primary and Secondary Exit routes
      3) Exit Doors and Stairwells.
      4) Fire Extinguisher, Fire Pull, First Aid and AED locations.
      5) Assembly Areas (after exiting the building)
      6) Legend for all graphics.

D. Interior Signage: Sign with smooth, uniform Photopolymer matte (non-glare) surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles on an Acrylic backing plate material as follows:

1. Basis-of-Design Product: ASI Sign Systems, Inc.; InTouch ADA-Ready Sign System.
2. Acrylic Sheet Sign: face sheet with raised graphics laminated to backing sheet to produce composite sheet.
   a. Material Thickness: 0.125 inch thick matte finish acrylic.
   b. Text and Graphics: Tactile copy and Grade 2 Braille raised 1/32 inch minimum from sign surface by manufacturer's photopolymer bonded integrally on a single material. Precisely formed lettering and graphics, uniformly opaque, ADA compliant in size, style, spacing, content, position and colors.
   c. Sign Sizes: As indicated on the drawings.
   d. Sign Shape: As indicated on the drawings.
   e. Sign Graphics: As indicated on the drawings.
   f. Letter Style: As selected by the Architect from the manufacturer's full text style offering.
   g. Letter Size: As selected by the Architect from the manufacturer's full text style size offering or as indicated on the drawings.
   h. Color(s): As selected by the Architect from the manufacturer's full color offering.
   i. Mounting: System CSMH-Counter Sunk mechanical fasteners.

2.04 INTERIOR DIMENSIONAL LETTER SIGNAGE

A. SIGNAGE SYSTEMS

1. Acceptable Manufacturers:
   a. ASI Signage Innovations, 8181 Jetstar Drive, Suite 100, Irving, Texas 75063; (214) 352-9140 telephone; (214) 352-9741 facsimile; (800) ASI-SPEC [274-7732]
   b. Substitutions: Submit in accordance with Sections 012500 - PRODUCT SUBSTITUTION PROCEDURES and 016100 - BASIC PRODUCT REQUIREMENTS.
2. Acceptable Product: Series LPP, Cut Acrylic Dimensional Letters.
3. Material: Precision Cut Acrylic or as indicated on the drawings.
4. Finish: As selected by the Architect from the manufacturer's full color offering..
5. Fabricated Letters:
   a. Text and Typeface:
      1) Character Font: Helvetica, Arial, or other sans serif font.
         (a) Font Stroke: Standard
      2) Character Case: Upper case only.
   b. Letter Height: Nine (9) inches
   c. Letter Depth: Three-quarter (3/4) inch.
6. Mounting Method: Integral Threaded Rod with Tube Spacer Standoffs with back plates and securing hardware..

B. FABRICATION - GENERAL

1. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
2. Design, fabricate, and install sign assemblies to prevent buckling, opening up of joints, and over-stressing of welds and fasteners.
3. Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
5. Create signage to required sizes and layout. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

2.05 SIGN MATERIALS

A. Acrylic Covers / Properties:

1. Excellent weather resistance.
2. Long stability against UV degradation.

B. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

C. Powder Coated Finish:

1. General: The standard powder coat finish consists of a Polyester or TGIC (Triglycidyl Isocyanurate) Polyester.
2. Surface Preparation and Powder Coating: The exterior surface is cleaned in a minimum 5 stage wash system prior to the powder application. Then all exterior surfaces are coated with either a Polyester or TGIC (Triglycidyl Isocyanurate) Polyester powder. The powder coating is electrostatically applied to an average film thickness (DFT) of 3.0 mils (0.003”) and then cured in a gas fired convection oven at a temperature range of 350° F - 400° F.

The thermosetting powder resin provides both inner coat as well as substrate fusion adhesion.

2.06 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
      b. Fastener Heads: For nonstructural connections, use screws and bolts with tamper-resistant spanner-head slots unless otherwise indicated.
   3. Sign Mounting Fasteners and Sleeves:
      a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
      b. Provide Brushed Stainless Steel spacer tubes as indicated on the drawings over integral threaded studs complete with backer plate and securing hardware for Stand-off mounting.
   4. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.

2.07 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that mounting locations for each sign exist which comply with ICC A117.1, Chapter 7.

C. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

D. Verify that anchor inserts are correctly sized and located to accommodate signs.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to the accessibility standard.
   3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
   4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Room Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to ICC A117.1 accessibility standards.

C. Mounting Methods:
   1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
      a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
      b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
   2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
      a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
      b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
   3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
   4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
   5. Mount signs in accordance with the manufactures specifications using non-corrosive vandal-resistant fasteners finished to match adjacent sign material.

D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.03 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
B. Remove temporary protective coverings and strippable films as signs are installed.
C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 220523 - VALVES FOR PLUMBING SYSTEMS **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Gate valves
B. Check valves
C. Plug valves
D. Water pressure reducing valves
E. Gage cocks
F. Ball valves

1.02 ABBREVIATIONS

A. IBBM: Iron body, bronze mounted.
B. OS&Y: Outside screw and yoke.
C. WOG: Water, oil, gas.
D. WSP: Working steam pressure.

1.03 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets and specifications for each valve type.
B. Valve Schedule: List type of valve, manufacturer's model number, and size for each service application.

1.04 MAINTENANCE

A. Special Tools:
    1. One wrench for each type and size wrench operated plug valve.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
C. Valve parts of same manufacturer, size and type shall be interchangeable.
D. Manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified.
E. Valves which use packing, shall be capable of being packed when wide open and under full working pressure.
F. Size valves the same size as the piping in which they are installed, unless specified otherwise.

2.02 GATE VALVES

A. Type A: 125 psig WSP, 200 psig WOG, bronze body, union bonnet, solid wedge disc, and threaded ends. Acceptable Valves: Crane428UB, Hammond IB617, Jenkins 47CU, Milwaukee 1152, Nibco T13, and Stockham B105.

B. Type C: 125 psig WSP, 200 psig WOG up to 12 inch size, and 150 psig WOG for 14 inch and 16 inch sizes; IBBM OS&Y, bolted bonnet, solid wedge disc, and threaded or flanged ends depending on size. Acceptable Valves: Crane 464-1/2, 465-1/2, Hammond IR1140, Milwaukee F2885, Nibco T6170 & F6170, and Stockham G620 & G623

C. Type D: 125 psig WSP, 200 psig WOG, bronze body, threaded bonnet, solid wedge disc, and solder ends. Acceptable Valves: Crane 1330, Hammond IB635, Jenkins 991AJ, Milwaukee 149, Nibco S111, and Stockham B108.

2.03 CHECK VALVES

A. Type S: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and threaded ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 37, Hammond IB940, Jenkins 4092, Milwaukee 509, Nibco T413Y, and Stockham B319Y.

B. Type U: 125 psig WSP, 200 psig WOG, bronze body, brass or bronze trim, horizontal swing, renewable and regrindable disc, and solder ends. Face discs for cold water service with teflon. Acceptable Valves: Crane 1340, Hammond IB912, Jenkins 4093, Milwaukee 1509, Nibco S413Y, and Stockham 309Y.

C. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

D. Type W:

1. Globe Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
    a. Acceptable Valves (125 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 20D, Hammond IR9354, Milwaukee 1800, Nibco F910, and Williams Hager 636.
    b. Acceptable Valves (250 psig flange pressure rating): Apco Series 600, Combination Pump & Valve 21D, Milwaukee 1800, Nibco F960, and Williams Hager 636.
2. Wafer Style Silent Check Valve: IBBM or semi-steel with bronze mounting, renewable seat and disc, 18-8 stainless steel spring, and flanged ends.
    a. Acceptable Valves (125 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 10D, Hammond IR9253, Milwaukee 1400, Nibco W910, and Williams Hager 329 & 375.
    b. Acceptable Valves (250 psig flange pressure rating): Apco Series 300, Combination Pump and Valve 11D, Milwaukee 1400, Nibco W960, and Williams Hager 329 & 375.

2.04 PLUG VALVES

A. Type AA: 200 psig WOG, lubricated type with standard port opening, cast iron or semi-steel body, sealed lubrication system with lubricant fitting and dial indicator, cylindrical plug or teflon tapered plug, lubricant grooves in body or plug, threaded or flanged ends depending on size, and capable of lubrication with valve under pressure and plug in any position.
   1. Acceptable Valves:
      a. 1/2 inch to 3 inch size: Homestead 611 & 612, , Resun R1430 & R1431,and Rockwell 142 & 143.
      b. 4 inch size: Homestead 611 & 612, , Resun R1430 & R1431, and Rockwell 142 & 143.
      c. 5 inch size: Homestead 611 & 612, Resun R1431, Rockwell 143, and Walworth 1797F.
      d. 6 inch size: Homestead 611 & 612, , Resun R1431, Rockwell 143.
      e. 8, 10 & 12 inch sizes: Homestead 612G, , Resun R1431WGA, Rockwell 149.
   2. Operators:
      a. 6 inch size and Less: Wrench operator.
      b. 8 inch size and Up: Worm gear operator.
B. Type AB: 100 psig WOG, gas cock type with cast iron or bronze body, bronze plug, square head, wrench operator, and threaded ends. Acceptable Manufacturers: Crane, Eclipse Combustion, and McDonald.

2.05 WATER PRESSURE REDUCING VALVES

A. Main Water Service:
   1. Valve shall be an adjustable, direct acting, spring loaded, diaphragm operated, single seat, bottom guided type suitable for dead end service; guaranteed not to stick and shall maintain a constant discharge pressure which will not vary more than 1 psig for each 10 psig decrease in inlet pressure. Valves shall have cast iron, mild steel or bronze bodies, with either flanged ends or screwed ends with unions. Valve trim shall be of stainless steel with renewable composition disc. Parts subject to wear shall be renewable.
   2. Material of diaphragm and disc shall be suitable for an operating temperature to 150 degrees F. The control line, from diaphragm casing, shall be connected to the discharge piping at least 10 feet downstream from pressure reducing valve. Control line shall be of same material as adjoining piping. Valves shall be standard weight for inlet pressures up to 125 psig, and extra heavy weight for inlet pressures in excess of 125 psig.
   3. Acceptable Valves: Fisher Governor Type 655A, Kieley Mueller Type 4250.
B. Cold Water Make-Up Service:
   1. Adjustable direct acting, spring loaded, diaphragm operated, single seat type conforming to ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Supply Systems. Acceptable Manufacturers: Bell & Gossett, Watts, and Wilkins.
      a. Body: Brass or bronze construction.
      b. Wetted Parts: Brass, bronze, stainless steel, or nickel alloy construction.
      c. Renewable seat and removable composition disc.
      d. Integral low inlet pressure check valve.
      e. Operating Temperature Range: 33-160 degrees F.
      f. Maximum Working Pressure: 125 psi.

2. Pressure reducing valves with integral strainers may be substituted for approval, in lieu of separate valve and strainer, if integral strainer and valve meet individual valve and strainer specifications.

2.06 GAGE COCKS

A. Gage Cocks: All brass construction, “T” or lever handles, threaded ends, built for 300 psig hydraulic pressure. Acceptable Manufacturers: Marsh Instrument Company, Mueller Instruments Co., H.O. Trerice Co. and Weksler Instruments Corp.

2.07 BALL VALVES

A. Type BV: 150 psig WSP, 600 psig WOG, 2 piece bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips, balancing stop, and threaded or solder ends. Acceptable Manufacturers: Conbraco, Hammond, Milwaukee, Nibco, and Watts.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install valves at locations noted on the drawings or specified.

3.02 VALVE APPLICATION SCHEDULE

A. Schedule of valve applications for the different services is as follows:
   1. Cold Water In Buildings and Tunnels (CW) 125 psig and Less:
      a. 3 inch and Less: A or D gates or BV balls, O globes or angles, and S or U checks; or C gates, K globes or angles, and V checks, with solder joint companion flanges.
      b. 4 inch and Up: C gates or BF butterflys, K globes or angles, and V checks.
   2. Gas - Natural, Manufactured or Mixed Fuel (G) 125 psig and Less:
      a. 2 inch and Less: AB plug valves.
      b. 2-1/2 inch and Up: AA plug valves.

END OF SECTION

SECTION 220529 - PIPE HANGERS AND SUPPORTS FOR PLUMBING PIPING **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. General support requirements for plumbing piping
B. Pipe support requirements for steel/concrete construction
C. Pipe hangers and supports
D. Anchors and attachments
E. Seismic restraint system for piping
F. Fasteners
G. Shop painting and plating

1.02 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Companion high density filler pieces for installation over the top 180 degree surface of pipe or tubing, at points of support where a combination clevis hanger, insulation shield and high density insulating saddle are installed.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Piping Insulation: Section 220700.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Details of trapeze hangers and upper hanger attachments for piping 4 inches in diameter and over. Include the number and size of pipe lines to be supported on each type of trapeze hanger.
   2. Details of pipe anchors.
   3. Drawings identifying seismic locations with corresponding details of pre-approved seismic restraints, with seismic loads and seismic force level (Fp) calculations; pre-engineered and stamped by a Project Location State Licensed Professional Engineer experienced in seismic restraint systems.
B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.
C. Quality Control Submittals:
   1. Seismic Restraint Manufacturer’s Qualifications Data:
      a. Name of firm producing the seismic restraints, business address and telephone number.
      b. Period of time firm has been in the business producing seismic restraints, and names and addresses of 3 similar projects that the manufacturer has produced seismic restraints for during the past 5 years.
   2. Company Field Advisor Data:
      a. Name, business address and telephone number of Company Field Advisor secured for the required services.
      b. Certified statement from the Company listing the qualifications of the Company Field Advisor.

c. Services and each product for which authorization is given by the Company, listed specifically for this project.

3. Manufacturer's Certificate of Compliance for Seismic Restraints: Certificate from seismic restraint manufacturer stating that the restraint and its mounting system or anchorage has been tested or analyzed and meets the requirements of the applicable building codes.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with the applicable requirements of the ASME B31 Piping Codes.
2. Unless otherwise shown or specified, comply with the requirements of the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) Standards SP-58, and SP-69.
3. The contractor shall provide pre-engineered or stamped and signed details (by a Project Location State Licensed Professional Engineer) of seismic restraint systems to meet total design lateral force requirements for support and restraint of mechanical and electrical systems.
4. Seismic components shall be UL listed or California OSHPD (Office of Statewide Health Planning and Development) approved.

B. Seismic Restraint Manufacturer Qualifications: The firm producing the seismic restraints shall be experienced in seismic restraint work and shall have produced seismic restraints for a minimum of 5 years.

C. Company Field Advisor: Secure the services of a Company Field Advisor from seismic restraint manufacturer for the following:

1. Render advice regarding installation and final adjustment of seismic restraint system.
2. Render advice on the suitability of each seismic restraint for its particular application.
3. Inspect completed installation of seismic restraint system and certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.
4. Train facility maintenance personnel on the installation of seismic restraint system and routine maintenance of the system.

PART 2 PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddle with companion high density filler piece.

1. Insulating saddles and filler pieces shall be of the same thickness and materials as the adjoining pipe insulation. Saddles shall cover the lower 180 degrees of the pipe or tubing, and companion filler pieces shall cover the upper 180 degrees of the pipe or tubing. Physical sizes, gages, etc. of the components of insulated hangers shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE	SADDLE LENGTH (Inches)	VAPOR BARRIER JACKET LENGTH (Inches)
Up to 2-1/2	4	16	6	10
3 to 6	4	14	6	10

8 to 14	10	12	12	16
16 and up	10	10	12	16

B. Pipe Insulation Shields: Fabricated of steel, with a minimum arc of 180 degrees, unless otherwise indicated. Shields for use with hangers and supports, with the exception of combination clevis type hangers, shall be in accordance with the following schedule:

PIPE OR TUBING SIZE (Inches)	SHIELD LENGTH (Inches)	SHIELD GAGE
Up to 2-1/2	8	18
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

C. Pipe Covering Protection Saddles: 3/16 inch thick steel, of sufficient depth for the insulation thickness specified, notched so that saddle contact with the pipe is approximately 50 percent of the total axial cross section. Saddles for pipe 12 inches in size and larger shall have a center support.

D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.

1. Pipe spreaders or spacers shall be used on cross bolts of clevis hangers, when supporting piping 10 inches in size and larger.

E. Adjustable Floor Rests and Base Flanges: Steel.

F. Hanger Rods: Mild, low carbon steel, fully threaded or threaded at each end, with two nuts at each end for positioning rod and hanger, and locking each in place.

G. Riser Clamps: Malleable iron or steel.

H. Rollers: Cast Iron.

2.02 ANCHORS AND ATTACHMENTS

A. Sleeve Anchors (Group II, Type 3, Class 3): Molly's Div./USM Corp. Parasleeve Series, Ramset's Dynabolt Series, or Red Head/Phillips AN, HN, or FS Series.

B. Wedge Anchors (Zinc Plated, Group II, Type 4, Class 1): Hilti's Kwik Bolt Series, Molly's Div./USM Corp. Parabolt PB Series, Ramset's Trubolt T Series, or Red Head/Phillips WS Series.

C. Self-Drilling Anchors (Group III, Type 1): Ramset's RD Series, or Red Head/Phillips S Series.

D. Non-Drilling Anchors (Group VIII, Type 1): Ramset's Dynaset DS Series, Hilti's HDI Series, or Red Head/Phillips J Series.

E. Stud Anchors (Group VIII, Type 2): Red Head/Phillips JS Series.

F. Beam Clamps: Forged steel beam clamp, with weldless eye nut (right hand thread), steel tie rod, nuts, and washers, Grinnell's Fig No. 292 (size for load, beam flange width, and rod size required).

G. Metal Deck Ceiling Bolts: B-Line Systems' Fig. B3019.

2.03 SEISMIC RESTRAINT SYSTEM FOR PIPING

A. General:
   1. Coordinate all structural attachments with the Owner.
   2. Design analysis shall include calculated dead loads, static seismic loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
   3. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
   4. Design seismic restraint devices to accept without failure the forces calculated per the applicable building code and as specified.
   5. Friction from gravity loads shall not be considered resistance to seismic forces.
   6. Fire protection systems shall meet the requirements of NFPA-13 and NFPA-14 for the building seismic requirements.
   7. Construct seismic supports constructed so that support engagement is maintained.
   8. Stamp seismic supports with manufacturer's name and part number for identification.
   9. Design seismic supports specifically for mitigation of seismic force loads.
   10. Design the stiffness of seismic restraints for mechanical equipment so that the load path for the restraint performs its intended function.
   11. Where possible, utilize components designed with tamper resistant break-off bolt heads or break-off nuts to assure visual verification of proper installation.
   12. Attachment components shall be UL Listed catalog components with published loads designed specifically for seismic application.

B. Type: Pre-engineered seismic restraint system designed to support and restrain piping to meet applicable lateral force requirements.

C. Acceptable Manufacturers:
   1. B-Line.
   2. Mason Industries.
   3. TOLCO Inc.

D. Strut/Channel Bracing: 12 gauge solid steel with no holes, 1-5/8 inches wide x 1-5/8 inches deep of single lengths or stitch-welded back-to-back configurations.

E. Pipe Bracing: Schedule 40 steel pipe.

F. Cable Bracing: Pre-stretched galvanized aircraft cable 7 x 19 strand core.

G. Rigid Seismic Braces For Single Hung Pipe Systems: A12 strut channel or schedule 40 steel pipe.
   1. Maximum Brace Length: 13 feet 1 inches.

H. Rigid Seismic Braces For Trapeze Supported Pipe Systems: A12 strut channel or schedule 40 steel pipe.
   1. Maximum Brace Length: 13 feet 1 inches.

I. Cable Seismic Braces For Single Hung Pipe Systems: Pre-stretched aircraft cable 7 x 19 core.

J. Cable Seismic Braces For Trapeze Supported Pipe Systems: Pre-stretched aircraft cable 7 x 19 core.

K. Structural Attachments for Rigid and Cable Seismic Braces For Single Hung and Trapeze Supported Pipe Systems:

1. Structural attachments shall be positive.
2. Do not make structural attachments to the bottom of a bar joist.
3. Supplemental steel shall be installed for all pre-cast decks less than 4 inches thick
4. Do not use concrete inserts or continuous concrete insert strut to attach brace.
5. Wedge type anchors are permitted. The size and embedment depth shall be determined by the supplier of the seismic restraint system and as approved.

L. Vertical Brace Component (up-thrust protection)

1. Reinforce Vertical Hanger Rod when lengths exceed the following:
   a. 3/8 inch dia rod: 19 inches.
   b. 1/2 inch dia rod: 25 inches.
   c. 5/8 inch dia rod: 31 inches.
   d. 7/8 inch dia rod: 43 inches.
   e. 1 inch dia rod: 50 inches.
   f. 1-1/4 inch dia rod: 62 inches.

2.04 FASTENERS

A. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for high humidity locations, and treated wood; plain finish for other interior locations. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work.

2.05 SHOP PAINTING AND PLATING

A. Hangers, supports, rods, inserts and accessories used for pipe supports, unless chromium plated, cadmium plated or galvanized shall be shop coated with metal primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper pipe or copper tubing.

B. Hanger supports for chromium plated pipe shall be chromium plated brass.

PART 3 EXECUTION

3.01 INSTALLATION

A. Do not hang or support one pipe from another or from ductwork.

1. Do not bend threaded rod.

B. Support all insulated horizontal piping conveying fluids below ambient temperature, by means of hangers or supports with insulation shields installed outside of the insulation.

C. Space hangers or supports for horizontal piping on maximum center distances as listed in the following hanger schedules, except as otherwise specified, or noted on the Drawings.

1. For Steel, and Threaded Brass Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1 and under	8
1-1/4 and 1-1/2	9
2	10

2-1/2 and up	12

1. For Grooved End Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	7
2 through 4	10
5 and over	12

1. No pipe length shall be left unsupported between any two coupling joints.
2. For Copper Pipe and Copper Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	6
2 and over	10

1. For Glass Pipe, and Aluminum Tubing:

Glass Pipe	8	8	8
Plastic Tubing	3	5	7
Aluminum Tubing	3	5	7

1. For Plastic Tubing:

PIPE OR TUBING SIZE (Inches)	MAXIMUM SPACING (Feet)
Under 2 inch	3
2 inch and over	4

1. For Directional Changes: Install a hanger or support close to the point of change of direction of all pipe runs in either a horizontal or vertical plane.
2. For Concentrated Loads: Install additional hangers or supports, spaced as required and directed, at locations where concentrated loads such as in-line pumps, valves, fittings or accessories occur, to support the concentrated loads.
3. For Branch Piping Runs and Runouts Over 5 feet In Length: Install a minimum of one hanger, and additional hangers if required by the hanger spacing schedules.
4. Parallel Piping Runs: Where several pipe lines run parallel in the same plane and in close proximity to each other, trapeze hangers may be submitted for approval. Base hanger spacing for trapeze type hangers on the smallest size of pipe being supported. Design the entire hanger assembly based on a safety factor of five, for the ultimate strength of the material being used.
5. Support floor drain traps from the overhead construction, with hangers of type and design as required and approved. Overhead supports are not required for floor drain traps installed directly below earth supported concrete floors.

D. Size hanger rods in accordance with the following:

	PIPE	TUBING	PIPE	TUBING
1/2 to 2	3/8	1/4	3/8	1/4
2-1/2 and 3	1/2	3/8	3/8	1/4

4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

1. Size hanger rods, for piping over 12 inches in size and multiple line supports, based on a safety factor of five for the ultimate strength of the materials being used.
2. Secure hanger rods as follows: Install one nut under clevis, angle or steel member; one nut on top of clevis, angle or steel member; one nut inside insert or on top of upper hanger attachment and one nut and washer against insert or on lower side of upper hanger attachment. A total of four nuts are required for each rod, two at upper hanger attachment and two at hanger.

E. Vertical Piping:

1. Support vertical risers of piping systems, by means of heavy duty hangers installed close to base of pipe risers, and by riser clamps with extension arms at intermediate floors, with the distance between clamps not to exceed 25 feet, unless otherwise specified. Support pipe risers in vertical shafts equivalent to the aforementioned. Install riser clamps above floor slabs, with the extension arms resting on floor slabs. Provide adequate clearances for risers that are subject to appreciable expansion and contraction, caused by operating temperature ranges.
2. Support extension arms of riser clamps, secured to risers to be insulated for cold service, 4 inches above floor slabs, to allow room for insulating and vapor sealing around riser clamps.

F. Floor Supports: Install adjustable yoke rests with base flanges, for the support of piping, unless otherwise indicated on the Drawings. Install supports in a manner, which will not be detrimental to the building structure.

G. Underground Pipe Supports: Firmly bed pipe laid underground, on solid ground along bottom of pipe. Install masonry piers for pipe laid in disturbed or excavated soil or where suitable bearing cannot be obtained. Support pipe, laid proximate to building walls in disturbed or excavated soil, or where suitable bearing cannot be obtained, by means of wall brackets or hold-fasts secured to walls in an approved manner.

3.02 UPPER HANGER ATTACHMENTS

A. General:

1. Secure upper hanger attachments to overhead structural steel, steel bar joists, or other suitable structural members.
2. Do not attach hangers to steel decks that are not to receive concrete fill.
3. Do not attach hangers to precast concrete plank decks less than 2-3/4 inches thick.
4. Do not use flat bars or bent rods as upper hanger attachments.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by pipe support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of five.

1. Do not use drive-on beam clamps.
2. Do not support piping over 4 inches in size from steel bar joists. Secure upper hanger attachments to steel bar joists at panel points of joists.

3. Do not drill holes in main structural steel members.
4. Beam clamps, with tie rods as specified, may be used as upper hanger attachments for the support of piping, subject to clamp manufacturer's recommended limits.

C. Attachment to Concrete Filled Steel Decks:

1. New Construction: Install metal deck ceiling bolts.
2. Existing Construction: Install welding studs (except at roof decks). Do not support a load in excess of 250 lbs from any single welded stud.
3. Do not attach hangers to decks less than 2-1/2 inches thick.

D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.

E. Attachment to Existing Cast-In-Place Concrete:

1. For piping up to a maximum of 4 inches in size, secure hangers to overhead construction with self-drilling type expansion shields and machine bolts.
2. Secure hangers to wall or floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.

F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Toggle bolts may be installed in cells for the support of piping up to a maximum of 2-1/2 inches in size.

G. Attachment to Hollow Block or Hollow Tile Filled Concrete Decks:

1. New Construction: Omit block or tile and pour solid concrete with cast-in-place inserts.
2. Existing Construction: Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.

H. Attachment to Waffle Type Concrete Decks:

1. New Construction: Install cast-in-place inserts.
2. Existing Construction: Install machine bolt expansion anchors at highest practical point on side of web.

I. Attachment to Precast Concrete Tee Construction:

1. New Construction: Tee hanger inserts between adjacent flanges, except at roof deck without concrete fill.
2. Existing Construction: Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
   a. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
   b. Do not use powder driven fasteners.

3.03 PIPING IN TUNNELS

A. Support piping in tunnels on adjustable stanchions, fabricated in accordance with the details on the Drawings, unless otherwise indicated. Install, secure and be responsible for the proper locations of all cast-in-place inserts and stanchion supports, in ample time so as not to delay construction Work. Secure tops of stanchions to overhead construction, as required and approved.

3.04 COMBINATION CLEVIS HANGER, PIPE INSULATION SHIELD AND VAPOR BARRIER JACKETED HIGH DENSITY INSULATING SADDLES

A. Install a combination clevis hanger, pipe insulation shield and vapor barrier jacketed high density insulating saddles, at all points of support for piping or tubing to be insulated for cold service. Furnish companion high density vapor barrier jacketed saddle pieces, of the same material, thickness and length, for installation over the top 180 degree surface of pipe or tubing, at each point of support where an insulated clevis hanger is utilized.

3.05 PIPE INSULATION SHIELDS

A. Unless otherwise specified, install a pipe insulation shield, at all points of support. Center shields on all hangers and supports outside of high density insulation insert, and install in such a manner so as not to cut, or puncture jacket.

3.06 PIPE COVERING PROTECTION SADDLES

A. Install pipe covering protection saddles at all points of support, for steel piping 6 inches in size and larger, insulated with hot service insulation. Weld saddles to piping to insure movement with pipe.

3.07 SEISMIC RESTRAINT SYSTEMS

A. General:
   1. Install seismic restraints in accordance with seismic restraint manufacturer's printed installation instructions and guidelines unless otherwise specified.
   2. Do not use powder-actuated fasteners for seismic restraint anchorage in tension applications.
   3. Laterally support vertical risers with riser clamps at each floor unless otherwise specified.
   4. When systems cross building seismic separation points, pass between buildings, or are supported from different portions of the building, install to allow differential support displacements without damaging the pipe, equipment or support connections. Install pipe loops, anchors, offsets, and guides as required to provide specified capability of motion and limit movement of adjacent piping.
   5. Do not brace seismic bracing to different parts of the building that may respond differently during seismic activity.
   6. Provide adequately sized openings in walls, floors, and ceilings for anticipated seismic movement. Provide fire stopping in fire-rated walls.
   7. Seismic restraint installations shall not cause any modifications in the positioning of equipment or piping resulting in stresses or misalignment.
   8. No rigid connections between equipment, piping, duct, or conduit shall be made to the building structure that degrades the noise and vibration-isolation system specified.
   9. Bracing attached to structural members may present additional stresses. Submit loads to the Owner.
   10. Provide vertical stiffening components to support rods when necessary to accept compressive loads. Welding of components to vertical support rods is not acceptable.
   11. Clevis supported pipe must have cross-bolt support at each seismic bracing location.
   12. Notify Owner if any discrepancies between the specifications and field conditions prior to installation.

B. Seismic Restraints for Piping:
   1. Trapeze assemblies supporting pipes shall be braced considering the total weight of the pipes on the trapeze.

2. Provide transverse bracing at 40 ft. maximum spacing for welded steel pipe, brazed copper pipe or grooved piping with UL 213 listed connections.
    a. Traverse bracing for threaded steel or copper pipe or non-listed UL grooved connections shall not exceed 20 ft. maximum.
3. Provide longitudinal bracing at 80 ft. maximum spacing for welded steel pipe, brazed copper pipe or grooved piping with UL 213 listed connections.
    a. Traverse bracing for threaded steel or copper pipe or non-listed UL grooved connections shall not exceed 40 ft. maximum.
4. Transverse piping restraints for one pipe section may also act as a longitudinal restraint for a pipe section of the same size connected perpendicular to it if the restraint is installed within 24-inches of the elbow centerline or tee or combined stresses are within allowable limits at longer distances.
5. Branch line piping shall not be used to brace main piping.
    a. No larger diameter pipe shall be braced by a smaller diameter pipe.
6. Attach all longitudinal seismic braces directly to piping.
    a. Encapsulate clamp and brace with insulation equal to that on the pipe.
7. Use hold down clamps to attach pipe to trapeze hangers before installing seismic restraints.
8. Brace vibration isolated piping with cables to allow flexibility.

END OF SECTION

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND VALVES **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Pipe markers and accessories

B. Pipe service identification tags

C. Valve service identification tags

D. Valve service identification chart frames

1.02 REFERENCES

A. ANSI A13.1 - Scheme for Identification of Piping Systems.

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each item specified.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. W.H. Brady Co., Milwaukee, WI.

B. Emed Co., Buffalo, NY.

C. Panduit Corp., Tinley Park, IL.

D. Seton Nameplate Corp., New Haven, CT.

2.02 PIPE MARKERS AND ACCESSORIES

A. Snap-on Marker: One piece wrap around type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, 3/4 inch adhesive strip on inside edge, and 360 degree visibility.

B. Strap-On Marker: Strip type constructed of precoiled acrylic plastic with clear polyester coating, integral flow arrows, legend printed in alternating directions, factory applied grommets, and pair of stainless steel spring fasteners.

C. Stick-On Marker: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, and integral flow arrows for applications where flow arrow banding tape is not being used.

D. Pipe Marker Legend and Color Field Sizes:

OUTSIDE DIAMETER OF PIPE OR INSULATION (Inches)	**LETTER SIZE (Inches)**	**LENGTH OF COLOR FIELD (Inches)**
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1-1/4	12
8 to 10	2-1/2	24
Over 10	3-1/2	32

E. Banding Tapes: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating.
   1. Plain Tape: Unprinted type; color to match pipe marker background.
   2. Flow Arrow Tape: Printed type with integral flow arrows; color to match pipe marker background.

F. Pipe Size Labels: Pressure sensitive adhesive backed type constructed of vinyl with clear polyester coating, vertical reading pipe size in inches, and legend size matching adjacent pipe marker.

2.03 PIPE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high pipe service abbreviated legend on one line, over 1/2 inch high pipe size legend in inches, both deep stamped and black filled; and 3/16 inch top hole for fastener.

B. Size: 2 inch square tag.

C. Fasteners: Brass “S” hook or brass jack chain of size as required for pipe to which tag is attached.

2.04 VALVE SERVICE IDENTIFICATION TAGS

A. Type: No. 19 B & S gage brass, with 1/4 inch high valve service abbreviated lettering on one line over 1/2 inch high valve service chart number, both deep stamped and black filled; and with 3/16 inch top hole for fastener.

B. Sizes:
   1. Plumbing Use: 1-1/2 inch hexagon.

C. Fasteners: Brass “S” hook or brass jack chain of size as required for valve stem or handle to which tag is attached.

2.05 VALVE SERVICE IDENTIFICATION CHART FRAMES

A. Type: Satin finished extruded aluminum frame with rigid clear plastic glazing, size to fit 8-1/2 x 11 inches valve chart.

PART 3 EXECUTION

3.01 PREPARATION

A. Complete testing, insulation and finish painting work prior to completing the Work of this Section.

B. Clean pipe surfaces with cleaning solvents prior to installing piping identification.

C. Remove dust from insulation surfaces with clean cloths prior to installing piping identification.

3.02 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer’s printed installation instructions, unless otherwise specified.

B. Stick-On Pipe Markers:

1. Install minimum of 2 markers at each specified location, 90 degrees apart on visible side of pipe.
2. Encircle ends of pipe markers around pipe or insulation with banding tape with one inch lap. Use plain banding tape on markers with integral flow arrows, and flow arrow banding tape on markers without integral flow arrows.

C. Pipe Size Labels: Install labels adjacent to each pipe marker and upstream from flow arrow. Install a minimum of 2 pipe size labels at each specified location, 90 degrees apart on visible side of pipe.

D. Pipe Service Identification Tags: Attach tags to piping being identified with “S” hooks or jack chains.

3.03 PIPING IDENTIFICATION SCHEDULE

A. Piping Identification Types:

1. Piping or Insulation under 3/4 inch od: Pipe identification tags.
2. Piping or Insulation 3/4 inch to 5-7/8 inch od: Snap-on marker or stick-on marker.
3. Piping or Insulation 6 inch od and Larger: Strap-on marker or stick-on marker.

B. Identify exposed piping, bare or insulated, as to content, size of pipe and direction of flow, with the following exceptions:

1. Piping in non-walk-in tunnels or underground conduits between manholes.
2. Piping in furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
3. Piping in finished spaces such as offices, class rooms, wards, toilet rooms, shower rooms and spaces as specified.

C. Locate piping identification to be visible from exposed points of observation.

1. Locate piping identification at valve locations; at points where piping enters and leaves a partition, wall, floor or ceiling, and at intervals of 20 feet on straight runs.
2. Where 2 or more pipes run in parallel, place printed legend and other markers in same relative location.

3.04 VALVE IDENTIFICATION SCHEDULE

A. Valve Service Identification Tags:

1. Tag control valves, except valves at equipment, with a brass tag fastened to the valve handle or stem, marked to indicate service and numbered in sequence for the following applications:
   a. Domestic water valves controlling mains, risers and branch runouts.
   b. Gas valves controlling mains, risers, and branch runouts.
   c. Valves in sprinkler and fire standpipe systems, except hose valves.

B. Valve Service Identification Charts:

1. Provide 2 framed valve charts for each piping system specified to be provided with valve identification tags. Type charts on 8-1/2 x 11 inches heavy white bond paper, indicating valve number, service and location.
2. Hang framed charts at locations as directed.

END OF SECTION

SECTION 220577 - FLOOR AND AREA DRAINS **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Floor drain for installation in concrete flooring

B. Fasteners

1.02 REFERENCES

A. Unless otherwise specified, the Work of this section shall meet the applicable requirements of FS WW-P-541 - Plumbing Fixtures, and ASME A112.21.1M - Floor Drains.

1.03 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions for each type drain specified.

1.04 MAINTENANCE

A. Special Tools: Deliver to the Building Owner.

B. Tools for Vandal Resistant Fasteners: One for each type and size.

PART 2 PRODUCTS

2.01 FLOOR DRAIN – CONCRETE FLOORING

A. Drain Body: Coated cast iron, two-piece body with reversible flashing clamp, minimum 9 inch dia drainage flange, corrosion resistant bolts, weep holes, bottom outlet, and connection to match piping option selected.

B. Strainer Head: Round, minimum 7 inch dia, nickel bronze with threaded shank for height adjustment.

C. Strainer Grate: Polished nickel bronze, heel proof; secured with stainless steel vandal resistant fasteners.

D. Acceptable Drain Series: Josam 30000A, Smith 2010A, Wade W1100, and Zurn Z415.

2.02 FASTENERS

A. Corrosion Resistant Fasteners: Brass, bronze, or Type 302 or 304 or stainless steel bolts.

B. Vandal Resistant Fasteners: Torx head with center pin.

2.03 FREE AREA OF GRATE

A. Minimum strainer grate free area listed below for each connecting pipe size:

CONNECTING PIPE SIZE (Inches Nominal)	**INTERIOR DRAINS FREE AREA (Square Inches)**	**EXTERIOR DRAINS FREE AREA (Square Inches)**

1-1/2	3.06	4.08
2	4.71	6.28
3	10.59	14.12
4	18.90	25.20
5	29.40	39.20
6	42.45	56.60
8	75.38	100.50

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. Protect weep holes from plugging during installation. Rod out weep holes after installation to remove obstructions.

C. Set drainage flange flush with top of structural floor slab, or at elevation otherwise indicated.

D. After membrane waterproofing installed and cured, secure clamping ring.

E. Adjust strainer head to height indicated. If height not indicated, set at 1/2 inch below finished floor elevation.

F. Secure external components in place with vandal resistant fasteners or devices which cannot be removed without special tools.

END OF SECTION

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Piping insulation

B. Insulation jackets

C. Adhesives, mastics, and sealers

D. Miscellaneous materials

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

B. Painting: Section 099103.

C. Pipe Hangers and Supports: Section 220529.

1.03 ABBREVIATIONS

A. FS: Federal Specification.

B. K: Thermal Conductivity, i.e., maximum Btu per inch thickness per hour per square foot.

C. pcf: Pounds per cubic foot.

D. PVC: Polyvinylchloride.

1.04 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the following:

1. Insulation Materials.
2. Jacket Materials.

B. Quality Control Submittals:

1. Installers Qualification Data:
   a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
   b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.05 QUALITY ASSURANCE

A. Qualifications: The persons installing the Work of this Section and their Supervisor shall be personally experienced in mechanical insulation work and shall have been regularly employed by a company installing mechanical insulation for a minimum of 5 years.

B. Regulatory Requirements:

1. Insulation installed inside buildings, including laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 PIPING INSULATION

A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
   1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:
      a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
   2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
   3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
      a. Suitable for temperatures up to 450 degrees F.

B. Flexible Elastomeric Foam Insulation:
   1. FM tested and approved, meeting the following:
      a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
      b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
      c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
   2. Pipe Insulation: ASTM C 534, Type I.
   3. Polyethylene and polyolefin insulation is not acceptable.

C. High Density Jacketed Insulation Inserts for Hangers and Supports:
   1. For Use with Fibrous Glass Insulation:
      a. Cold Service Piping:
         1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
      b. Hot Service Piping:
         1) Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
         2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
   2. For Use with Flexible Elastomeric Foam Insulation: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

D. Cements:
   1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
   2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.02 INSULATION JACKETS

A. Laminated Vapor Barrier Jackets for Piping: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Type I.
   1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.
      a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.
   2. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.

B. Canvas Jackets: Cotton duck, fire retardant, complying with NFPA 701, 4 oz or 6 oz per sq yd as specified.

C. Premolded PVC Fitting Jackets:

1. Constructed of high impact, UV resistant PVC.
   a. ASTM D 1784, Class 14253-C.
   b. Working Temperature: 0-150 degrees F.

D. Under Lavatory Piping Protection Cover: ADA compliant.

1. Construction: 1/8 inch thick chemical, microbial, and fungal resistant, injection molded smooth PVC vinyl with internal ribs.
2. Fasteners: Reusable, finger press internal fasteners presenting no sharp or abrasive external surfaces.
3. Cover Trimming: Tear on internal, dimensioned tear lines for proper fit.
4. Kit includes covering for 8 inch tailpiece-trap, 8 inch waste arm, hot and cold water supplies and valves, and required fasteners.
5. Acceptable Covers:
   a. Lav Guard 2, E-Z Series by IPS Corp., 202 Industrial Park Lane, Collierville, TN 38017, (800) 340-5969, www.truebro.com.
   b. Pro-Extreme Series by Plumberex, P.O. Box 1684, Palm Springs, CA 92263, (800) 475-8629, www.plumberex.com.

2.03 ADHESIVES, MASTICS, AND SEALERS

A. Lagging Adhesive (Canvas Jackets): Childers' CP-50AMV1, Epolux's Cadalag 336, Foster's 30-36.

B. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.

C. Vapor Barrier Mastic(Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65.

D. Adhesive (Flexible Elastomeric Foam): Armstrong's 520, Childers' CP-82, Epolux's Cadoprene 488, Foster's 85-75. 5 gallon cans only

E. Adhesive (Fiberglass Duct Liner): Childers' Chil Quick CP-127, Foster Vapor Fas 85-60. Must comply with ASTM C 916, Type II

F. Weather Barrier Breather Mastic (Reinforcing Membrane): Childers' VI-CRYL CP-10/11, Foster's Weatherite 46-50.

G. Sealant (Metal Pipe Jacket): Non hardening elastomeric sealants. Foster Elastolar 95-44, Childers Chil Byl CP-76, Pittsburgh Corning 727

H. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

2.04 MISCELLANEOUS MATERIALS

A. Pressure Sensitive Tape for Sealing Laminated Jackets:

1. Acceptable Manufacturers: Alpha Associates, Ideal Tape, Morgan Adhesive.
2. Type: Same construction as jacket.

B. Wire, Bands, and Wire Mesh:

1. Binding and Lacing Wire: Nickel copper alloy or copper clad steel, gage as specified.
2. Bands: Galvanized steel, 1/2 inch wide x 0.015 inch thick, with 0.032 inch thick galvanized wing seals.

3. Wire Mesh: Woven 20 gage steel wire with 1 inch hexagonal openings, galvanized after weaving.

C. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

PART 3 EXECUTION

3.01 PREPARATION

A. Perform the following before starting insulation Work:
   1. Install hangers, supports and appurtenances in their permanent locations.
   2. Complete testing of piping.
   3. Clean and dry surfaces to be insulated.

3.02 INSTALLATION, GENERAL

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions unless otherwise specified.

B. Provide continuous piping insulation and jacketing when passing thru interior wall, floor, and ceiling construction.
   1. At Through Penetration Firestops: Coordinate insulation densities with the requirements of approved firestop system being installed. See Section 078400.
      a. Insulation densities required by approved firestop system may vary with the densities specified in this Section. When this occurs use the higher density insulation.

C. Do not intermix different insulation materials on individual runs of piping.

D. All water, soil, and waste piping exposed to freezing temperatures shall be protected from freezing by insulation, heat, or both. This included piping in unheated garages, building overhangs, and exposed storm piping.

3.03 INSTALLATION AT HANGERS AND SUPPORTS

A. Reset and realign hangers and supports if they are displaced while installing insulation.

B. Install high density jacketed insulation inserts at hangers and supports for insulated piping.

C. Insulation Inserts For Use with Fibrous Glass Insulation:
   1. Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
      a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
         1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.

D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:
   1. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.
   2. Contour hardwood blocks to match the curvature of pipe, and shield.
   3. Coat dowels and blocks with insulation adhesive, and insert while still wet.

4. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.
5. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1-1/2”	2 dowel plugs	6 o’clock; in tandem
2” thru 4”	1 block, 2 dowel plugs	6 o’clock, and 4 & 8 o’clock respectively
6” thru 8”	2 blocks, 4 dowel plugs	6 o’clock; in tandem and 4 & 8 o’clock; in tandem

3.04 INSTALLATION OF FIBROUS GLASS COLD SERVICE INSULATION

A. Install insulation materials with a field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket, unless otherwise specified.

B. Piping:
   1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide butt adhesive backed strips.
      a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as jacket, may be used in lieu of butt strips.
   2. Bed insulation in a 2-inch wide band of vapor barrier mastic, and vapor seal exposed ends of insulation with vapor barrier mastic at each butt joint between pipe insulation and equipment, fittings or flanges at the following intervals:
      a. Horizontal Pipe Runs: 21 ft.
      b. Vertical Pipe Runs: 9 ft.

C. Fittings, Valves, Flanges and Irregular Surfaces:
   1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as pipe insulation.
   2. Secure insulation in place with 16-gage wire, with ends twisted and turned down into insulation.
   3. Butt insulation against pipe insulation and bond with joint sealer.
   4. Insulate valves up to and including bonnets, without interfering with packing nuts.
   5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
   6. When insulating cement has dried, seal fitting, valve and flange insulation, by imbedding a layer of reinforcing membrane or 4 oz. canvas jacket between 2 flood coats of vapor barrier mastic, each 1/8 inch thick wet.
   7. Lap reinforcing membrane or canvas on itself and adjoining pipe insulation at least 2 inches.
   8. Trowel, brush or rubber glove outside coat over entire insulated surface.
   9. Exceptions:
      a. Type C and D Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
         1) Additional insulation inserts are required for services with operating temperatures under 45 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not go below 45 degrees F.

3.05 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.

B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces:
   1. For Piping 2 inch Size and Smaller: 4 oz per sq yd unless otherwise specified.
   2. For Piping Over 2 inch Size: 6 oz per sq yd unless otherwise specified.

C. Piping:
   1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self-sealing longitudinal jacket laps and 3-inch wide adhesive backed butt strips.
      a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as the jacket, may be used in lieu of butt strips.
   2. Fill voids in insulation at hanger with insulating cement.
   3. Exceptions:
      a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces and Concealed Piping: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.

D. Fittings, Valves, Flanges and Irregular Surfaces:
   1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as insulation.
   2. Secure in place with 16-gage wire, with ends twisted and turned down into insulation.
   3. Butt fitting, valve and flange insulation against pipe insulation, and fill voids with insulating cement.
   4. Insulate valves up to and including bonnets, without interfering with packing nuts.
   5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
   6. After insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz or 6 oz canvas jacket as required by pipe size.
      a. Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
      b. Size entire canvas jacket with lagging adhesive.
   7. Exceptions:
      a. In Types E, and F Service Piping Systems: Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
         1) Additional insulation inserts are required for services with operating temperatures over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not exceed 150 degrees F.
      b. In Types E, and F Service Piping Systems: Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size.
         1) Terminate pipe insulation adjacent to flanges and unions with insulating cement, trowelled down to pipe on a bevel.
      c. Fittings, Valves, Flanges, and Irregular Surfaces In Concealed Piping, Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Rooms, Unfinished Spaces, and Tunnels: Sizing of canvas surface is not required.

3.06 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive.
   1. Where the slip-on technique is not possible, slit the insulation and install.
   2. Re-seal with adhesive, making sure the mating surfaces are completely joined.

B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
   1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation with adhesive.

C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.

D. Piping Exposed Exterior to a Building, Totally Exposed to the Elements:
   1. Apply flexible elastomeric foam insulation to piping with adhesive.
   2. Apply reinforcing membrane around piping insulation with adhesive or mastic.
   3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.
   4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.07 INSTALLATION OF SHEET METAL JACKETING ON PIPING

A. Secure jacketing to insulated piping with preformed aluminum snap straps and stainless steel strapping installed with special banding wrench.

B. Jacket exposed insulated fittings, valves and flanges with mitred sections of aluminum jacketing.
   1. Seal joints with sealant and secure with preformed aluminum bands.

3.08 FIELD QUALITY CONTROL

A. Field Samples: The Owner's Representative, may at their discretion, take field samples of installed insulation for the purpose of checking materials and application. Reinsulate sample cut areas.

3.09 PIPING INSULATION SCHEDULE

A. Insulate all cold service and hot service piping, and appurtenances except where otherwise specified.

B. Schedule of Items Not to be Insulated:
   1. Chrome plated piping, unless otherwise specified.
   2. Exposed piping in finished spaces, serving one fixture, or piece of equipment, and which connection from the main, branch, or riser, is 24 inches or less in length.
   3. Water heater blow-off piping.
   4. Air vents, pressure reducing valves, pilot lines, safety valves, relief valves.
   5. Water meters.
   6. Piping buried in the ground, unless otherwise specified herein.
   7. Items installed by others, unless otherwise specified herein.
   8. Sanitary drainage piping, unless otherwise specified herein.
   9. Mechanical equipment with factory applied steel jacket.
   10. Hot service piping 81 degrees F to 104 degrees F.
   11. Flanges and unions in Type E, F, and G service piping systems.
   12. Sprinkler and standpipe piping, unless otherwise specified.

3.10 COLD SERVICE INSULATION MATERIAL SCHEDULE

TYPE	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES	MINIMUM (NOMINAL)

			(INCHES)	INSULATION THICKNESS (INCHES)
C	Fluids (except domestic cold water) 40 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & less Over 1-1/2	1 1-1/2
D	Domestic cold water, and as specified. 33 F to 80 F.	Flex. Elastomeric Foam or Fibrous Glass	All Sizes	1/2

A. NOTES:

1. Sprinkler and Standpipe Piping (First 10 feet connected to domestic water main within building): Insulate with same materials and thicknesses specified for domestic cold water.
2. Roof Drain Bodies Below Roof, Horizontal Conductor Piping Including Drops, and First Fitting on Vertical conductor: Insulate with same materials and thicknesses specified for domestic cold water.
3. Piping Serving Handicapped Accessible Lavatories:
   a. Insulate exposed hot and cold water supply, and waste piping with under lav piping protection cover. Install fasteners thru each pair of holes in insulated safety wrap.

3.11 HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
E	Water and other fluids 105 F to140 F.	Flex. Elastomeric Foam or Fibrous Glass	1-1/2 & Less Over 1-1/2	1 2
F	Water and other fluids 141 F to 250 F.	Fibrous Glass	6 & Less 8 & Up	2 2-1/2

3.12 SCHEDULE OF METAL JACKETING FOR INSULATED PIPE

A. Piping Exterior to Building: Jacket insulated piping with circumferentially corrugated aluminum jacketing.

1. Lap longitudinal and circumferential joints a minimum of 2 inches.
2. Secure jacketing in place with 1/2 inch x 0.020 inch thick aluminum bands secured with aluminum wing type seals, on maximum 12 inch centers.

3. Cover insulated fittings, valves, and offsets with mitered sections of jacketing. Seal joints with metal pipe jacket sealant, and secure with aluminum strapping and wing seals.
4. Factory fabricated, preformed fitting covers of same material as jacketing may be used instead of mitered jacketing.
5. Install jacketing so as to avoid trapping condensation and precipitation.

END OF SECTION

SECTION 220800 - CLEANING AND TESTING FOR PLUMBING PIPING **H2M**

PART 1 GENERAL

1.01 SUBMITTALS

A. Quality Control Submittals

1. Test Reports (Field Tests): Submit data for each system tested, and/or disinfected; include date performed, description, and test results for each system.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Perform factory testing of factory fabricated equipment in complete accordance with the agencies having jurisdiction.
2. Perform field testing of piping systems in complete accordance with the local utilities and other agencies having jurisdiction and as specified.

1.03 PROJECT CONDITIONS

A. Protection: During test Work, protect controls, gages and accessories which are not designed to withstand test pressures. Do not utilize permanently installed gages for field testing of systems.

1.04 SEQUENCING AND SCHEDULING

A. Transmit written notification of proposed date and time of operational tests to the Owner's Representative at least 5 days in advance of such tests.

B. Perform cleaning and testing Work in the presence of the Owner's Representative.

C. Pressure test piping systems inside buildings, at the roughing-in stage of installation, before piping is enclosed by construction Work, and at other times as directed. Perform test operations in sections as required and directed, to progress the Work in a satisfactory manner and not delay the general construction of the building. Valve or cap-off sections of piping to be tested, utilizing valves required to be installed in the permanent piping systems, or temporary valves or caps as required to perform the Work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Test Equipment and Instruments: Type and kind as required for the particular system under test.

B. Test Media (air, vacuum, water): As specified for the particular piping or system under test.

C. Cleaning Agent (water): As specified for the particular piping, apparatus or system being cleaned.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

A. Thoroughly clean pipe and tubing prior to installation. During installation, prevent foreign matter from entering systems. Prevent if possible and remove stoppages or obstructions from piping and systems.

3.02 PRESSURE TESTS - PIPING

A. Piping shall be tight under test and shall not show loss in pressure or visible leaks, during test operations or after the minimum duration of time as specified. Remove piping which is not tight under test; remake joints and repeat test until no leaks occur.

B. Water Systems:

1. Domestic water (potable cold, domestic hot and recirculation) inside buildings:
   a. Before fixtures, faucets, trim and accessories are connected, perform hydrostatic test at 125 psig minimum for 4 hours.
   b. After fixtures, faucets, trim and accessories are connected, perform hydrostatic retest at 75 psig for 4 hours.

C. Gas Piping: Before backfilling or concealment perform air test of duration and pressure as required by the local gas company. However, for gas piping designed for pressures of from 4 inches to 6 inches water column, air test at 15 inches Hg for one hour, without drop in pressure. Test gas piping with air only. Check joints for leaks with soap suds.

D. Air Piping:

1. Compressed Air: Test with air at 150 psig for one hour.
2. Check joints for leaks with soap suds.

E. Vacuum Piping: Perform air test at 150 psig for one hour, followed by a vacuum test of 25 inches Hg for one hour, during which time the mercury shall remain stationary for the last 30 minutes of test.

F. Gasoline Piping: As Specified under the Section entitled “Fuel Dispensing System”.

G. Drainage, Vent, Conductor and Roof Drain Piping (Inside Buildings): Perform tests before fixtures are installed. Test by filling the entire system with water, and allowing to stand for 3 hours, with no noticeable loss of water. Test joints under a minimum head of 10 feet of water, except the uppermost section. Test the uppermost section to overflowing.

3.03 TESTING OF EQUIPMENT, APPARATUS AND APPURTENANCES

A. Relief Valves: Increase pressure in equipment or apparatus to relief valve setting, to test opening of valves at required relief pressures.

3.04 DISINFECTION OF POTABLE WATER SYSTEMS

A. Disinfect potable water pipe and equipment installed in the Work of this Contract.

1. Completely fill the piping, including water storage equipment if installed, with a water solution containing 50 mg/L available chlorine, and allow stand for 24 hours. Operate all valves during this period to assure their proper disinfection.
2. After the retention period, discharge the solution to an approved waste and flush the system thoroughly with water until substantially all traces of chlorine are removed. Drain and flush water storage equipment if installed.

B. Connect plumbing fixtures and equipment and place the system into service. Prevent recontamination of the piping during this phase of the Work.

END OF SECTION

SECTION 221100 - PLUMBING PIPING **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Domestic water piping and fittings

B. Natural gas piping and fittings

C. Sanitary and storm piping and fittings

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Through Penetration Firestops: Section 078400.

B. Sealants: Section 079200.

1.03 SUBMITTALS

A. Product Data:

1. Catalog sheets and specifications indicating manufacturer name, type, applicable reference standard, schedule, or class for specified pipe and fittings.
2. Material Schedule: Itemize pipe and fitting materials for each specified application in Pipe and Fittings Schedule in Part 3 of this Section. Where optional materials are specified indicate option selected.

B. Quality Control Submittals

1. Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in domestic tubing.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

A. Steel Pipe for Threading: Standard weight, Schedule 40, black or galvanized; ASTM A 53 or ASTM A 135.

B. Malleable Iron, Steam Pattern Threaded Fittings:

1. 150 lb Class: ASME B16.3.
2. 300 lb Class: ASME B16.3.

C. Cast Iron Fittings:

1. Drainage Pattern, Threaded: ASME B16.12.
2. Steam Pattern, Threaded: ASME B16.4.
   a. Standard Weight: Class 125.
   b. Extra Heavy Weight: Class 250.

D. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.

E. Couplings: Same material and pressure rating as adjoining pipe, conforming to standards for fittings in such pipe. Use taper tapped threaded type in screwed pipe systems operating in excess of 15 psig.

F. Nipples: Same material and strength as adjoining pipe, except nipples having a length of less than one inch between threads shall be extra heavy.

2.02 COPPER AND BRASS PIPE, TUBING AND FITTINGS

A. Copper Tube, Types K, L, and M: ASTM B 88.

B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.

C. Cast Copper Alloy Tube Fittings, Solder Joint: ASME B16.18.

D. Drainage Tube, Type DWV: ASTM B 306.

E. Wrot Copper Drainage Tube Fittings, Solder Joint: ASME B16.29.

F. Cast Copper Alloy Drainage Fittings, Solder Joint: ASME B16.23.

G. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.

H. Plumber's Tube: Seamless, semi-annealed, minimum 65 percent copper, No. 18 B & S Gage.

I. Flared Tube Fittings:

1. Water Tube Type: ASME B16.26.

J. Flanges: Conform to the Standards for fittings used in systems.

1. Brazing Flanges: ASME B16.24, hubs modified for brazing ends.

2.03 HYDRAULIC PRESS FITTINGS FOR COPPER TUBING

A. Acceptable Fittings:

1. ProPress by Viega, 301 N. Main, Wichita, KS 67202, (877) 843-4262, www.viega.com.
2. Operating Conditions:
   a. Maximum Operating Pressure: 200 psi.
   b. Operating Temperature Range: 0-250 degrees F.
   c. Maximum Test Pressure: 600 psi.
   d. Maximum Vacuum: 29.2 inches hg @ 68 degrees F.
3. Features:
   a. Fittings: Copper and copper alloy conforming to material requirements of ASME B16.18 or ASME B16.22.
      1) Stainless Steel Grip Ring: Adds strength to the joint without collapsing the interior passageway
   b. No flame for soldering required for installation of fittings and valves.
   c. Unpressed connections identified during pressure testing when water flows past sealing element.
   d. Sealing Elements: Factory installed, EPDM.
   e. Fittings that have been pressed can be rotated. If rotated more than 5 degrees, the fitting must be repressed to restore its resistance to rotational movement.
   f. Extended fitting end lead allows for twice the retention grip surface, and assists with proper tube alignment.
   g. Soldered adapter fittings are not allowed.

2.04 CAST IRON PIPE AND FITTINGS

A. Bell and Spigot Soil Pipe: Service Weight, Bitumin coated; ASTM A 74.

B. Bell and Spigot Soil Pipe Fittings: Service Weight, Bitumin coated; ASTM A 74.

C. Hubless Pipe: Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.

D. Hubless Pipe Fittings: Drainage Pattern, Bitumin coated; Cast Iron Soil Pipe Institute Standard No. 301.

E. Hubless Joint Couplings: Stainless steel shield and clamp assembly, and elastomer sealing sleeve; CISPI-310.

F. Water Pipe Fittings: Bitumin coated, cement-mortar lined; AWWA C110.

2.05 DUCTILE IRON PIPE AND FITTINGS

A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151.
   1. 3 and 4 Inch Sizes: Class 51.
   2. 6 inch Size and Over: Class 50.

B. Fittings: Bitumin coated and cement-mortar lined; AWWA C110.

2.06 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

A. Couplings: Grinnell Corp.'s Rigidlok Fig. 7401, or Victaulic Co.'s Style 107, having minimum pressure rating of:
   1. 750 psi from 1-1/2 inch to 4 inch.
   2. 700 psi for 6 inch.
   3. 600 psi for 8 inch.
   4. Couplings: Gustin-Bacon Inc.'s No. 100 Gruvagrips, or Victaulic Co.'s Style 77, having pressure rating of:
      a. 1000 psi for 3/4 inch to 6 inch.
      b. 800 psi for 8 inch to 12 inch.
      c. 300 psi for 14 inch to 24 inch.
   5. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
      a. Steel: ASTM A 53 or A 106, Grade B.
      b. Malleable Iron: ASTM A 47.
      c. Ductile Iron: ASTM A 536.

2.07 JOINING AND SEALANT MATERIALS

A. Thread Sealant:
   1. LA-CO Industries', Slic-Tite Paste with Teflon.
   2. Loctite Corp.'s No. 565 Thread Sealant.
   3. Thread sealants for potable water shall be NSF approved.

B. Thread Sealant (Natural Gas Piping): Rectorseal Corp.'s T Plus 2 non-hardening pipe dope with teflon.

C. Solder: Solid wire type conforming to the following:
   1. Type 3: Lead-free tin-silver solder (ASTM B 32 Alloy Grade E, AC, or HB); Engelhard Corp.'s Silvabrite 100, Federated Fry Metals' Aqua Clean, or J.W. Harris Co. Inc.'s Stay-Safe Bridgit.

D. Soldering Flux for Soldered Joints: All-State Welding Products Inc.'s Duzall, Engelhard Corp.'s General Purpose Liquid or Paste, Federated Fry Metals' Water Flow 2000, or J.W. Harris Co. Inc.'s Stay-Clean.

E. Lead for Calking Joints in Cast Iron Soil Pipe: ASTM B 29 for pig lead.

F. Joint Packing:

1. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504) 466-1484.
2. Acid Resistant Joint Packing: Sealite Inc.'s Red Stripe, Asbestos-Free Acid-Resistant White Oakum, No. 312.

G. Gaskets For Use With Ductile Iron Water Pipe and Cast Iron Drainage Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.

H. Flange Gasket Material:

1. For Use with Cold Water: 1/16 inch thick rubber.
2. For Use with Hot Water, or Air : Waterproofed non-asbestos ceramic or mineral fiber, or a combination of metal and water-proofed non-asbestos ceramic or mineral fiber, designed for the temperatures and pressures of the piping systems in which installed.

I. Gaskets For Use With Grooved End Pipes and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.

J. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.08 PACKING MATERIALS FOR BUILDING CONSTRUCTION PENETRATIONS

A. Oiled Oakum: Manufactured by Nupak of New Orleans, Inc., 931 Daniel St., Kenner, LA 70062, (504)466-1484.

2.09 DIELECTRIC CONNECTORS

A. Dielectric Fitting: Bronze ball valve with end connections and pressure rating to match associated piping.

1. Nipples with inert non-corrosive thermoplastic linings are not acceptable.
2. Flange Electrical Insulation Kit: Consisting of dielectric sleeves and washers, and dielectric gasket.
   a. Rated 150 psi at 250 degrees F: ANSI Class 150, full faced neoprene gasket with bolt holes, double phenolic washers, and mylar sleeves; Model 150 by APS, Lafayette, LA 70596, (337) 233-6116.

2.10 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gage galvanized sheet steel.

C. Type C: Schedule 40 steel pipe with 1/4 inch steel collar continuously welded to pipe sleeve. Size steel collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

D. Type D: No. 16 gage galvanized sheet steel with 16 gage sheet steel metal collar rigidly secured to sleeve. Size metal collars as required to span a minimum of one cell or corrugation, on all sides of the rough opening thru the metal deck.

2.11 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Solid type with polished chrome plated finish, and set screw.

1. Series Z89 by Zurn, 929 Riverside Drive, Grosvenordale, CT 06255, (800) 243-1830.
2. Model 127XXXX by Maguire Mfg., Cheshire CT 06410, (203) 699-1801.
3. Stamped Steel: Split type, polished chrome plated finish, with set screw.
   a. Figures 2 and 13 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
4. Cast Iron or Malleable Iron: Solid type, galvanized finish, with set screw:
   a. Model 395 by Anvil International, Portsmouth, NH 03802, (603) 422-8000.
   b. Model 900-016XX by Landsdale International, Westville, NJ 08093, (800) 908-0523.

2.12 FLEXIBLE CONNECTIONS

A. Underground Application:
   1. Acceptable Companies:
      a. Titeflex Inc., Springfield, MA.
      b. Flex-ing, Sherman, TX.
   2. Features:
      a. Construction: Stainless steel innercore covered with braided Type 304 stainless steel outer jacket.
      b. UL listed for underground fuel storage tank systems.
      c. Permanently crimped stainless steel collars with one threaded end and one threaded swivel end.

B. Underground or Above Ground Application:
   1. Acceptable Companies:
      a. Titeflex Inc., Springfield, MA.
      b. Flex-ing, Sherman, TX.
   2. Features:
      a. Construction: Convoluted, Type 321 stainless steel inner core, minimum .012 inch wall thickness covered with braided Type 304 stainless steel outer jacket.
      b. UL listed for above ground and underground use.
      c. Factory installed male swivel on one end.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install piping at approximate locations indicated, and at maximum height.

B. Install piping clear of door swings, and above sash heads.

C. Make allowances for expansion and contraction.

D. Allow for a minimum of one inch free air space around pipe or pipe covering, unless otherwise specified.

E. Install horizontal piping with a constant pitch, and without sags or humps.
   1. Water Piping: Pitch 1/4 inch per 10 feet upward in direction of flow, unless otherwise noted. If it is not possible to maintain constant pitch, establish a new low point and continue. At the low point, provide a 1/2 inch drip leg and gate valve with a hose bibb end. Provide an air vent at the high point.
   2. Drainage Piping: Pitch 1/4 inch per foot downward, in direction of flow, unless otherwise noted.
   3. Vent Piping: Pitch 1/4 inch per foot upward, unless otherwise noted.

F. Install vertical piping plumb.

G. Use fittings for offsets and direction changes, except for Type K soft annealed copper temper water tube.

H. Cut pipe and tubing ends square; ream before joining.

I. Threading: Use American Standard Taper Pipe Thread Dies.

1. Thread brass pipe with special brass threading dies.

3.02 DRAINAGE SYSTEMS

A. Fittings:

1. Use long turn drainage pattern fittings, unless space conditions prohibit their use; in such cases, short turn pattern fittings may be used.
2. Vertical Offsets: Make vertical offsets with 45 degree elbows, or 1/8 bends.
3. Tucker Fittings: Tucker fittings may only be installed in vertical piping.

B. Cleanouts:

1. Install cleanouts with sufficient side and end clearance to allow for the removal of the cleanout plug, and the use of cleaning tools.
2. Lubricate cleanout plugs with anti-seize lubricant.

3.03 DOMESTIC WATER PIPING SYSTEM

A. Connect runouts to the upper quadrant of the main, and run upward at not less than 45 degrees before extending laterally.

B. Make final connections to plumbing fixtures and equipment with unions, or flanges:

1. Do not use unions in ferrous piping larger than 3 inches.
2. Do not use unions in brass or copper piping larger than 2 inches.

3.04 NATURAL GAS PIPING SYSTEM

A. Install gas piping system in conformance with the National Fuel Gas Code, NFPA 54, or as required by the serving gas supplier.

B. Use non-hardening pipe dope on threads. Do not use thread seal tape.

3.05 PIPE JOINT MAKE-UP

A. Threaded Joint: Make up joint with a pipe thread compound applied in accordance with manufacturer's printed application instructions for the intended service.

1. Chrome Plated Brass Pipe: Tighten joint with a strap or Parmalee wrench; do not mar pipe finish. Install piping so that no threads are visible.

B. Soldered Joint: Thoroughly clean tube end and inside of fitting with emery cloth, sand cloth, or wire brush. Apply flux to the pre-cleaned surfaces. Install fitting, heat to soldering temperature, and join the metals with type solder specified. Remove residue.

C. Flanged Pipe Joint:

1. Install threaded companion flanges on steel pipe; flanges on galvanized pipe are not required to be galvanized.
2. Provide a gasket for each joint.
   a. Hot Water Pipe Gasket: Coat with a thin film of oil before making up joint.
   b. Air Pipe Gasket: Coat with a thin film of oil before making up joint.

3. Coat bolt threads and nuts with anti-seize lubricant before making up joint.

D. Calked Joint: Pack hub with joint packing specified, and calk. Run 12 ounces molten lead for each inch of pipe diameter. Calk cooled lead ring and face off smoothly.

E. Rubber Ring Push-on Joint: Clean hub, bevel spigot, and make up joint with lubricated gasket in conformance with the manufacturer's printed installation instructions.

F. Grooved Pipe Joint: Roll groove pipe ends, make up joint with grooved end fittings and couplings, in conformance with the manufacturer's printed installation instructions.

1. Cut grooved end piping is not acceptable.

G. Hubless CI Pipe Joint: Make up joint with hubless fitting and couplings, in conformance with the manufacturer's printed installation instructions.

H. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.

I. Polyethylene Containment Pipe Joint: Follow manufacturer's printed installation instructions.

J. High Density Polyethylene Pipe Joint (HDPE): Follow manufacturer's printed installation instructions.

K. Hydraulic Pressed Joint: Follow manufacturer's printed installation instructions.

L. Dissimilar Pipe Joint:

1. Joining Bell and Spigot and Threaded Pipe: Install a half coupling on the pipe or tube end to form a spigot, and calk into the cast iron bell.
2. Joining Dissimilar Threaded Piping: Make up connection with a threaded coupling or with companion flanges.
3. Joining Dissimilar Non-Threaded Piping: Make up connection with adapters recommended by the manufacturers of the piping to be joined.
4. Joining Galvanized Steel Pipe and Copper Tubing: Make up connection with a dielectric connector.
5. Joining FRP and Threaded Pipe: Make up connection with adapters as recommended by manufacturers of piping being joined.

3.06 PIPING PENETRATIONS

A. Sleeve Schedule: Unless otherwise shown, comply with the following schedule for the type of sleeve to be used where piping penetrates wall or floor construction:

1. CONSTRUCTION — SLEEVE TYPE
   a. Frame construction. — None Required
   b. Foundation walls. — A*
   c. Non-waterproof interior walls. — B*
   d. Non-waterproof interior floors on — D* — metal decks.
   e. Non-waterproof interior floors not on — B* — metal decks.
   f. Floors not on grade having a floor drain. — A
   g. Floors over mechanical equipment, steam service, machine, and boiler rooms. — A
   h. Floors finished or to be finished with terrazzo, and on — D* — latex composition or metal decks.

i.	Floors finished or to be finished with terrazzo, and not	A latex composition or on metal decks.
j.	Earth supported concrete floors.	None Required
k.	Exterior concrete slabs on grade.	A
l.	Fixtures with floor outlet waste piping.	None Required
m.	Metal roof decks.	C
n.	Non-metal roof decks.	A
o.	Waterproof floors on metal decks.	D
p.	Waterproof floors not on metal decks.	A
q.	Waterproof walls.	A

*Core drilling is permissible in lieu of sleeves where marked with asterisks.

B. Diameter of Sleeves and Core Drilled Holes:
   1. Unless otherwise specified, size holes thru floors and walls in accordance with the through penetration fire stopping system being used.
   2. Size holes thru exterior walls or waterproofed walls above inside earth or finished floors, and exterior concrete slabs in accordance with the following:
      a. Uninsulated (Bare) Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of pipe, unless otherwise specified.
      b. Insulated Pipe: Inside diameter of sleeve or core drilled hole 1/2 inch greater than outside diameter of insulation, unless otherwise specified.
      c. Mechanical Modular Seals: Size holes in accordance with the manufacturer's recommendations.
   3. Size holes for sprinkler and fire standpipe piping in accordance with NFPA 13.

C. Length of Sleeves (except as shown otherwise on Drawings):
   1. Walls and Partitions: Equal in length to total finished thickness of wall or partition.
   2. Floors with Finish: Equal in length to total finished thickness of floor and extending 1/2 inch above the finished floor level, except as follows:
      a. In furred spaces at exterior walls, extend sleeve one inch above the finished floor level.
   3. Exterior Concrete Slabs: Equal in length to total thickness of slab and extending 1/2 inch above the concrete slab.
   4. Roofs: Equal in length to the total thickness of roof construction, including insulation and roofing materials, and extending one inch above the finished roof level.

D. Packing of Sleeves and Core Drilled Holes:
   1. Unless otherwise specified, pack sleeves or cored drilled holes in accordance with Section 078400 - FIRESTOPPING.
   2. Pack sleeves in exterior walls or waterproofed walls above inside earth or finished floors with oakum to within 1/2 inch of each wall face, and finish both sides with Type 1C (one part) sealant. See Section 079200.
      a. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.
   3. Pack sleeves in exterior concrete slabs with oakum to full depth, and within 1/2 inch of top of sleeve and finish the remainder with sealant. See Section 079200.
      a. Sealant Types:
         1) Piping Conveying Materials up to 140 degrees F other than Motor Fuel Dispensing System Piping: Type 1C (one part).

b. Mechanical modular seals may be used in lieu of packing and sealant for sleeves and core drilled holes.

E. Weld metal collars of Type C and D sleeves to the upper surface of the metal deck. Seal voids under the metal collar as recommended by the manufacturer of the metal deck.

3.07 FLOOR, WALL AND CEILING PLATES

A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and exterior concrete slabs as follows:

1. In Finished Spaces:
   a. Piping 4 Inch Size and Smaller: Solid or split, chrome plated cast brass.
   b. Piping Over 4 Inch Size: Split, chrome plated cast brass.
   c. Unfinished Spaces (Including Exterior Concrete Slabs): Solid, unplated cast iron.
   d. Fasten plates with set screws.
   e. Plates are not required in pipe shafts or furred spaces.

3.08 PIPE AND FITTING SCHEDULE

A. Where options are given, choose only one option for each piping service. No deviations from the selected option will be allowed.

B. Domestic Water (Above Ground):

1. 3 inch and Under: Type L hard drawn copper tube, with cast copper alloy or wrot copper solder type fittings, and joints made up with Type 3 solder, or hydraulic press joints.
2. 4 inch and Over: Coated ductile iron water pipe and fittings, with mechanical or push-on joints installed as per manufacturer’s instructions.

C. Domestic Water (Below Ground):

1. 2-1/2 inches and Under: Type K soft annealed copper tube with water tube type flared fittings.
2. 3 inches and Over: Coated ductile iron water pipe and fittings, with mechanical or push-on joints.

D. Drainage (Sanitary) Above Ground:

1. Service weight, coated, cast iron bell and spigot pipe and fittings with calked joints.
2. Service weight, coated, cast iron bell and spigot pipe and fittings with rubber ring push-on joints.
3. Hubless, coated, cast iron pipe, fittings, and joint couplings.
4. DWV copper tubing, with cast brass or wrot copper drainage pattern fittings, and joints made with Type 3 solder.

E. Drainage (Storm) Above Ground:

1. Service weight, coated, cast iron bell and spigot pipe and fittings, with calked joints.
2. Service weight, coated, cast iron bell and spigot pipe and fittings, with rubber ring push-on joints.
3. Hubless, coated, cast iron pipe, fittings and joint couplings.
4. DWV copper drainage tube, with cast copper alloy or wrot copper drainage pattern fittings, and joints made up with Type 3 solder.

F. Drainage Piping (Below Ground):

1. Option No. 1: Service weight, coated, cast iron bell and spigot pipe and fittings, with calked joints.

2. Option No. 2: Service weight, coated, cast iron bell and spigot pipe and fittings, with rubber ring push-on joints.

G. Natural Gas Piping including associated vent:

1. Inside Building: Standard weight black steel pipe, with 150 lb malleable iron fittings, and threaded joints.

H. Vent Piping: Same materials that are used for piping system to which vent is connected.

END OF SECTION

SECTION 221118 - BACKFLOW PREVENTERS **H2M**

PART 1 GENERAL

1.01 **SECTION INCLUDES**

A. Reduced pressure zone principle device

B. Double check valve device

C. Atmospheric vent

1.02 SUBMITTALS

A. Product Data:

1. Manufacturer’s catalog sheets, specifications, and installation instructions for each type backflow preventer and test kit.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with the State Department of Health Sanitary Code for Cross Connection Control, and the other standards listed in Part 2 of this section.
2. Where conflicts occur between the referenced standards, the most stringent requirements shall apply.

1.04 MAINTENANCE

A. Special Tools (as furnished or recommended by the backflow preventer manufacturer). Deliver to the Building Owner:

1. Test Kit A: Portable, packaged in a substantially built, compartmented carrying case, containing hose, gauge, and fittings required for testing backflow preventer for proper operation, and printed procedure for conducting test.
2. Test Kit B: Sight tube, of required length, for testing backflow preventer for proper operation, and printed procedure for conducting test.

PART 2 PRODUCTS

2.01 BACKFLOW PREVENTERS

A. Type A: Reduced Pressure Zone Principle device, with atmospheric vent, conforming to ASSE Standard 1013, AWWA C-511, and USC specifications manual for Cross Connection Control.

1. Performance: 150 psig, and 130 degrees F maximum working conditions.
2. Assembly: Strainer and gate valve on inlet side, gate valve on outlet side, and four test cocks, all as furnished or recommended by the backflow preventer manufacturer.
3. Acceptable Manufacturer’s: Watts, Zurn Wilkins, Febco

B. Type B: Double Check Valve device, conforming to ASSE Standard 1015, AWWA C-510, and USC specifications manual for Cross Connection control.

1. Performance: 150 psig, and 130 degrees F, maximum working conditions.
2. Assembly: Strainer and gate valve on inlet side, gate valve on outlet side, and four test cocks, all as furnished or recommended by the backflow preventer manufacturer.
3. Acceptable Manufacturer’s: Watts, Zurn Wilkins, Febco

C. Type C: Atmospheric vent, conforming to ASSE 1012.

1. Performance: 175 psig and 210 degrees F maximum working conditions.
2. Assembly: Internal strainer, and union connections.
3. Acceptable Manufacturer's: Watts, Zurn Wilkins, Febco

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions.

B. Atmospheric Vent: Pipe vent to spill over closest point of drainage, as directed, maintaining a minimum 12 inch air gap above the drain.

1. Install air gap fitting when shown, or if atmospheric vent must be connected to drainage line. See Section 220576.

3.02 FIELD QUALITY CONTROL

A. Operation Test: Test kit as specified under Part 1 of this section may be used. Conduct test in the presence of the Owner's Representative.

1. Type A Backflow Preventer: Test the device with the test kit in accordance with the manufacturer's test procedures.
2. Type B Backflow Preventer: Test the device with the test kit in accordance with the manufacturer's test procedure.
3. Type C Backflow Preventer: Test at 125 psi hydrostatic pressure, and hold for four hours; check for leaking.

B. Re-testing: Repair or replace any device failing the operation test, and repeat the test.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the general requirements for all mechanical items and systems required by the Contract Documents.

B. Comply with all Contract Requirements, General Conditions, Supplementary Conditions and Division 1 Sections applying to or affecting the Work of Division 23.

C. Unless specifically dimensioned, the Work shown on the Drawings is in diagrammatic form only to show general arrangement.

D. Include, in the Work, all accessories and appurtenances, necessary and integral, for the intended operation of any system, component or device, as such systems, components and devices are specified.

E. Do not install pipe or conduit through ductwork.

F. If the pipe or duct size shown on the Drawings does not match the connection size of the equipment that it is connected to, provide the necessary transition pieces at the piece of equipment.

G. Do not use or allow to be used asbestos or asbestos-containing materials on this project. Be rigorous in assuring that all materials, equipment, systems and components thereof do not contain asbestos. Any deviations from this requirement shall be remedied at the Contractor's expense without regard to prior submittal approvals.

1.02 RELATED DOCUMENTS

A. The General Conditions and General Requirements Division 1 apply to the Work of this Section.

1.03 REFERENCE STANDARDS

A. Compliance with the following codes and standards shall be required:

1. Codes, Rules and Regulations of the State of New York
2. USAS USA Standards Institute (Formerly ASA)
3. AMCA Air Moving and Conditioning Association
4. ADC Air Diffusion Council
5. NEMA National Electrical Manufacturers Association
6. FM Factory Mutual
7. NFPA National Fire Protection Association
8. ASTM American Society for Testing Materials
9. UL Underwriters Laboratories, Inc.
10. NEC National Electrical Code
11. ASME American Society of Mechanical Engineers
12. ANSI American National Standards Institute
13. OSHA Occupational Safety and Health Act
14. BSA Board of Standards and Appeals
15. MEA Materials and Equipment Acceptance
16. DEC New York State Department of Environmental Conservation - 6 NYCRR Part 613 Handling and Storage of Petroleum

17. ASHRAE American Society of Heating, Refrigeration and Air Conditioning Engineers.
18. AWWA American Water Works Association
19. MSS Manufacturer's Standardization Society of the Valve and Fitting Industry
20. ARI American Refrigeration Institute
21. SMACNA Sheet Metal and Air Conditioning Contractor's National Association
22. TEMA Tubular Exchanger Manufacturers Association
23. F.S. or FED Spec. Federal Specification
24. ASA Acoustical Society of America
25. NACE National Association or Corrosion Engineers
26. ASSE American Society of Sanitary Engineers
27. NYC PC 2022 NYC Plumbing Code
28. NYC MC 2022 NYC Mechanical Code
29. NYC FGC 2022 NYC Fuel Gas Code
30. NYC BC 2022 NYC Building Code
31. NYC ECC 2020 NYC Energy Conservation Code
32. New York State Industrial Code Rules
33. IRI Industrial Risk Insurers
34. AGA American Gas Association
35. AABC American Air Balance Council
36. NEBB National Environmental Balancing Bureau
37. AWS American Welding Society

1.04 DEFINITIONS

A. "Provide" means furnish and install, complete the specified material, equipment or other items and perform all required labor to make a finished installation.

B. "Furnish and install" has the same meaning as given above for "Provide."

C. Refer to General Conditions for other definitions.

1.05 ABBREVIATIONS

A. Reference by abbreviation may be made in the Specifications and the Drawings in accordance with the following list:

1. HVAC Heating, Ventilating and Air Conditioning
2. CM Construction Manager
3. AC Air Conditioning
4. H & V Heating and Ventilating
5. AWG American Wire Gauge
6. BWG Birmingham Wire Gauge
7. USS United States Standard
8. B & S Brown & Sharpe
9. OS & Y Outside Screw and Yoke
10. IBBM Iron Body Brass Mounted
11. WSP Working Steam Pressure
12. PSIG Pounds per Square Inch Gauge
13. PRV Pressure Reducing Valve
14. GPM Gallons per Minute

15. MBH Thousand BTU per hour
16. BTU British Thermal Units
17. WG Water Gage
18. LB Pound (Also shown as: #)
19. ASME American Society of Mechanical Engineers
20. ASTM American Society for Testing Materials
21. ABMA American Boiler Manufacturers Association
22. ASA American Standards Associates
23. MER Mechanical Equipment Room

See Drawings for additional abbreviations

1.06 REVIEW OF CONTRACT DOCUMENTS AND SITE

A. Give written notice with the submission of bid to the Architect/Engineer of any materials or apparatus believed inadequate or unsuitable, in violation of laws, ordinances, rules or regulations of Authorities having jurisdiction, and any necessary items of work omitted. In the absence of such written notice it is mutually agreed that the Contractor has included the cost of all required items in his proposal for a complete project.

B. Contractors shall acknowledge that they have examined the Plans, Specifications and Site, and that from his own investigations he has satisfied himself as to the nature and location of the Work; the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials; availability of labor, utilities, roads and uncertainties of weather; the composition and condition of the ground; the characters quality and quantity of subsurface materials to be encountered; the character of equipment and facilities needed preliminary to and during the execution of the Work; all federal, state, county, township and municipal laws, ordinances and regulations particularly those relating to employment of labor, rates of wages, and construction methods; and all other matters which can in any way affect the Work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with the available information concerning these conditions will not relieve him from the responsibility for successfully performing the Work.

C. Owner assumes no responsibility for any understanding or representation made during or prior to the negotiation and execution of this Contract unless such understanding or representations are expressly stated in the Contract and the Contract expressly provides that the responsibility, therefore, is assumed by the Owner.

1.07 MEASUREMENTS

A. Base all measurements, both horizontal and vertical from established bench marks. Make all Work agree with these established lines and levels. Verify all measurements at site; and check the correctness of same as related to the Work.

1.08 LABOR AND MATERIALS

A. Provide all materials and apparatus required for the Work of new and first-class quality. Furnish, deliver, arrange, erect, connect and finish all materials and equipment in every detail, so selected and arranged as to fit properly into the building spaces.

B. Remove all materials delivered, or work erected, which does not comply with Drawings or Specifications, and replace with proper materials, or correct such work as directed, at no additional cost to the Owner.

1.09 COVERING OF WORK

A. Do not cover up or hide from view any duct, piping, fitting, or other work of any kind before it has been examined or approved by the Architect/Engineer and/or other authority having jurisdiction over the same. Remove and correct immediately any unacceptable or imperfect work or unauthorized or disapproved materials discovered immediately after being disapproved.

1.10 PROTECTION

A. Protect the Work and material of all trades from damage and replace all damaged material with new.

B. Protect work and equipment until the Work is finally inspected, tested, and accepted; protect the Work against theft, injury or damage; and carefully store material and equipment received on site which is not immediately installed; close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.

C. Preserve all public and private property, along and adjacent to the Work, and use every precaution necessary to prevent damage or injury thereto. Use suitable precautions to prevent damage to pipes, conduits and other underground structures or utilities, and carefully protect from disturbance or damage all property marks until an authorized agent has witnessed or otherwise referenced their location, and do not remove them until directed.

1.11 CUTTING AND PATCHING

A. Provide all cutting and rough patching required for the Work. Perform all finish patching.

B. Furnish and locate all sleeves and inserts required before the floors and walls are built, pay the cost of cutting and patching required for pipes where sleeves and inserts were not installed in time, or where incorrectly located. Provide all drilling required for the installation of hangers.

C. Punch or drill all holes cut through concrete slabs or arches from the underside. Do not cut structural members without the approval of the Architect/Engineer. Perform all cutting in a manner directed by the Architect/Engineer.

D. Do not do any cutting that may impair strength of building construction. Do no drill any holes, except for small screws, in beams or other structural members without obtaining prior approval. All Work shall be done in a neat manner by mechanics skilled in their trades and as approved.

1.12 SUBMITTALS

A. Submit for review, shop drawings for all materials and equipment furnished and installed under this Contract. Submissions shall include but not be limited to:

1. Ductwork layout drawings, air devices and accessories
2. Breeching layout drawings
3. Piping and equipment layout drawings.
4. Piping materials, valves, hangers, supports and accessories
5. Automatic temperature control equipment, diagrams and control sequences
6. Equipment, fixtures, and appurtenances
7. Insulation
8. Rigging Plan - Include the name of the rigging company; a layout drawing that details the crane with its outriggers extended outward. Provide dimensions showing how rigging operations will affect the road and parking lines being used, the type of crane and its specification including crane arm height, lift capacity, crane reach.

B. Reports

1. Compliance with listings and approvals for equipment and for fire ratings.
2. Acceptance certificates from inspecting agencies.
3. Complete printed and illustrated operating instructions in report format.
4. Manufacturer's performance tests of equipment.
5. Field pipe and duct testing reports.
6. Field operating test results for equipment.
7. Performance report on the balancing of air and water systems.
8. Performance reports for vibration isolation equipment.
9. Manufacturer's reports on motorized equipment alignment and installation.

C. Specific references to any article, device, product or material, fixture or item of equipment by name, make or catalog number shall be interpreted as establishing a basis of cost and a standard of quality. All devices shall be of the make and type listed by Special Agencies, such as the Underwriters' Laboratories, and where required, approved by the Fire Department.

1.13 SPACE ALLOTMENTS AND SUBSTITUTIONS

A. The space allotments and equipment layouts on the Drawings are based on the manufacturer’s model indicated or scheduled as the “Basis of Design”. Ensure that any equipment that is submitted other than the “Basis of Design” will fit in the space allotment and will provide the necessary maintenance clearances as recommended by the manufacturer. If maintenance clearances are not met, pay for any changes such that maintenance clearances will be met.

B. Bear all costs associated with re-layout of the equipment, changes to piping/ductwork, and other changes as required if approved equipment other than the “Basis of Design” equipment is purchased. This shall also include any structural steel modifications and structural steel design changes. Submit, at no cost to the Owner, a steel design stamped by a structural engineer licensed in the state in which the Work is to be performed for structural modifications that must be made resulting from the use of equipment other than the “Basis of Design” or not specified.

1.14 PAINTING

A. Prime paint all bare supplemental steel, supports and hangers required for the installation of Division 23 Work in accordance with “Painting” Specification Section. Touch up welds of galvanized surfaces with galvanizing primer.

1.15 MATERIAL SAFETY DATA SHEETS

A. Submit material safety data sheets (MSDS) for all chemicals, hydraulic fluids, seal oils, lubricating oils, glycols and any other hazardous materials used in the performance of the Work, in accordance with the US Department of Labor, Occupational Safety and Health Administration (OSHA) hazard communication and right-to-know requirements stipulated in 29 CFR 1910.1200 (g).

1.16 MOTORS AND STARTERS

A. Provide new NEMA Standard electric motors, sized and designed to operate at full load and full speed continuously without causing noise, vibration, and temperature rise in excess of their rating. Provide motors with a service factor of at least 1.15.

B. Equip motors for belt driven equipment with rails with adjusting screws for belt tension adjustment. Weather protect motors exposed to the weather.

C. Install high efficiency electric motors for air handling units, relief fans, and exhaust fans.

D. Provide all motors for use with Variable Frequency Drives with “high efficiency inverter duty” insulation class “F” with class “B” temperature rise and that conform to or exceed the International Energy Conservation Code or the Federal EP Act of 1992 requirements for efficiency.

E. Provide stainless steel nameplates, permanently attached to the motor, and having the following information as a minimum:

1. Manufacturer
2. Type
3. Model
4. Horsepower
5. Service Factor
6. RPM
7. Voltage/Phase/Frequency
8. Enclosure Type
9. Frame Size
10. Full-Load Current
11. UL Label (where applicable)
12. Lead Connection Diagram
13. Bearing Data
14. Efficiency at Full Load.

F. Provide motors whose sound power levels do not exceed that recommended in NEMA MG 1-12.49.

G. Provide motors with drive shafts long enough to extend completely through belt sheaves when sheaves are properly aligned and balanced.

H. Protect motor starters on equipment located outdoors in weatherproof NEMA 4X enclosures.

I. Provide weatherproof NEMA 4X disconnect switches when located outdoors.

J. Motor Characteristics:

1. 120V/1/60 Hz, 208V/1/60 Hz or 240V/1/60 Hz: Capacitor start, open drip-proof type, ball bearing, rated 40 C. continuous rise.
2. 208V/3/60 Hz, 240V/3/60 Hz or 460/3/60 Hz: NEMA B, normal starting torque, single speed, squirrel-cage type, open drip-proof, rated 40 C continuous rise, with ball bearings rated for B-10 life of 100,000 hours and fitted with grease fittings and relief ports. Provide motors with aluminum end brackets with steel inserts in bearing cavities.

1.17 ACOUSTICAL PERFORMANCE OF EQUIPMENT AND SYSTEMS

A. Install the Work in such a manner that noise levels from operation of motor driven equipment, whether airborne or structure-borne, and noise levels created by or within air handling equipment and air distribution and control media, do not to exceed sound pressure levels determined by the noise criteria curves published in the ASHRAE guide.

B. Acoustical Tests

1. Owner may direct the Contractor to conduct sound tests for those areas he deems too noisy.
2. If NC level exceeds the requirements of the Contract Documents due to improper installation or operation of mechanical systems, make changes or repairs to bring noise levels to within required levels.
3. Retest until specified criteria have been met.

1.18 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Instructions and Demonstration for Owner's Personnel

1. Provide operating and maintenance instruction to the Owner when project is completed and all HVAC equipment serving the building is ready to be turned over to the Owner.
2. Turn over the HVAC equipment to the Owner only after the final testing and proper balancing of HVAC systems.
3. Instruct the Owner's personnel in the use, operation and maintenance of all equipment of each system.
4. The above instruction requirements are in addition to that specified for specific equipment or systems. Conform to specified requirements if more stringent or longer instruction is specified for specific equipment or systems.

1.19 CODES, RULES, PERMITS & FEES

A. Give all necessary notices, obtain all permits and pay all government sales taxes, fees, and other costs, in connection with the Work. Unless indicated otherwise, fees for all utility connections, extensions, and tap fees for water, storm, sewer, gas, telephone, and electricity will be paid directly to utility companies and/or agencies by the Owner. File all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments having jurisdiction; obtain all required certificates of inspection for the Work and deliver same to the Owner's Representative before request for acceptance and final payment for the Work.

B. Conform to the requirements of the NFPA, NEC, FM, UL and any other local or State codes which may govern.

1.20 RECORD DRAWINGS

A. During the progress of the Work, make a record set of drawings of all changes by which the actual installation differs from the Drawings.

B. Create all record drawings in AutoCAD version 2002 or later in .dwg format. Upon completion of the Work, submit to the Architect/Engineer for approval three complete sets of hard copies of the record drawings, of the same size as the Drawings for approval. Upon approval by the Architect/Engineer furnish the Owner a CD copy of the record drawings along with one hard copy for his records.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 CLEANING AND ADJUSTING

A. Cleaning
   1. Blow out, clean and flush each system of piping and equipment, to thoroughly clean the systems.
   2. Clean all materials and equipment; leave in condition ready to operate and ready to receive final finishes where required.
   3. Clean the operating equipment and systems to be dust free inside and out.
   4. Clean concealed and unoccupied areas such as plenums, pipe and duct spaces and equipment rooms to be free of rubbish and dust.

B. Adjusting
   1. Adjust and align equipment interconnected with couplings or belts.
   2. Adjust valves of all types and operating equipment of all types to provide proper operation.
   3. Clean all strainers after system cleaning and flushing and again before system startup.

C. Lubrication
   1. Lubricate equipment as recommended by the manufacturer, during temporary construction use.
   2. Provide complete lubrication just prior to acceptance.

D. Permanent Equipment Operating During Construction
   1. Use only in same service as the permanent applications.
   2. Use disposable filters during temporary operation.
   3. Replace expendable media, including belts used for temporary operation and similar materials just prior to acceptance of the Work.
   4. Repack packing in equipment operated during construction just prior to system acceptance, using materials and methods specified by the equipment manufacturer.

E. Retouch or repaint equipment furnished with factory finish as required to provide same appearance as new.

F. Tools

1. Provide one set of specialized or non-standard maintenance tools and devices required for servicing the installed equipment.

3.02 EQUIPMENT BASES, PLATFORMS AND SUPPORTS

A. Provide supporting platforms, steel supports, anchor bolts, inserts, etc., for all equipment and apparatus provided.

B. Obtain prior approval for installation method of structural steel required to frame into building structural members for the proper support of equipment, conduit, etc. Welding will be permitted only when approved by the Architect/Engineer.

C. Submit shop drawings of supports to the Architect/Engineer for approval before fabricating or constructing.

D. Provide leveling channels, anchor bolts, complete with nuts and washers, for all apparatus and equipment secured to concrete pads and further supply exact information and dimensions for the location of these leveling channels, anchor bolts, inserts, concrete bases and pads.

E. Where supports are on concrete construction, take care not to weaken concrete or penetrate waterproofing.

3.03 ACCESSIBILITY

A. Install valves, dampers and other items requiring access conveniently and accessibly located with reference to the finished building.

3.04 USE OF EQUIPMENT

A. The use of any equipment, or any part thereof, even with the Owner's consent, is not an indication of acceptance of the Work on the part of the Owner, nor shall it be construed to obligate the Owner in any way to accept improper work or defective materials.

3.05 MODIFICATIONS OF EXISTING WORK

A. Coordinate the Work with all other contractors and provide necessary dimensions for all openings. Provide all cuts and openings which are necessary for the Work for passage of piping and ductwork

B. Upon completion, remove all temporary piping and equipment, shoring, scaffolds, etc., and leave all areas clean and free from material and debris resulting from the Work performed under this Section. Provide rough patching in areas required.

3.06 EQUIPMENT INSTALLATION

A. Locate and set equipment anchor bolts, dowels and aligning devices for equipment requiring them.

B. Level and shim the equipment; coordinate and oversee the grouting work.

C. Perform field assembly, installation and alignment of equipment under direct supervision provided by the manufacturer or with inspections, adjustments and approval by the manufacturer.

D. Alignment and Lubrication Certification for Motor Driven Apparatus

1. After permanent installation has been made and connections have been completed, but before the equipment is continuously operated, have a qualified representative of the equipment manufacturer inspect the installation and report in writing on the manufacturer's letterhead on the following:
   a. Whether shaft, bearing, seal, coupling, and belt drive alignment and doweling is within the manufacturer's required tolerances so that the equipment will remain aligned in the normal service intended by the Contract Documents and that no strain or distortion will occur in normal service.
   b. That all parts of the apparatus are properly lubricated for operation.
   c. That the installation is in accordance with manufacturer's instructions.
   d. That suitable maintenance and operating instructions have been provided for the Owner's use.
   e. Make any corrections to items that are required or recommended based on the manufacturer's inspection and have the equipment re-inspected.

E. Belt Drives

1. V-belt drives - a driving and driven sheave grooved for belts of trapezoidal cross-section. Construct belts of fabric and rubber so designed so as not to touch the bottom of the grooves, the power being transmitted by the contact between the belts and V-shaped groove sides. Design drives for a minimum of 150 percent of motor horsepower. Provide companion type driven sheaves.
2. Select drives to provide for 12-1/2 percent variation in speed, plus or minus, from specified speed. Provide all motors with adjustable sheaves except where indicated otherwise in the Specifications or on the Drawings.
3. Install all fans with adjustable pitch sheaves on their drive motors. Select sheaves to provide air quantities under specified conditions. Put air systems into operation, and determine as a result of the completed air balance the actual size of sheaves required to produce specified air quantities on installed systems. The adjustable pitch sheaves shall then be replaced with the proper size fixed sheaves. Remove adjustable pitch sheaves from premises. Provide fixed motor sheaves manufactured by Wood's or Engineer Approved Equal.
4. Where indicated on the Drawings or specified, provide spare motor, bearings, and belts.

F. Machinery Guards

1. Protect motor drives by guards furnished by the equipment manufacturer or in accordance with the Sheet Metal and Air Conditioning Contractors National Association's Low Pressure Duct Manual. Provide guards of all types approved as acceptable under OSHA Standards.

G. Equipment Start-up

1. Require each equipment manufacturer to provide qualified personnel to inspect and approve equipment and installation and to supervise the start-up of the equipment and to supervise the operating tests of the equipment.
2. If a minimum number of hours for start-up and instruction are not stated with the equipment specifications, these shall be 2 full 8-hour working days as a minimum.
3. Advise Owner of start-up at least 72 hours in advance.

3.07 CLOSEOUT PROCEDURES

A. General Operating and Maintenance Instructions: Arrange for each installer of operating equipment and other work that requires regular or continuing maintenance, to meet at the site

with the Owner's personnel to provide necessary basic instructions in the proper operation and maintenance of the entire Work. Where installers are not expert in the required procedures, include instruction by the manufacturer's representatives.

B. Where applicable, provide instruction and training, including application of special coatings systems, at manufacturer's recommendation.

C. Provide a detailed review of the following items:

1. Maintenance manuals
2. Record documents and catalog cuts for each piece of equipment.
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning

D. Warranties, bonds, maintenance agreements, and similar continuing commitments.

E. Demonstrate the following procedures:

1. Start-up
2. Shut-down
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization.

F. Prepare instruction periods to consist of approximately 50% classroom instruction and 50% "hands-on" instruction. Provide minimum instruction periods as follows:

Systems or Equipment	Training Time (Hours)
Boilers and Burners	16 hrs.
All Other Equipment	4 hrs. (each)

Note: Consult individual equipment specification sections for additional training requirements.

G. Prepare a written agenda for each session and submit for review and approval. Include date, location, purpose, specific scope, proposed attendance and session duration.

H. Record training sessions in digital format, format as selected by the Owner. Turn over digital files to the Owner after training has been completed.

END OF SECTION

SECTION 230015 - MECHANICAL DEMOLITION **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the draining, disconnecting, dismantling, demolition, removal, relocation, rerouting and reconnection of existing mechanical facilities, in a neat and workmanlike manner, of mechanical systems, materials and accessories as required, as shown on the Drawings and specified herein, to accomplish alteration, restoration and to accommodate the Work.

1.02 RELATED WORK

A. General Mechanical Requirements - Section 230010

1.03 REFERENCES

A. NYC BC - 2022 NYC Building Code
B. NYC MC - 2022 NYC Mechanical Code
C. NFPA Fire Code
D. ANSI A10.6 - Safety Requirements for Demolition
E. National Association of Demolition Contractors (NADC) - Demolition Safety Manual
F. NFPA 51B - Cutting and Welding Processes
G. NFPA 70 - National Electrical Code
H. NFPA 241 - Safeguarding Building Construction and Demolition Operations
I. OSHA 29 CRF 1910 - Occupational Safety and Health Standards
J. US EPA - Clean Air Act Amendment of 1990.

1.04 SUBMITTALS

A. Demolition Schedule
B. Fire Watch Procedures
C. Inspection Report of Underground Piping Systems
D. Welding/Burning Permit - Obtain a welding/burning permit from the local Fire Official prior to the start of any welding or burning in accordance with the local Fire Code or as required by the Owner.

1.05 QUALITY ASSURANCE

A. Only employ workers skilled in the specific trades involved for cutting, patching and removal.
B. Job Conditions: Prior to start of the Work, make an inspection accompanied by the Architect/Engineer to determine physical condition of adjacent construction that is to remain.

1.06 SPECIAL PRECAUTIONS

A. Do not torch cut ductwork.
B. Torch cutting of other mechanical equipment will be permitted only with the specific written approval of the Architect/Engineer.

C. Include “Fire Watch” procedures as required by the Fire Code and/or Owner’s Fire Insurance Carrier for any cutting work that may produce sparks. Submit fire watch procedures for approval.

D. Perform draining operations so that damage to existing building components does not occur.

PART 2 - PRODUCTS

2.01 GENERAL

A. Adequately sized rubbish containers for the proper and safe disposal of all debris.

PART 3 - EXECUTION

3.01 PREPARATION

A. Construct temporary partitions enclosing respective work prior to any demolition work. Erect temporary fencing and signage around demolished materials.

B. Protect existing materials and equipment which are not to be demolished.

C. Prevent movement of structure; provide required bracing and shoring.

D. Do not begin the work until the time schedules and manner of operations have been approved by the Architect/Engineer and Owner. Include all interruptions of existing services in schedules submitted for approval by the Architect/Engineer and Owner.

3.02 GENERAL

A. Provide alteration and demolition of mechanical facilities as required by the Drawings and Specifications. The Drawings are diagrammatic and do not show the exact location of all existing mechanical work. Where existing equipment is to remain in service during construction, provide rerouting and reconnection of mechanical services as required to maintain continuous service.

B. Review all equipment with the Architect/Engineer and Owner prior to disposal. Completely remove existing ductwork, piping, conduit and similar items to be abandoned that are not embedded in walls or floor slabs unless otherwise shown on the Drawings. Cap open ends at all walls and floors.

C. Remove, store and protect all equipment or materials designated to be turned over to the Owner. Coordinate exact location of storage with the Owner.

D. Temporarily cap ends of ductwork, piping and sanitary vent piping to avoid entry of dirt, debris, or discharge of foul odors and gases.

E. Where existing louvers or ductwork penetrations are to remain, blank-off the opening on the inside with galvanized sheet metal on both sides of 2-inch thick, 6 pcf density rigid fiberglass board insulation. Paint side attached to the opening with weather resistant flat black paint.

F. Do not close or obstruct egress width to exits.

G. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to the Architect/Engineer and Owner.

H. Conform to procedures applicable when discovering hazardous or contaminated materials.

I. Conduct demolition to minimize interference with adjacent building structures or Owner's operations.

J. Cease operations immediately if structure appears to be in danger or hazardous materials are encountered. Notify Architect/Engineer. Do not resume operations until directed.

K. Demolish in an orderly and careful manner. Do not cut or remove more than is necessary to accommodate the new construction or alteration.

L. Remove demolished materials from site daily. Do not burn or bury materials on site. Dispose of all material at an approved disposal facility.

M. Protect finished surfaces at all times and repair or replace, if damaged, to match existing construction to the satisfaction of the Architect/Engineer.

3.03 PIPING REMOVAL

A. Cut off all welded piping square at the locations indicated on the Drawings. No cutting is required where the demolition ends at a flanged valve or equipment. Close off all openings of any remaining valves, piping or fittings with weld caps or blind flanges to prevent debris from entering the existing system.

B. Disconnect all threaded piping at the location indicated on the Drawings. Close off all openings of remaining valves, piping, fittings and equipment with pipe plugs or pipe caps as required to prevent debris from entering the existing systems.

C. Remove all pipe hangers, supports, miscellaneous steel and anchors with the piping.

3.04 PROTECTION FROM FREEZING

A. It is intended that the building remain protected from damage due to freezing temperatures. To that end, keep in place and in operation existing equipment and systems used for heating until scheduling permits shutdown.

B. Where the removal of equipment, etc. will leave an area unprotected from freezing, notify the Owner and Architect/Engineer at least 72 hours in advance prior to removal so appropriate steps can be taken by the Owner to protect the area. Provide temporary heating equipment sufficient to prevent freezing.

C. It is the Contractor’s responsibility to ensure that piping systems that are being worked on are completely drained from water prior to the start of demolition. If water is not drained and the water freezes it is the Contractor’s responsibility to replace piping and repair all damages caused by water leakage at his own expense.

3.05 DISCONNECTION AND INTERRUPTION OF MECHANICAL SERVICES

A. When portions of an existing piping system or ductwork system are removed, and this removal causes loss of operation to another piece of equipment due to open or disconnected piping or

ductwork, cap piping or ductwork or provide temporary piping or ductwork system to retain operation of the system.

3.06 MECHANICAL EQUIPMENT REMOVAL

A. Remove all mechanical equipment as shown on the Drawings. Remove all electrical work, including wiring between equipment, and wiring to power source or point of origin.

B. Where equipment is supported by steel and/or structural supports, remove these supports.

3.07 DUCTWORK REMOVAL

A. Disconnect all ductwork which must be removed, at the closest joint and support the remaining ductwork.

B. Prepare all remaining ductwork joints at the point of disconnection to receive new ducts or blank-off panels.

C. Remove all ductwork supports and miscellaneous steel with ductwork to be demolished.

3.08 INSULATION REMOVAL

A. Remove insulation, together with all piping, fittings, valves and equipment designated for demolition.

3.09 CONTROL WIRING REMOVAL

A. Disconnect and remove all control wiring and tubing, including conduit, for the Automatic Temperature Control (ATC) System associated with equipment and systems to be removed.

END OF SECTION

SECTION 230529 - PIPE HANGERS AND SUPPORTS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Work covered under this Section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the pipe hanger and supports as described in this Specification. Size hangers and supports to fit the outside diameter of the

1.02 REFERENCES

A. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel
B. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
C. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process
D. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)
E. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture
F. MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application
G. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.03 QUALITY ASSURANCE

A. Provide hangers and supports used in fire protection piping systems listed and labeled by Underwriters Laboratories.
B. Steel pipe hangers and supports shall have the manufacturer’s name, part number, and applicable size stamped in the part itself for identification.
C. Design and manufacture hangers and supports in conformance with MSS SP 58.

1.04 SUBMITTALS

A. Submit product data on all hanger and support devices, including shields and attachment methods. Include as a minimum as part of product data materials, finishes, approvals, load ratings, and dimensional information.
B. Submit Pipe Hanger and Support Application Schedule.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with these specifications, provide pipe hanger and support systems manufactured by:
    1. Cooper B-Line, Inc.

2. Carpenter and Patterson
3. Grinnell

2.02 PIPE HANGERS AND SUPPORTS

A. Hangers

1. Uninsulated pipes 2 inch and smaller:
   a. Adjustable steel swivel ring (band type) hanger, B-Line B3170.
   b. Adjustable steel swivel J-hanger, B-Line B3690.
   c. Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
   d. Malleable iron split-ring hanger with eye socket, B-Line B3173 with B3222.
   e. Adjustable steel clevis hanger, B-Line B3104 or B3100.
2. Uninsulated pipes 2-1/2 inch and larger:
   a. Adjustable steel clevis hanger, B-Line B3100.
   b. Pipe roll with sockets, B-Line B3114.
   c. Adjustable steel yoke pipe roll, B-Line B3110.
3. Insulated pipe- Hot or steam piping:
   a. 2 inch and smaller pipes: use adjustable steel clevis with galvanized sheet metal shield. B-Line B3100 with B3151 series.
   b. 2-1/2 inch and larger pipes
      1) Adjustable steel yoke pipe roll with pipe covering protection saddle. B-Line B3110 with B3160-B3165 series.
      2) Pipe roll with sockets with pipe covering protection saddle, B-Line B3114 with B3160-B3165 series.

B. Pipe Clamps

1. When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weldless eye nuts, B-Line B3140 or B3142 with B3200. For insulated lines use double bolted pipe clamps, B-Line B3144 or B3146 with B3200.

C. Multiple or Trapeze Hanger

1. Construct trapeze hangers from 12 gauge roll formed ASTM A1011 SS Grade 33 structural steel channel, 1-5/8 inch by 1-5/8 inch minimum, B-Line B22 strut or stronger as required.
2. Mount pipes to trapeze with 2 piece pipe straps sized for outside diameter of pipe, B-Line B2000 Series.
3. For pipes subjected to axial movement:
   a. Strut mounted roller support, B-Line B3126. Use pipe protection shield or saddles on insulated lines.
   b. Strut mounted pipe guide, B-Line B2417.

D. Wall Supports

1. Pipes 4 inch and smaller:
   a. Carbon steel hook, B-Line B3191.
   b. Carbon steel J-hanger, B-Line B3690.
2. Pipes larger than 4 inch:
   a. Welded strut bracket and pipe straps, B-Line B3064 and B2000 series.
   b. Welded steel brackets, B-Line B3066 or B3067, with roller chair or adjustable steel yoke pipe roll. B-Line B3120 or B3110. Use pipe protection shield or saddles on insulated lines.

E. Floor Supports

1. Hot piping under 6 inch and all cold piping:

a. Carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. B-Line B3093 and B3088T or B3090 and B3088. Screw or weld pipe saddle to appropriate base stand.

2. Hot piping 6 inch and larger:
   a. Adjustable Roller stand with base plate, B-Line B3117SL
   b. Adjustable roller support and steel support sized for elevation, B-Line B3124

F. Vertical Supports

1. Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.
2. Copper Tubing Supports
   a. Size hangers to fit copper tubing outside diameters.
      1) Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
      2) Malleable iron ring hanger, B-Line B3198RCT or hinged ring hanger B3198HCT.
      3) Malleable iron split-ring hanger with eye socket, B-Line B3173CT with B3222.
      4) Adjustable steel clevis hanger, B-Line B3104CT.
   b. For supporting vertical runs use epoxy painted or plastic coated riser clamps, B-Line B3373CT or B3373CTC.
   c. For supporting copper tube to strut use epoxy painted pipe straps sized for copper tubing, B-Line B2000 series, or plastic inserted vibration isolation clamps, B-Line BVT series.

G. Pipe Supports Between Anchors and Pipe Expansion Loops

1. Provide supports between pipe anchors designed to cause minimal resistance to piping movement. Provide roller hanger supports or slide plates between anchors.
2. Provide supports near the L bends of pipe thermal expansion loops. No more than 12 inches from either side of the horizontal elbow.

2.03 UPPER ATTACHMENTS

A. Beam Clamps

1. Use beam clamps where piping is to be suspended from building steel. Select clamp type on the basis of load to be supported, and load configuration.
2. Use center loaded beam clamps where specified. For steel clamps provide B-Line B3050, or B3055. For malleable iron or forged steel beam clamps with cross bolt provide B-Line B3054 or B3291-B3297 Series as required to fit beams.

2.04 ACCESSORIES

A. Hanger Rods shall be threaded both ends or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

B. Provide shields that are 180 degree galvanized sheet metal, 12 inch minimum length, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151.

C. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

2.05 FINISHES

A. Indoor Finishes

1. Hangers and clamps for support of bare copper piping with copper colored epoxy paint, B-Line Dura-Copper®. Use additional PVC coating of the epoxy painted hanger where necessary.
2. Zinc plate hangers for other than bare copper pipe in accordance with ASTM B633 OR provide an electro-deposited green epoxy finish, B-Line Dura-Green®.
3. Provide pre-galvanized strut channels in accordance with ASTM A653 SS Grade 33 G90 or provide an electro-deposited green epoxy finish, B-Line Dura-Green®.

B. Outdoor and Corrosive Area Finishes

1. Hot dip galvanize hangers and struts located outdoors after fabrication in accordance with ASTM A123. Provide all hanger hardware as hot dip galvanized or stainless steel. Zinc plated hardware is not acceptable for outdoor or corrosive use.
2. Provide hangers and strut manufactured of type 304 stainless steel with stainless steel hardware where located in corrosive areas.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

A. Adequately support pipe by pipe hanger and supports specified in PART 2 PRODUCTS. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Size hangers for insulated pipes sized to accommodate insulation thickness.

B. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.

C. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.

D. Provide pipe hangers capable of supporting the pipe in all conditions of operation selected to allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

E. Painted or shop prime all hangers and supports that are not galvanized.

F. Support horizontal steel piping in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 1-1/4	3/8	6
1-1/2	3/8	9
2	3/8	10
2-1/2	1/2	11
3	1/2	12
3-1/2	1/2	13
4	5/8	14
5	5/8	16
6	3/4	17

8	3/4	19
10	7/8	22
12	7/8	23
14	1	25
16	1	27

G. Support horizontal copper tubing in accordance with MSS SP-69 Tables 3 and 4, excerpts of which follow below:

NOMINAL PIPE SIZE (INCHES)	ROD DIAMETER (INCHES)	MAXIMUM SPACING (FEET)
1/2 to 3/4	3/8	5
1	3/8	6
1-1/4	3/8	6
1-1/2	3/8	8
2	3/8	8
2-1/2	1/2	9
3	1/2	10
3-1/2	1/2	11
4	1/2	12
5	1/2	13
6	5/8	14
8	3/4	16

3.02 CONCRETE INSERTS

A. Secure pipe hangers attached to concrete structure and slabs with embedded inserts, anchor bolts or concrete fasteners. Use a safety factor of 5 in selection of all inserts and expansion bolts unless there are seismic requirements (See “Seismic Restraint” specification if applicable). In which case, the larger of the two loadings shall govern the design.

B. Provide inserts for placement in formwork before concrete is poured.

C. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

D. Where concrete slabs form finished ceilings, provide inserts to be flush with slab surface.

E. E. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch.

END OF SECTION

SECTION 230555 - MECHANICAL SYSTEM IDENTIFICATION **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the marking and identification materials for identifying mechanical equipment, ductwork and piping systems.

B. Mark and identify all mechanical equipment, ductwork and piping systems described herein, and as shown and specified in the Contract Documents.

1.02 REFERENCES

A. ANSI A13.1 - Scheme for the Identification of Piping Systems.

B. Z53.1 - Safety Color Code for Marking Physical Hazards.

C. OSHA 29 CFR 1910 - Subpart J, General Environmental Controls

1.03 SUBMITTALS

A. Identification Scheme - Submit scheme of identification codes.

B. Steam Trap Schedule - Submit steam trap schedules listing proposed steam trap number, location, type, sizes and service.

C. Valve Schedules - Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Samples - Submit samples of tags, attachments, labeled and identified.

E. Equipment Schedules - Submit mechanical equipment schedules, listing proposed equipment numbers, and their location and function.

F. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Seton

B. Bunting

C. W.H. Brady Company

2.02 VALVE TAGS

A. Provide valve tags for all valves installed for this project. Valve tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.

B. Valve tags shall be permanently stamped and marked with a service designation, normal valve position, and an identifying number as large as possible. Each valve shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the

Owners existing valve numbering system. Coordinate with the Architect/Engineer and Owner before finalizing the valve tag numbering system.

2.03 STEAM TRAP TAGS

A. Provide steam trap tags for all steam traps installed for this project. Steam trap tags shall be constructed of brass with stamped letters and service designation tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges, brass S hook.

B. Each steam trap tag shall be permanently stamped and marked with a service designation and a unique identifying number as large as possible.

C. Each trap shall have a separate and distinct number coordinated with the service designations shown on the Drawings and the Owners existing trap numbering system. Coordinate with the Architect/Engineer and Owner before finalizing the trap tag numbering system.

2.04 PIPE MARKERS

A. All accessible piping installed indoors for this project, insulated and uninsulated shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. “Accessible” piping shall include exposed piping, and piping located above lay-in ceilings. Markers shall include system name, flow arrow, and color code and pipe diameter.

B. All piping installed outdoors for this project, insulated and uninsulated, shall be identified with wraparound pipe markers. Pipe markers shall be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. The marker shall be printed with weather-resistant ink.

C. Where pipes are too small or not readily accessible for application of pipe markers, a brass identification tag at least 1 ½ inches in diameter, with depressed ½ inch high black letters and numerals, shall be securely fastened at locations specified for pipe markers.

D. See pipe marker schedule for size requirements of pipe markers.

2.05 MECHANICAL EQUIPMENT MARKERS

A. Identify all mechanical equipment, bare or insulated, installed in the rooms or on the roof, by means of lettered and numbered nameplate (not stenciled) identifying the equipment and service. Refer to the Drawings for equipment identifications. Nameplates shall be aluminum with permanent 1 ½ inch high white letters on a black background, mechanically affixed and installed in a readily visible location on the equipment. Coordinate the final equipment designation with the Owner.

B. In addition to markers, all mechanical equipment shall be furnished with the manufacturer’s identification plate showing the name of equipment, manufacturer’s name and address, date of purchase, model number and performance data.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Apply piping system markers and valve tags in the following locations:
   1. Adjacent to each valve and fitting.
   2. At each branch location and riser take-off
   3. At each side of a pipe passage through floors, walls, ceiling and partitions.
   4. At each pipe passage to and from underground areas.
   5. Every 20 feet on all horizontal and vertical pipe runs.

B. Provide arrow markers showing direction of flow incorporated into or adjacent to each piping system marker. Use double-headed arrows if flow is in both directions.

C. Apply all piping system markers where view is unobstructed; markers and legends shall be clearly visible from operating positions.

D. Apply all tags and piping system markers in accordance with the manufacturer's instructions. Do not attach tags to valve handle such that the normal or emergency operation of the valve will be hindered.

3.02 VALVE CHART

A. Provide valve and steam trap chart identifying each valve's and steam trap's number, size of valve and service.

B. Frame the chart and locate the schedule in the Mechanical Equipment Room. (Aluminum Frame with plastic window).

C. Provide a compact disc that has the valve and steam trap chart schedule in a spreadsheet format. The spreadsheet software to be used for the schedule shall be identified by the Owner.

3.03 SCHEDULES

A. Pipe Marker Letter Size Schedule:

Outside diameter of insulation or pipe Inches	**Letter height Inches**	**Color field Inches**
3/4 to 1-1/4	1/2	8
1-1/2 to 2	3/4	8
2-1/2 to 6	1 - 1/4	12
8 to 10	2 - 1/2	24
Over 10	2	24

END OF SECTION

SECTION 230595 - BALANCING OF HYDRONIC SYSTEMS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section specifies requirements for testing, adjusting, and balancing of hydronic fluid distribution systems, including the equipment and devices associated with the system.

B. The work includes setting speed and flow, adjusting equipment and devices installed for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to the mechanical installations specified in other Sections of the Specifications.

1.02 RELATED WORK

A. Drawings and general provisions of the Contract, including General Conditions, any Supplemental Conditions and Division 01 Specification Sections, govern the work of this section.

1.03 SUBMITTALS

A. Submit for review, products and procedures utilized under this Contract per the requirements of section 013300-Submittals. Submissions shall include but not be limited to:

1. Certified Balancing Reports
   a. Testing, adjusting and balancing agency certification: Submit proof that the testing, adjusting and balancing agency meets the requirements of Article 1.04 “Quality Assurance” below, and all other specified requirements.
   b. Certified Balancing Reports: Submit certified test reports, signed by the authorized representative of the testing and balancing agency. Certify the reports to be proof that the systems have been tested, adjusted and balanced in accordance with the selected reference standards (NEBB); are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at completion of the testing, adjusting and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Submittal of test report shall be in the following format:
      1) Draft Report: Upon completion of testing, adjusting and balancing procedures, prepare draft reports on the approved forms. Draft report may be handwritten, but must be complete, factual, accurate and legible. Organize and format draft reports in the same manner specified herein for the final reports. Submit digital (PDF) of draft reports. Only one complete set of draft reports will be returned.
      2) Final Report: Upon verification and approval of draft reports, prepare final reports, type written and organized and formatted as described herein. Submit digital (PDF) of final reports.
         (a) Report Format: Submit reports using the standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted and balanced. Include schematic systems diagrams. Divide the contents into the below listed divisions, separating them by divider pages with titles descriptive of the contents:
            (1) General Information and Summary
            (2) Hydronic Systems
         (b) Report Contents: Provide the following minimum information, forms and data:

(1) General Information and Summary: Identify the testing, adjusting and balancing Agency, Contractor, Owner, Architect/Engineer, and Project on the inside cover sheet. Include addresses, and contact names and telephone numbers. Include a certification sheet containing the seal and name, address, telephone number and signature of the Agency's responsible certified Test and Balance Engineer. Include in this division a listing of the instrumentation used for the procedures, along with the proof of calibrations.

(2) Include in the remainder of the reports the appropriate forms containing, as a minimum, the information indicated on the standard report forms prepared by NEBB, for each item of equipment and system. Prepare a schematic diagram for each item of equipment and system, to accompany each respective report form.

(c) Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards within a period not exceeding six months prior to conducting the test procedures.

(d) Existing Systems: Where existing systems are to be added to or modified include in the report results of operational tests taken prior to modifications including but not limited to existing pump curves, pressure readings and flow measurements. Include in the report copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications and, where existing equipment is retained, operating points after system balance. Where terminals are adjusted or modified include terminal performance curves/data and final readings.

B. Blank Report Forms: Prior to performing the work, submit sample blank forms of the test reports that will be submitted by the entity performing work of this Section, indicating all data and parameters included.

1.04 QUALITY ASSURANCE

A. Test, adjust and balance systems and equipment by using competent mechanics regularly employed by a testing, adjusting and balancing Subcontractor whose primary business is the testing, adjusting and balancing of building mechanical systems. The testing, adjusting and balancing Subcontractor shall be a business established for a minimum of 10 years.

B. The testing, adjusting, and balancing Subcontractor shall be certified by the National Environmental Balancing Bureau (NEBB).

C. Instrumentation type, quantity, and accuracy shall be as described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

D. All instrumentation shall be calibrated at least every 6 months or more frequently if required by the instrument manufacturer.

1.05 PERFORMANCE REQUIREMENTS

A. Comply with all applicable Federal, State and Local laws, ordinances, regulations and codes, and the latest industry standards including, but not limited to the entities listed below for procedures, measurements, instruments and test reports for testing, adjusting and balancing work:
   1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
   2. National Environmental Balancing Bureau (NEBB)
B. Set the fluid flow delivery rates of each zone to within five percent of the values shown on the Drawings.
C. Set the pump delivery flow rates to be within 10 percent above the design value.

1.06 JOB CONDITIONS

A. Require the testing and balancing specialist to review his/her work with the respective manufacturers of the equipment and devices involved, and coordinate and schedule all work.
B. Furnish and install pressure taps, gauges, valves, and other components as required for a properly balanced system, whether or not specified herein or shown on the Drawings, all at no additional cost to the Owner. Make all adjustment or replacement parts recommended by the testing and balancing specialist in strict accordance with the respective equipment manufacturer’s recommendations.
C. Coordinate with the control manufacturer’s representative to set the adjustment of the automatically operated control valves to operate as required.

1.07 GENERAL

A. The Owner will occupy the building during the entire testing, adjusting, and balancing period. Cooperate with the Owner during testing, adjusting, and balancing operations to minimize conflicts with the Owner's operations.
B. Complete all tests specified herein to the satisfaction of the Architect/Engineer before final acceptance.
C. The Architect/Engineer, or his representative, is the sole judge of the acceptability of the tests. The Architect/Engineer may direct the performance of any such additional tests, as he deems necessary in order to determine the acceptability of the systems, equipment, material and workmanship. No additional payment will be made for any test required by the Architect/Engineer.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

B. Obtain copies of approved shop drawings of all hydronic equipment, manual valves, automatic valves and the temperature control diagrams, including intended sequence of operations.

C. Existing Systems: Where existing systems are to be added to or modified perform operational tests prior to modifications including but not limited to existing pump curves, pressure readings and flow measurements.

1. Obtain copies of the equipment and motor nameplate data along with equipment performance curves indicating operating points prior to any modifications. Where terminal units are to be adjusted or modified obtain performance data for these units.

D. Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned, and is operable. Do not proceed with testing, adjusting and balancing until unsatisfactory conditions have been corrected in a manner approved by the testing and balancing specialist.

E. Examine the hydronic systems to see that they are free from abnormal obstructions, and that all piping, valves and equipment have been properly made fully operational. Determine that all equipment and control systems are performing correctly by functional testing.

F. Where existing systems are to be modified or added to ensure that all strainers and filters are clean and any operational problems that will prevent system balance have been brought to the attention of the Owner and repaired.

3.02 TESTING, ADJUSTING AND BALANCING

A. Notify the Owner 48 hours in advance of starting any tests. Do not perform any tests until acknowledgment of notification and approval has been received from the Owner.

B. Provide all necessary instruments and personnel for the tests. If, in the opinion of the Architect/Engineer, the results of such tests show that the Work has not complied with the requirements of the Contract Documents, make all additions or changes necessary to put the system in proper working condition and pay all expenses for all subsequent tests which are necessary to determine whether the Work is satisfactory. Any additional work or subsequent tests shall be carried out at the convenience of the Architect/Engineer.

C. Test all packaged equipment in strict accordance with the equipment manufacturer’s requirements.

D. Perform any and all other tests that may be required by the local municipality or other governing body, board or agency having jurisdiction.

E. Perform testing, adjusting, and balancing after leakage and pressure tests on fluid distribution systems have been satisfactorily completed.

F. Actuate all safety devices in a manner that clearly demonstrates their workability and operation.

G. Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary to allow adequate performance of test procedure.

H. Perform tests and compile test data for all the hydronic systems within the scope of work.

I. All instruments used shall be provided by the entity performing the Work of this Section, and shall be accurately calibrated and maintained in good working order.

J. Hydronic Systems:

Perform the testing, adjusting and balancing of hydronic systems in accordance with the detailed procedures outlined in the referenced standards; and including but not limited to the following:

1. Preliminary procedure prior to balancing:
   a. Examine water in system and determine if water has been treated and cleaned.
   b. Check expansion tank to determine that it is not air bound and the system is completely full of water.
   c. Purge all air vents of water systems, check automatic air vents and determine if they are operating properly. Repair or replace any air vents that are not operating properly.
   d. Coordinate with control manufacturer for required cooling and heating temperature controls and corresponding, automatic valve operation settings.
   e. Open all normally open valves to full open position. Set automatic valves to full coil flow.
   f. Check water pumps for pump rotation and for proper flow rate delivery against manufacturer's pump curves.
   g. Set all balancing valves for required flow delivery at mains and branch mains to cooling and heating elements.
   h. Upon completion of flow readings and adjustments of balancing valves, mark all settings and record data, so that they can be restored to their correct "balanced" position, if disturbed later.
2. Include the following as part of the final balancing:
   a. After required heating temperature controls and automatic valve operation settings are made, recheck pump flow requirements and readjust system as required.
   b. Record pressure drop through manifolds at set flow rate. Set balancing valves as required to achieve specified flow rates.
      1) Inlet water temperatures and static pressure at connections.
      2) Leaving water temperatures and pressure drop of each manifold.
   c. Record operating suction and discharge pressures of each pump and final total dynamic head and rated amperage versus actual amperage of pump motors.
   d. Record entering and leaving water temperatures and flow through all equipment and devices.
   e. Check and record all flow rates at all locations in the piping system with flow meters.
   f. Retest, adjust, and balance systems subsequent to system modifications. Resubmit test results.

END OF SECTION

SECTION 230700 - PIPE INSULATION **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the insulation, jackets and accessories for piping as scheduled in Part 3 of this Section and as shown on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 078400 - Firestopping

B. Section 232000 - Pipe, Valves, and Fittings

1.03 REFERENCES

A. National Fire Protection Association (NFPA):

1. NFPA 255 - Surface Burning Characteristics of Building Materials.

B. Greenguard

C. 2020 New York City Energy Conservation Code

D. 2022 New York City Mechanical Code

E. Underwriters Laboratories, Inc. (UL):

1. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

F. American Society for Testing and Materials (ASTM):

1. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
3. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
4. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
5. ASTM C335 - Standard Test Method for Steady-State Heat Transfer Properties of Horizontal Pipe Insulation.
6. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
7. ASTM C518 - Standard Test Method for Steady-State Heat Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
8. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation.
9. ASTM C534 - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
10. ASTM C547 - Standard Specification for Mineral Fiber Preformed Pipe Insulation.
11. ASTM C 552 - Standard Specification for Cellular Glass Thermal Insulation
12. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
13. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
14. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing.
15. ASTM C 591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.

16. ASTM C 610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation.
17. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
18. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
19. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
20. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
21. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
22. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
23. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.

1.04 DEFINITIONS

A. Greenguard: Greenguard Environmental Institute

B. IAQ: Indoor Air Quality

C. EPA: Environmental Protection AgencyA

D. WHO: World Health Organization

E. ASJ: All Service Jacket

F. SSL: Self-Sealing Lap

G. FSK: Foil-Scrim-Kraft; jacketing

H. PSK: Poly-Scrim-Kraft; jacketing

I. PVC: Polyvinyl Chloride

J. FRP: Fiberglass Reinforced Plastic

K. Cold Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 60 degrees F or lower.

L. Hot Service Piping/ Surfaces: Pipes or surfaces where the normal operating temperature is 105 degrees F or higher.

1.05 SUBMITTALS

A. Product data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Manufacturer’s Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Company specializing in manufacturing products specified with minimum 3 years documented experience.
2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

B. Materials:
   1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
   2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1" thickness in less than 53 seconds when tested in accordance with ASTM D1692.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

B. Follow manufacturer's recommended storage and handling practices.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient conditions required by manufacturers of each product (tapes, adhesives, mastics, cements, insulation, etc.).

B. Maintain temperature before, during, and after installation for a minimum of 24 hours.

C. Supply fiberglass products that assure excellent IAQ (Indoor Air Quality) performance through Greenguard Certification.

D. Mold: Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold growth remove it from the Site. If the material is wet but shows no sign of mold, dry rapidly and thoroughly. If it shows signs of facing degradation from wetting remove it from the Site.

PART 2 - PRODUCTS

2.01 FIBER GLASS INSULATION

A. Approved Manufacturers:
   1. Knauf Insulation
   2. Johns Manville Corporation
   3. Owens Corning Corporation
   4. CertainTeed Corporation

B. Fiber glass insulation meeting ASTM C547, ASTM C585, and ASTM C795; rigid molded, noncombustible.

C. Factory applied vapor barrier jacket: ASJ/SSL conforming to ASTM C1136 Type I and ASTM E96, secured with self-sealing longitudinal laps and butt strips.

2.02 FIBER GLASS INSULATION JACKETS AND ACCESSORIES

A. Field-Applied Jackets and Fitting Covers
   1. PVC - 25/50 or Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consisting of pre-molded, high-impact PVC materials with fiber glass inserts. Approved Manufacturer: Proto Corporation.
      a. Thickness: 10 mil.
      b. Closures: stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.

2. ASTM B209 formed aluminum, 0.016-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
   a. Overlap: 2-inch minimum.
   b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
   c. Metal jacket bands: 3/8-inch wide, 0.015-inch thick aluminum or 0.010-inch thick stainless steel.
3. ASTM A666, Type <<302; 304; 316>> stainless Steel, 0.010-inch thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Approved Manufacturer: Childers.
   a. Overlap: 2-inch minimum.
   b. Fittings: 0.016-inch thick die-shaped with factory-applied moisture barrier.
   c. Metal jacket bands: 3/8-inch wide, 0.010-inch thick stainless steel.
4. Laminated Self-Adhesive Water and Weather Seals - Permanent acrylic self-adhesive System; weather resistant, high puncture and tear resistance; meeting or exceeding requirements of UL 723; applied in strict accordance with manufacturers' recommendations.

B. Fitting Insulation
   1. Pre-formed fiberglass, preformed perlite, mitered fiberglass, mitered perlite or calcium silicate in lieu of PVC systems. Protect fittings with field-applied fitting covers.

C. Tapes
   1. Vapor barrier type, self-sealing, non-corrosive, fire-retardant. Approved Manufacturer: Compac Corporation

2.03 HIGH DENSITY JACKETED INSULATION INSERTS FOR HANGERS AND SUPPORTS

A. For use with Fiberglass Insulation:
   1. Cold Service Piping:
      a. Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
   2. Hot Service Piping:
      a. Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
      b. Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.

B. For Use with Flexible Elastomeric Foam Insulation: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that all piping is tested and approved prior to insulation installation.

B. Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

3.02 INSTALLATION (GENERAL)

A. Install all materials using skilled labor regularly engaged in this type of work. Install all materials in strict accordance with manufacturer's recommendations, building codes, and industry standards.

B. Locate insulation and cover seams in the least visible location. Extend all surface finishes in such a manner as to protect all raw edges, ends and surfaces of insulation.

C. On cold surfaces where a vapor retarder must be maintained, apply insulation with a continuous, unbroken moisture and vapor seal. Insulate and vapor seal all hangers, supports, anchors, or other projections secured to cold surfaces to prevent condensation.

D. Insulated pipes conveying fluids below ambient temperature; insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E. For hot piping conveying fluids <<140°F>> or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

F. For hot piping conveying fluids over <<140°F>>, insulate flanges and unions at equipment.

G. Maintain continuous pipe insulation through walls, ceiling or floor openings, or sleeves except where firestop or firesafing materials are required.

H. Install insulation neatly, accurately and without voids, in accordance with manufacturer's instructions and NIAC National Commercial and Industrial Insulation Standards.

I. Insulate fittings, valves and flanges using premolded covers with precut insulation inserts.

J. Insulate piping using insulation of type and thickness scheduled in this Section.

K. Install metal shields between hangers or supports and the piping insulation. Install rigid insulation inserts as required between the pipe and the insulation shields. Fabricate inserts to be of equal thickness to the adjacent insulation and vapor seal as required. Insulation inserts shall be no less than the following lengths:

1½" to 2½" IPS	10" long
3" to 6" IPS	12" long
8" to 10" IPS	16" long
12" and over IPS	22" long

L. Pipe exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor or operating mezzanine) to be finished with PVC jacket and fitting covers, aluminum jacket, or stainless steel jacket.

M. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.

N. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping. Coordinate insulation installation with heat-tracing installation and testing. Insulate piping after tracing or heat distribution tape has been installed and tested for continuity.

3.03 INSTALLATION (FIBER GLASS)

A. Provide a continuous vapor retarder on piping operating below ambient temperatures. Seal all joints, seams and fittings.

B. Firmly butt and secure ends with appropriate butt-strip material. On high-temperature piping, double layering with staggered joints when recommended by the insulation manufacturer. When double layering, the inner layer should not be jacketed.

C. Insulated pipes conveying fluids below ambient temperature:

1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

D. Insulated pipes conveying fluids above ambient temperature:

1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

E. Exterior Applications:

1. Jacket piping and fittings exposed to the elements using aluminum or stainless steel jackets with a factory applied moisture barrier. Hold firmly in place with a friction type Z lock or a minimum 2” overlap joint. Seal all joints completely along the longitudinal seam and install so as to shed water. Seal all circumferential joints by use of preformed butt strips; minimum 2" wide or a minimum 2" overlap. Overlap butt strips to the adjacent jacketing a minimum ½-inch and completely weather seal. Install a 6" to 10" unsealed slide joint every 25 to 30 lineal feet to allow for the thermal expansion of the pipe and jacketing. In addition, apply a thin bead of silicone grease in the overlap to prevent water migration while allowing the joint to slide. Install an unsealed slide joint where distance between fittings exceeds 8 lineal feet.
2. Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness ad adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with <<aluminum; stainless steel>> jacket with seams located on bottom side of horizontal piping.

3.04 PIPING INSULATION MATERIAL SCHEDULE

SYSTEM OR SERVICE	LOCATION	INSULATION TYPE	JACKET
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM (LPS) TO 15 PSIG.	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET
STEAM CONDENSATE	INSIDE	FIBER GLASS	ALL SERVICE JACKET

STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
STEAM CONDENSATE	OUTSIDE	FIBER GLASS	ALUMINUM JACKET
DOMESTIC COLD WATER	INSIDE	FIBER GLASS	ALL SERVICE JACKET

3.05 MINIMUM PIPING INSULATION THICKNESS (IN.)

	CONDUCTIVITY BTU*IN./(H*FT.^{2}* °F)	**MEAN RATING TEMPERATURE (°F)**	**< 1**	**1 TO < 1-1/2**	**1-1/2 TO < 4**	**4 TO < 8**	**= 8**
> 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.32	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.21-0.28	100	1.0	1.0	1.5	1.5	1.5
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20-0.26	50	0.5	1.0	1.0	1.0	1.5

END OF SECTION 230700

SECTION 230800 - COMMISSIONING OF MECHANICAL SYSTEMS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION

A. General provisions and other mechanical systems are specified in other Sections of Division 23.

B. Commissioning is an ongoing process and shall be performed throughout construction. Commissioning requires the participation of Division 23 to ensure that all systems are operating in a manner consistent with the Contract Documents. Division 23 shall be familiar with the commissioning plan issued by the Commissioning Authority (CA) as it applies to the work of Division 23 and shall execute all commissioning responsibilities assigned to them in the Contract Documents.

C. Commissioning shall conclude with the completion of all required deferred testing, training and system documentation as specified and required to ensure the proper operation of the mechanical equipment and systems provided by this Division.

D. This Section covers mechanical systems commissioning, as required to demonstrate that the equipment and systems of Division 23 are ready for safe and satisfactory operation, as defined by project documents. Commissioning shall include, but shall not be limited to, identification of piping and equipment, cleaning, lubrication, start-up, check-out, and testing, adjusting, and balancing of systems, preparation of equipment and systems documentation and of maintenance and operation manuals, Owner training, and preparation of record drawings.

E. This section does not alter the commissioning requirements indicated in Section 019113 of the General Commissioning Requirements. This section is to help define/supplement the requirements of Section 019113 where applicable.

1.02 QUALITY ASSURANCE

A. The mechanical contractor shall identify a mechanical commissioning supervisor. The mechanical commissioning supervisor should have a minimum of ten years experience in mechanical contracting. The mechanical commissioning supervisor shall become familiar with the design intent and the requirements of the commissioning process as defined in this Section. The mechanical commissioning supervisor shall attend all commissioning meetings and coordinate the commissioning schedule as outlined by the CA. The mechanical commissioning supervisor shall assist the CA in coordinating and executing the required commissioning activities.

1.03 MECHANICAL, PLUMBING, AND FIRE PROTECTION CONTRACTOR RESPONSIBILITIES

A. Include and itemize the cost of commissioning in the contract price with an estimated breakdown of hours for meeting and functional testing requirements.

B. The mechanical commissioning supervisor shall be responsible for scheduling, supervising, and coordinating the startup, testing and commissioning activities as specified herein with the CA.

Specific requirements of the mechanical contractor and associated subcontractors are identified in this Section and in other Sections of this Division.

C. Mechanical commissioning shall take place in three phases. Commissioning requirements for each phase are as follows:

1. Construction Phase
    a. The Contractor shall attend a Commissioning Scoping meeting and additional commissioning meetings as required throughout the commissioning process. These commissioning meetings will be monthly during early construction and may increase in frequency to weekly during the start-up, pre-functional and functional testing phases. The Contractor shall assure that all subcontractors who have commissioning responsibilities attend the Commissioning Scoping meeting and other commissioning meetings, as appropriate, during the construction process.
    b. The Contractor shall report, in writing, to the CA at least as often as commissioning meetings are scheduled concerning the status of his activities as they affect the commissioning process, the status of each discrepancy identified, the pre-functional and functional testing process, explanations of any disagreements with the identified deficiencies, and proposed resolution and schedule.
    c. The Contractor shall provide the CA with normal cut sheets and shop drawing submittals of equipment that is to be commissioned.
    d. The Contractor shall provide documentation to the CA for development of pre-functional and functional performance testing procedures, prior to normal O&M manual submittals. This documentation shall include detailed manufacturer installation, start-up, operating, troubleshooting and maintenance procedures; full details of any owner-contracted tests; fan and pump curves; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the development of functional performance testing and the commissioning process. This data request may be made prior to normal submittals.
    e. The Contractor shall develop and submit to CA, for review prior to equipment or system startup, a complete startup and initial checkout plan using manufacturer’s start-up procedures.
    f. The Contractor shall review and complete the CA’s pre-functional check-sheets and sign-off on the appropriate areas when the Contractor and sub-contractors are complete. The pre-functional test sheets will be developed by the CA. The CA may conduct their own pre-functional testing check in parallel with the Contractors or verify the contractors completed pre-functional forms after submission.
    g. The Contractor shall provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review.
    h. The Contractor shall assist in clarifying the proposed operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
    i. The CA shall prepare the specific functional test procedures as specified herein. The Contractors shall review the CA’s proposed functional performance test procedures to

ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.

j. Contractor shall prepare a preliminary schedule for Division 23 commissioning activities, to include pipe and duct system testing, flushing and cleaning, equipment start-up, and TAB start and completion, for use by the CA and shall update the schedule as appropriate. CA will assist in providing expected time durations for Cx activities.

k. The Contractor shall update the commissioning activities and notify any delays in the progress meetings. Contractor shall notify the CA during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction. Mechanical equipment start-up shall not be initiated until the complete sign-off of the pre-functional check-sheets as developed by the CA as specified in other Sections of Division 23.

l. The Contractor shall provide startup testing for all HVAC equipment, including the building automation control system and shall execute the mechanical-related portions of the pre-functional checklists for all commissioned equipment during the startup and initial checkout process. The CA shall conduct an independent start-up once the Contractor is complete with their requirements.

m. The Contractor shall perform and clearly document all completed start-up and system operational checkout procedures, providing a copy to the CA.

n. The Contractor shall correct current A/E punch list and CA deficiency items before functional performance testing can begin. Air and water TAB shall be completed with discrepancies and problems remedied before functional testing of the respective air or water related systems.

o. The CA shall generate the functional testing procedure and record to the mechanical contractor. The mechanical contractor shall review and provide support to the functional testing process. Contractor shall operate boilers, pumps, etc., and systems in accordance with the CA requirements, open and close disconnects and switch normal and emergency power requirements as directed by the CA and the functional testing procedures.

p. The Contractor shall report in writing to the CA at least as often as commissioning meetings are being scheduled concerning the status of each outstanding discrepancy identified during commissioning, pre-functional and functional performance testing. Report shall include description of the identified discrepancy, explanations of any disagreements, and proposals and schedule for correction of the discrepancy.

    1) Acceptance Phase. The Contractor shall assist and cooperate with the CA in the commissioning process by:

        (a) Putting all HVAC equipment and systems into operation and continuing the operation during each working day of the test and balance and commissioning effort, as required.

        (b) For a given area, have all required pre-functional checklists, calibrations, startup and selected functional tests of the mechanical system and associated controls completed and approved by the CA prior to beginning the test and balance process.

        (c) Provide a qualified technician to operate the controls as required to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.

        (d) Provide a TAB representative to assist the CA on conducting a random 10% check of the air and water distribution requirements.

(e) Including cost of sheaves and belts that may be required to obtain required equipment performance, as measured by the test and balance effort.
(f) Providing test holes in ducts and plenums where directed by TAB to allow air measurements and air balancing. Providing an approved plug.
(g) Providing temperature and pressure taps according to the Construction Documents for TAB and commissioning testing.
(h) Installing a P/T plug at each water sensor that is an input point to the Control System.
(i) Providing skilled technicians to execute starting and operation of equipment.
(j) The CA will conduct functional performance testing. The Contractor may be required to have a skilled technician present during functional testing, although it is suggested that one be available to make adjustments or assist in problem-solving.
(k) The CA will require full and part load performance verifications as well as seasonal and simulated testing requirements. The Contractor shall be prepared to operate different components of various systems (example, DX and hot water systems to generate loading strategies) during the functional testing.
(l) Correct deficiencies (differences between specified and observed performance) as interpreted by the CA and A/E.
(m) Prepare O&M manuals according to the Contractor Documents, including clarifying and updating the original sequence of operation to as-built conditions.
(n) Maintain on site redline as built drawings and produce final “As-built” drawings for all project drawings and contractor-generated coordination drawings. List and clearly identify on the as-built drawings the locations of all airflow stations and sensor installations that are not equipment mounted.
(o) Provide specified training of the Owner’s operating personnel in accordance with the CA’s overview and outline.
(p) Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
(q) Provide updated diagrammatical logic for all TAB adjustments to the system.

2) Warranty Period. During the warranty period, the Contractor shall:
(a) Be available during seasonal or deferred functional performance testing conducted by the CA, according to the specifications.
(b) Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.04 TAB CONTRACTOR RESPONSIBILITIES

A. Six weeks prior to the starting of the TAB, submit to the CA, the qualifications of the site technician(s) for the project, including three (3) names of contractors and facility managers of recent projects on which the personnel were in charge. The Owner and CA will approve the site technician for this job.

B. Three months prior to the start of the TAB, submit a TAB plan and approach for each system. The plan shall be reviewed by the TAB and the CA for review and approval. The submitted plan shall include:

1. Certification that the TAB contractor has reviewed the construction documents and the systems with the design engineers and Contractors to sufficiently understand the design intent for each system.
2. An explanation of the intended use of the building control system.
3. All field check-out sheets and logs to be used that lists each piece of equipment to be tested adjusted and balanced with the data cells to be gathered for each.
4. Final test report forms to be used during this process:
    a. Detailed step by step procedures for TAB work for each system.
    b. List all water flow, sound level, system capacity and efficiency measurements to be performed and a description of each of the test procedures, parameters and formulas to be used.
    c. Details of how total water flow will be determined (Water: pump curves, circuit setters, flow station, ultrasonic, etc.).
    d. The identification and types of measurement instruments to be used and their most recent calibration date.
    e. Specific procedures that will ensure that both air and watersides will be operating at there lowest possible pressure at the point where the system will operate.
    f. Confirmation that the TAB contractor understands the outside air ventilation criteria under all conditions and how this will be measured during normal, economizer and unoccupied conditions.
    g. Proposed selection points for traverse measurement locations on the as-built documents. Review the placement of the HVAC measurement devices for proper straight runs and accuracy.
    h. Plan for formal progress reports including scope and frequency.
    i. Plan for formal deficiency reports including scope and frequency.
        1) TAB contractor shall attend commissioning meetings as directed by the CA and the general contractor.
        2) TAB contractor shall communicate in writing to the controls contractor and the CA all setpoint and parameter changes made or problems and discrepancies identified during the TAB process that would affect the control loop system set-up and operation.
        3) Submit written report of discrepancies, deficit or uncompleted work by others, contract interpretation requests and list of completed tests to the CA at least once per week.
        4) After the TAB plan is accepted and two-weeks prior to TAB work, the contractor shall conduct a pre-balancing conference. Prior to the pre-balancing conference, the TAB contractor shall inspect the system readiness for testing and balancing. The TAB contractor shall prepare a list of deficiencies and uncompleted work that will affect the TAB process. This list shall be submitted to the CA and the general contractor.
        5) The TAB contractor shall review the projected schedule and provide, in writing, to the CA and CM any delays in the schedule and what items will require completion prior to the TAB work.
        6) The CA agent shall conduct independent verification of 10% of air and water end-devices for acceptance after the TAB contractor states in writing that they are complete with Testing & Balancing. The TAB contractor shall provide a mechanic to assist the CA in this verification and shall include this in the scope and price of the Work.

7) The TAB agent shall submit the TAB report to the CA for his review and comment. All data contained shall be re-verified in the field by the CA. A minimum of ten percent of the airflow readings shall be verified by the CA using his own equipment. All selection points shall be random. Total airflow shall be verified on all mains in the supply and the exhaust ducts.

1.05 CONTROL CONTRACTOR RESPONSIBILITIES

A. Include and itemize the cost of commissioning in the contract price with an estimated breakdown of hours for meeting and functional testing requirements.

B. The controls commissioning supervisor shall be responsible for scheduling, supervising, and coordinating the startup, testing and commissioning activities as specified herein with the CA. Specific requirements of the controls contractor and associated subcontractors are identified in this Section and in other Sections of this Division.

C. The CA shall conduct independent verification of installation, pre-functional, start-up and functional testing as per section 019113.

D. Controls commissioning shall take place in three phases. Commissioning requirements for each phase are as follows:

1. Construction Phase
   a. Contractor shall attend a Commissioning Scope meeting and additional commissioning meetings as required throughout the commissioning process. These commissioning meetings will be monthly during early construction and increase in frequency to weekly during the start-up, pre-functional and functional testing phases. Contractor shall assure that all subcontractors who have commissioning responsibilities attend the Commissioning Scope meeting and other commissioning meetings, as appropriate, during the construction process.
   b. Contractor shall report, in writing, to the CA at least as often as commissioning meetings are scheduled concerning the status of his activities as they affect the commissioning process, the status of each discrepancy identified, the pre-functional and functional testing process, explanations of any disagreements with the identified deficiencies, and proposed resolution and schedule.
   c. Contractor shall provide the CA with normal cut sheets and shop drawing submittals of equipment that is to be commissioned.
   d. Contractor shall provide documentation to the CA for development of pre-functional and functional performance testing procedures, prior to normal O&M manual submittals. This documentation shall include detailed manufacturer installation, start-up, operating, troubleshooting and maintenance procedures; full details of any owner-contracted tests; points listing; full factory testing reports, if any; and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA. The CA may request further documentation necessary for the development of functional performance testing and the commissioning process. This data request may be made prior to normal submittals.

e. The Contractor shall develop and submit to CA, for review prior to equipment or system startup, a complete startup and initial checkout plan using manufacturer's start-up procedures.
f. The Contractor shall review and complete the CA's pre-functional check-sheets and sign-off on the appropriate areas when the Contractor and sub-contractors are complete. The pre-functional test sheets will be developed by the CA. The CA may conduct their own pre-functional testing check in parallel with the Contractors or verify the contractors completed pre-functional forms after submission.
g. Contractor shall provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review.
h. Contractor shall assist in clarifying the proposed operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
i. CA shall prepare for the specific functional test procedures as specified herein. The Contractors shall review the CA's proposed functional performance test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
j. Controls contractor shall prepare a preliminary schedule for their commissioning activities, to include wiring, instrument installation, calibration, point-to-point verification, sequence of operation testing and emergency operating procedural testing for use by the CA and shall update the schedule as appropriate. The Contractor shall update the commissioning activities and notify any delays in the progress meetings. Contractor shall notify the CA during the commissioning meetings when commissioning activities not yet performed or not yet scheduled will delay construction.
k. Controls instrument and equipment start-up shall not be initiated until the complete sign-off of the pre-functional check-sheets as developed by the CA as specified in other Sections of Division 23.
l. Contractor shall provide startup testing for all HVAC equipment, including the building automation control system and shall execute the mechanical/controls-related portions of the pre-functional checklists for all commissioned equipment during the startup and initial checkout process. The CA shall conduct an independent start-up once the Contractor is complete with their requirements.
m. Contractor shall perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.
n. Contractor shall correct current A/E punch list and CA deficiency items before functional performance testing can begin. Point-to-point verification shall be completed with discrepancies and problems remedied before functional testing of the respective controls related systems.
o. The CA shall generate the functional testing procedure and record to the controls contractor. The controls contractor shall review and provide support to the functional testing process. Contractor shall aid in operating boilers, pumps, etc., and systems in accordance with the CA requirements, turn on and off normal and emergency power requirements as directed by the CA and the functional testing procedures.
p. Contractor shall report, in writing, to the CA at least as often as commissioning meetings are being scheduled concerning the status of each outstanding discrepancy identified during commissioning, pre-functional and functional performance testing. Report shall include description of the identified discrepancy, explanations of any disagreements, and proposals and schedule for correction of the discrepancy.

1) Acceptance Phase. Contractor shall assist and cooperate with the CA in the commissioning process by:
   (a) Putting all HVAC equipment and systems into operation and continuing the operation during each working day of the test and balance and commissioning effort, as required.
   (b) For a given area, have all required, pre-functional checklists, calibrations, startup and selected functional tests of the mechanical system and associated controls completed and approved by the CA prior to beginning the test and balance process.
   (c) Provide a qualified technician to operate the controls as required to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
   (d) Provide a controls representative to assist the CA on conducting a random 10% check of the air and water distribution requirements.
   (e) Providing skilled technicians to execute starting and operation of equipment.
   (f) The CA will conduct functional performance testing. The Contractor may be required to have a skilled technician present during functional testing, although it is suggested that one be available to make adjustments or assist in problem-solving.
   (g) The CA will require full and part load performance verifications as well as seasonal and simulated testing requirements. The Contractor shall be prepared to operate different components of various systems (example, chilled water and hot water systems to generate loading strategies) during the functional testing.
   (h) Correct deficiencies (differences between specified and observed performance) as interpreted by the CA and A/E.
   (i) Prepare O&M manuals according to the Contractor Documents, including clarifying and updating the original sequence of operation to as-built conditions.
   (j) Maintain on site redline as built drawings and produce final “As-built” drawings for all project drawings and contractor-generated coordination drawings. List and clearly identify on the as-built drawings the locations of all airflow stations and sensor installations that are not equipment mounted.
   (k) Provide specified training of the Owner’s operating personnel in accordance with the CA’s overview and outline.
   (l) Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.
   (m) Provide a detailed marked up drawings of all the instruments and their installed location (P&ID) for instruments and components.
2) Warranty Period. During the warranty period, the Contractor shall:
   (a) Be available during seasonal or deferred functional performance testing conducted by the CA, according to the specifications.
   (b) Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 - PRODUCTS

2.01 SYSTEMS TO BE COMMISSIONED

A. The following are systems to be commissioned:
   1. Boiler (B-1)
   2. Boiler Feed System (BF-1)

2.02 2.2. TEST EQUIPMENT

A. All standard testing equipment required to the mechanical portion startup, initial checkout shall be provided by the Contractor responsible for the equipment or system being tested. This includes TAB and controls verification.

B. The CA shall perform their own system verification and performance check-out. The CA shall provide their own calibrated equipment as required for this testing.

C. All testing equipment associated with functional performance verification and point-to-point required by the CA shall be the responsibility of the CA. All testing equipment associated with the control's contractor point-to-point verification shall be the responsibility of the control's contractor.

D. Special equipment, tools and instruments (only available from vendor or specific to a piece of equipment) required for the functional testing of that equipment, according to the requirements of the contract documents and the functional test procedures shall be provided to the CA by the installing contractor and shall become the property of the Owner at project completion as indicated in the specification.

E. Proprietary test equipment and software required by any manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide test equipment, demonstrate its use and assist in the commissioning process as needed. Proprietary test equipment (and software) shall become the property of the Owner upon successful completion of the commissioning process as required in the specifications.

PART 3 - EXECUTION

3.01 SUBMITTALS

A. Division 23 shall provide submittal documentation relative to commissioning as required in this Section Part 1 and Section 019113.

3.02 3.2 STARTUP PLAN AND PREFUNCTIONAL TESTING

A. The mechanical contractor and associated subcontractors shall be responsible for the installation of complete systems and sub-systems, fully functional, meeting the design objectives of the Contract Documents. Contractor shall follow the approved start-up, initial checkout, and pre-functional testing procedures. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility to the CA or Owner.

B. Pre-functional testing as directed and performed by the contractor shall be required for each piece of equipment to ensure that the equipment and systems are properly installed and ready for operation, so that functional performance testing to may proceed without delays. Sampling strategies shall not be used for pre-functional testing. The pre-functional testing for all equipment and subsystems of a given system shall be successfully completed and documented prior to functional performance testing of the system. The mechanical contractor and sub-contractors shall sign off on the CA's pre-functional test sheets that they are complete and the system is ready. The CA will verify and conduct their own independent verification and start-up in parallel to the Contractor's verification. Any deficiencies identified during this process shall be noted and reviewed by the Contractors. Start-up and functional testing shall not proceed until all the deficiencies are corrected and verified by the CA.

C. The following procedures shall apply to all equipment and systems to be commissioned.

END OF SECTION 23 08 00

SECTION 230993 - SEQUENCE OF OPERATIONS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The Work specified as part of this Section consists of the work required to achieve operational and coordinated Sequences of Operation as described. Work includes coordination of functions of controllers supplied as part of equipment packages, sizing of control valves, interconnection of systems, provision and installation of all accessory devices required for complete system operation including devices not provided as part of equipment, coordination of start up and testing and demonstration of the operation of Sequences of Operation to the Owner and his representatives.

B. The control system operation of all equipment shall be subject to the operational modes, conditions and logic described in this Section and the controlled equipment manufacturer's recommendations.

C. Training of the Owner's personnel in the operation, trouble shooting, adjustment and repair of all system controls.

1.02 RELATED SECTIONS AND WORK

A. Division 26

B. Owner's Fire Alarm System (FAS)

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 GENERAL

A. General

1. Conform to the requirements of the Owner's standards for all electrical work and devices.
2. System and system components shall be BACNet compatible.
3. All set points and operating points shall be able to be transmitted to and set from the BMS system. Specific points to be enabled shall be at the discretion of the Owner.
4. All systems shall be capable of operating independently of the BMS system based on set points and limits either input from the BMS system or manually.
5. Coordinate all work with the requirements and characteristics of the BMS system and the equipment provided for the project under this phase or earlier phases.
6. All space sensors and thermostats shall have an lcd display indicating their set point, the condition sensed and the mode of operation they are responding to

3.02 SEQUENCE OF OPERATION – BOILER (B-1)

A. Heating:

1. Boiler shall energize upon outside air temperature below 65F (adj)
2. Theboiler shall modulate to maintain the system steam pressure, 2-5 psi, adjustable.

3. Whenever the burner is called to start, the fresh air louver motorized damper shall be called to open.
4. Boiler control panel shall have the ability to program morning warm up and temperature setbacks

B. Safeties:

1. The boiler burner shall be provided with the following safeties:
   a. Automatic flame safeguard controls.
   b. Trial for ignition periods on the pilot and main burner.
   c. Combustion airflow supervision to the combustion chamber.
   d. Pre-ignition purging of the combustion chamber (four air changes of combustion chamber).
   e. Proven low-fire start.
   f. Shutdown on low gas pressure.
   g. Flame detector and programmer to continuously and periodically perform self-check during operation to assure safe equipment conditions during prolonged firing periods.
   h. High limit manual reset operating control of heating medium. This additional limit control shall not be installed on a common sampling tube with the operative limit control.
   i. High-pressure limit control.
   j. Low water cutoff control. Two low water cut-offs are required to automatically shut off fuel to the boiler. One shall have automatic reset; the second shall have a manual reset.
   k. An alarm system to signal burner failure and shut-down.
   l. Observation ports shall be provided for visually observing the pilot and main flame.
   m. Boiler to shut down immediately upon activation of manual break glass station.

3.03 SEQUENCE OF OPERATION – COMBUSTION AIR INTAKES

A. General:

1. The motorized combustion air dampers will be interlocked with the burners such that on a call to fire, the combustion air damper will open. Once the damper is proven open, the burner will be allowed to fire. This interlock will be hard-wired, independent from the BMS system.

3.04 SEQUENCE OF OPERATION - ELECTRIC UNIT HEATER, EUH-1

A. General:

1. The unit heater shall be provided with a remote, wall mounted digital thermostat.

B. Heating:

1. The heating set point temperature shall be 60 degrees (adj.) When the space temperature falls below the set point temperature, the unit heater shall turn on in order to maintain the set point temperature.

END OF SECTION

SECTION 232000 - PIPE, VALVES AND FITTINGS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the pipe, valves, fittings, and joining materials for use with the piping systems described in this Section and as shown on the Drawings.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Section 230529 - Pipe Hangers and Supports

C. Section 230555 - Mechanical System Identification

D. Section 230700 - Pipe Insulation

1.03 ABBREVIATIONS

A. The following are standard abbreviations:

1. CWP: Cold working pressure.
2. EPDM: Ethylene-propylene-diene-terpolymer rubber.
3. NRS: Nonrising stem.
4. OS&Y: Outside screw and yoke.
5. PTFE: Polytetrafluoroethylene plastic.
6. SWP: Steam working pressure.
7. TFE: Tetrafluoroethylene plastic.
8. NPS: Nominal Pipe Size

1.04 SUBMITTALS

A. Product Data: For each type of valve indicated: Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

B. Product data on pipe, fittings, gaskets, and bolts. Include dimensions, specifications, and manufacturer. Provide pipe and valve application schedule.

C. Provide product data, including but not be limited to dimensions, specifications, manufacturer, installation and operation instructions, temperature and pressure ratings, end connections, and required clearances on piping specialties included in this Specification.

D. Welder Certifications - Furnish the names of pipe welders and welding operators employed by the Contractor to perform the Work who have been qualified to use the welding procedures which have been qualified in accordance with the specified pressure piping codes or AWS or NFPA standards.

E. Shop Drawings

1. Where deviations from the Drawings and Specifications are proposed for any reason, submit shop drawings identifying proposed deviations showing layout of all piping, fittings,

materials, dimensions, and fabrication and installation details. Submit a comparison table of the specified features and ratings of the specified item and those of the proposed deviation to allow a direct comparison.

2. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility. No dimensional or coordination check will be made.
3. The Contractor has the sole responsibility to review the Drawings, coordinate piping fabrication, and provide clearances and access for installation, maintenance and balancing of this Work, and Work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the piping.
4. Submit all layout shop drawings on not less than ¼ inch equals 1 foot scale drawings.

1.05 REFERENCES

A. Division 1 - Quality Control: Requirements for references and standards.

B. AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.

C. ANSI C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

D. ASME B16.3 - Malleable Iron Threaded Fittings.

E. ASME B16.5 - Steel Pipe Flanges and Flanged Fittings

F. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings

G. ASME B16.15 - Cast Bronze Threaded Fittings

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

I. ASME B16.22 - Wrought Copper and Bronze Solder Joint Pressure Fittings.

J. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.

K. ASME B16.24 - Cast Copper Alloy Pipe Flanges and Flanged Fittings.

L. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.

M. ASME B16.39 - Pipe Unions, Malleable Iron Threaded

N. ASME-B31.1 - Power Piping.

O. ASME B31.2 - Fuel Gas Piping.

P. ASME B31.5 - Refrigeration Piping.

Q. ASME B31.9 - Building Service Piping.

R. ASME B36.10M - Welded and Seamless Wrought Steel Pipe

S. ASME SEC IV - Construction of Heating Boilers.

T. ASME SEC IX - Welding and Brazing Qualifications.

U. ASTM A47 - Ferritic Malleable Iron Castings

V. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

W. ASTM A74 - Cast Iron Soil Pipe and Fittings.

X. ASTM A105 - Forgings, Carbon Steel, for piping components.

Y. ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings

Z. ASTM A181 - Forgings, Carbon Steel, for General Purpose Piping

AA. ASTM A197 -Cupola Malleable Iron

BB. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

CC. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile

DD. ASTM B32 - Solder Metal.

EE. ASTM B42 - Seamless Copper Pipe.

FF. ASTM B62 - Composition Bronze or Ounce Metal Castings

GG. ASTM B75 - Seamless Copper Tube

HH. ASTM B88 - Seamless Copper Water Tube.

II. ASTM B306 - Copper Drainage Tube (DWV).

JJ. ASTM B584 - Copper Alloy Sand Castings for General Applications

KK. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

LL. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

MM. AWS A5.8 - Specification for Brazing Filler Material

NN. AWWA C651 - Disinfecting Water Mains.

OO. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.

PP. NFPA 30 - Flammable and Combustible Liquids Code

QQ. NFPA 54 - National Fuel Gas Code.

RR. NSF 61 - Domestic Water Pipe, Valves, and Fittings.

SS. Mechanical Code of New York State-Latest Edition

TT. Plumbing Code of New York State-Latest Edition

UU. Fuel Gas Code of New York State-Latest Edition

VV. FM - Factory Mutual Compliance

WW. UL - Underwriter’s Laboratory Compliance

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:
   1. Protect internal parts against rust and corrosion.
   2. Protect threads, flange faces, grooves, and weld ends.
   3. Set angle, gate, and globe valves closed to prevent rattling.
   4. Set ball and plug valves open to minimize exposure of functional surfaces.
   5. Set butterfly valves closed or slightly open.
   6. Block check valves in either closed or open position.

B. Use the following precautions during storage:
   1. Maintain valve end protection.
   2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.

D. Protect all flange faces with wood, plastic or soft metal to prevent damage to parts.

E. Protect all pipe threads from damage with plastic plugs or caps.

F. Mark and identify all piping materials in accordance with the Reference Standards specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

A. When two or more valves of the same type are used in the same service, furnish all valves of this type from the same manufacturer.

B. Specific manufacturer's model numbers are cited in the following Piping Material Schedules to establish the desired quality and performance for each type valve or material. Equivalent products by other approved manufacturers are also acceptable. Approval shall be subject to review by the Architect/Engineer.

2.02 LOW PRESSURE STEAM AND CONDENSATE (INCLUDING VENTS, RELIEF AND DRAIN LINES)

Piping	All sizes	Schedule 40, seamless steel, ASTM A 53 Grade B (all condensate and blowdown piping shall be schedule 80 seamless steel)	Wheatland
Joints	2 inches & smaller 2 ½ inches & larger	Threaded Connections Welded Connections	
Fittings	2 inches & smaller 2 ½	125#, cast iron, threaded, ASTM A126 Standard	Anvil Weldbend

	inches & larger	Weight, Seamless steel, butt welded, ASTM A234	
Flanges	2 ½ inches & larger	150#, forged steel, weld neck, bore to match pipe ID, ASTM A181	Weldbend
Bolts	All Sizes	Alloy Steel, Hex Head Bolts and Nuts, ASTM A307 Grade B	
Unions	2 inches & smaller	150#, malleable iron, brass trim, threaded ends ASTM A197, ASME B16.3	Anvil
Gaskets	All Sizes	Spiral wound metallic gaskets	Flexitallic Style LS/LSI
Gate Valves	2 inches & smaller 2 ½ inches & larger	Class 125, threaded connections, rising stem, union bonnet, solid wedge, bronze body and wedge, non-asbestos packing and ductile iron hand wheel. MSS-SP80, ASTM B62 Class 125, flanged connections,	Nibco T-124 Nibco F-617-O

		OS & Y, cast-iron body and bonnet, bronze trim, solid-wedge disc, 200 psig CWP rating. ASTM A-126 Class B	
Swing Check Valves	2 inches & smaller 2 ½ inches & larger	Class 125, Y-pattern swing type, threaded connections, bronze body with TFE seat disc. MSS-SP80, ASTM B 62 Class 125, swing-type, flanged connections, cast iron body with bronze trim, non asbestos gasket. MSS-SP71, ASTM A-126 Class B	Nibco T413-Y Nibco F918-B
Globe Valves	2 inches & smaller 2 ½ inches & larger	Class 150, threaded connections, bronze body, bonnet, and seat, TFE disc, copper-silicone bronze stem, union-ring bonnet, 300 psig CWP rating. ASTM	Nibco T-235-Y Nibco F-718-B

		B-62 Class 125, flanged connections, cast-iron body and bonnet with bronze trim, 200 psig CWP rating. ASTM A-126 Class B	
Ball Valves	2 inches & smaller	Two-Piece, Full-Port, threaded connections, bronze body, type 316 stainless-steel vented ball and stem, reinforced TFE seats, 150 psig SWP and 600-psig CWP ratings. MSS SP-110, ASTM B 584 Alloy C84400, ASME B1.20.1	Nibco T-585-70-66
Butterfly Valves	2 ½ inches & larger	Single flange, full lug, 720 psig CWP and 50 psig SWP rating, permanently lubricated 300-series stainless-steel bushings	Nibco LCS7822-3/5

Item	Pipe Size	Description	Manufacturer/ Model No.

		with graphite and modified PTFE seats, graphite packing and gasket, one-piece duplex stainless-steel stem and stainless-steel disc. Valves NPS 6 and smaller shall have lever-lock operator; valves NPS 8 and larger shall have weatherproof gear operator. MSS SP-88, API 609, ANSI B 1634A, ANSI B16.5					

2.03 DOMESTIC WATER (ABOVE GROUND)

Pipe	All sizes	Type L, hard drawn copper tubing, ASTM B88	Mueller Industries
Joints	All sizes	Lead-free solder, ASME B32; Water Soluble Flux, ASTM B-813	J.W. Harris-Bridgit

Fittings	All sizes	Cast copper alloy or wrought copper ASME B16.18 or ASME B16.22	Nibco
Flanges	4 inches & larger	150#, cast copper, ASME B16.24	Nibco
Bolts	All Sizes	Alloy Steel, Hex Head Bolts and Nuts, ASTM A307 Grade B	
Unions	3 inches & smaller	Wrought copper, solder unions, ASME B16.22	Nibco
Dielectric Unions	3 inches & smaller	Dielectric Type, Copper to Steel	Watts Regulator Series 3000
Gaskets	All sizes	Non-asbestos, fiber sheet	Flexitallic
Ball Valves	2 inches & smaller	Two-piece, full-port, soldered or threaded ends, bronze body, type 316 stainless-	Nibco T-585-70-66 or S-585-70-66

Item	Pipe Size	Description	Manufacturer/ Model No.

		steel vented ball and stem, reinforced TFE seats, 150 psig SWP and 600-psig CWP ratings. MSS SP-110, ASTM B 584 Alloy C84400, ASME B1.20.1					

2.04 NATURAL GAS PIPING (ABOVE GROUND)

Pipe	All sizes	Schedule 40 seamless, ASTM A 53 Grade B	Wheatland
Joints	3 ½ inches & smaller (or pressure 7 inches w.c. & smaller) 4 inches & larger (or pressure greater than 7 inches w.c.)	Threaded connections Welded connections	
Fittings	3 ½ inches & smaller (or pressure 7 inches	Threaded Joints - 150#, malleable iron, ASTM	Anvil Weldbend

	w.c. & smaller) 4 inches & larger (or pressure greater than 7 inches w.c.)	B16.3 Welded Joints - Standard weight, seamless steel, butt weld, ASTM A234					
Valves	All sizes	Class 150, bronze body, full port, bronze plug, non-lubricated, PTFE Fluorocarbon sleeve, threaded, steel wrench	Mueller Steam Specialty Non Lubricated Plug Valves	**Item**	**Pipe Size**	**Description**	**Manufacturer/ Model No.**

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Unless otherwise shown, route piping in the most direct manner parallel to building lines in accordance with the Drawings. Group piping whenever practical at common elevations.

B. Accurately align, support and connect piping without forcing.

C. Locate piping so that access to and clearance around equipment, and minimum piping headroom of 7 feet is maintained, except where otherwise shown.

D. Space piping so that insulation and flanges, if any, have at least 1 inch clearance after maximum movement.

E. Where pipe elevations are not shown, pitch supply and return lines to positive drain points and/or coils.

F. Provide accessible flanges or union connections on the supply and return connections of terminal equipment and other items which must be disconnected for maintenance. Where unions are furnished as an integral part of the equipment, additional unions are not required unless required for access to or removal of components. Arrange equipment piping connections so that maintenance can be made without removing large sections of pipe or relocating the equipment.

G. In Domestic Water Systems, connect branch lines to the top of the line. For all other liquid systems, connect branch lines to the bottom or lower half of the line, preferably the bottom.

H. Connect branch lines in steam service and compressed air to the top or upper half of the line, preferably the top.

I. Use fittings for all changes of direction. Bending of steel pipe is not permissible.

J. Clean all piping materials before installation to remove grease, loose dirt, mill scale and other foreign matter.

K. Provide air vents at all high points of water piping, and valved drains at all low points of water piping for complete venting, draining and flushing of the piping system. Locate and provide air vents at multiple high points that are necessary to prevent air binding in the piping system. Install additional air vents and drains if directed by the Architect/Engineer, at no cost to the Owner. As a minimum provide drains and air vents

1. In each section of piping separated by valves.
2. On all coils.
3. For each riser, where riser or runout to riser has a valve installed.
4. In low point of piping to each down fed convector or radiator.

L. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Provide loops, pipe offsets and anchors.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

N. Install gate or ball valves for shut-off and to isolate equipment, parts of systems, or vertical risers.

O. Sleeve pipes passing through partitions, walls and floors.

P. Identify piping under provisions of “Mechanical System Identification” Specification.

Q. Provide escutcheons at all locations where piping installed exposed to view penetrates wall, partitions, floors and ceilings.

R. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

S. Install flexible connectors at inlet and discharge connections of pumps and other vibration producing equipment.

T. Install strainers on the supply side of each control valve, pressure regulating valve, solenoid valve, trap, and elsewhere as indicated.

U. For pressurized liquid piping systems installed horizontally make reductions in pipe sizes using eccentric reducer fitting installed with the level side up to allow air venting.

V. For all nipples up to and including six inches in length provide extra-heavy shoulder type. For all nipples over six inches in length provide corresponding material, quality and thickness as the pipe on which they are used. Do not use close nipples. Provide nipples with designation mark of the manufacturer conforming to the ASTM pipe specifications for system served.

W. Make connections to all cooling and heating units with single or multiple cooling or heating coils in accordance with the manufacturer’s instructions and labeling on equipment

X. For pressures over 15 psig, use nipples and caps instead of plugs for permanent closures. Plugs in equipment provided by equipment manufacturers are acceptable.

Y. Do not install piping above electrical panels. Route piping around panels.

3.02 STEAM AND CONDENSATE PIPING SYSTEMS

A. Install drip legs with steam traps at low points and natural drainage points in the steam system, such as at the ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.

B. On straight runs with no natural drainage points, install drip legs with steam traps at intervals not exceeding 150 feet where pipe is pitched down in the direction of the steam flow and a maximum of 100 feet where the pipe is pitched up so that condensate flow is opposite of steam flow.

C. Size drip legs same diameter as the main up to 6 inches. In steam mains 6 inches and larger, provide drip legs half the size of the distribution line but never less than 6 inches. The length of the drip leg; 1-1/2 times the diameter of the distribution line but not less than 18 inches.

D. Equip drip legs and dirt pockets with capped gate valves to allow removal of dirt and scale.

E. In piping systems installed horizontally, make reductions in pipe sizes using eccentric reducer fitting installed with the level side down.

F. Install steam supply piping at a uniform grade of 1/4 inch in ten feet downward in the direction of flow or toward the trap when a trap is present.

G. Install condensate return piping at a uniform grade of 1/2 inch in ten feet downward in the direction of flow.

H. Install automatic air vents at the end of all steam mains and headers, and on large equipment steam spaces to facilitate start-up and heat transfer. Locate the air vent at a high point of the piping system or equipment, or where the air collects. Pipe the outlet to a safe place, cut the pipe end at a 45 degree angle. Install an isolation valve upstream of automatic air vents.

3.03 NATURAL GAS PIPING SYSTEMS

A. Provide capped dirt legs, full size of piping, for gas piping as close to the inlet of equipment as practical.

B. Provide vent to outside at pressure regulators sized for pressure regulator failure.

C. Above grade outdoor threaded piping and fittings shall be galvanized.

D. Above grade outdoor welded piping and fittings shall be painted or provided with a coating and taping system in accordance with utility company requirements.

E. Below grade piping shall be provided with corrosion protection (Magnesium anodes in accordance with local gas utility installation requirements).

3.04 THREADED CONNECTIONS

A. Ream pipe ends to remove burrs.

B. Use only standard ANSI taper threads. Threads shall be full, sharp, clean, and free of fins and burrs.

C. Apply joint sealing tape or paste to male threads only. Do not use paste on compressed air lines. When sealing fuel oil piping, use a thread-sealing compound suitable for oil when making up joints. When sealing natural gas piping, use a thread-sealing compound suitable for natural gas when making up joints.

D. Do not use close or short nipples of a size where the length of unthreaded pipe is less than the width of a pipe wrench.

E. Thredolets or similar code-approved fittings may be used for branch connections.

F. Provide unions at all threaded valve locations to facilitate the removal of the valve.

G. Joint Sealing Compound; Hercules, RectorSeal or approved equal.

3.05 WELDED CARBON STEEL CONNECTIONS

A. Perform welding using qualified welders and procedures following specified reference standards.

B. Do not use mitered welds for elbows.

C. Welded branch connections may be used in place of welding tees provided that requirements of the applicable ASME Code for pressure piping, B31.1 and/or B31.9 are met.

D. Weldolets or similar code-approved fittings may be used for branch connections.

E. Qualifications of welders, welding procedures, performance of welders and welding operators are required complying with the requirements of ASME B31.9 and ASME Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by code on file and available for inspection.

F. Whenever welding is done close to walls, floors or building structure, thoroughly clean the surfaces of weld splatter. Remove weld splatter from the surface of all welds, pipe and pipe supports.

G. Provide long radius pattern for welding elbows unless otherwise shown on the Drawings.

H. Examine and inspect welded pipe joints as follows:

1. Visually examine all welded pipe joints for imperfections using qualified representatives. Submit qualifications to the Architect/Engineer.
2. Make available to the Architect/Engineer records of visual examinations upon request.
3. Remove weld defects by grinding or chipping and repair or replace joints in accordance with approved procedures.
4. Make shop and field welded joints available to the Owner for nondestructive inspection and examination upon request.

3.06 FLANGED CONNECTIONS

A. Arrange flange bolt holes to straddle the pipe vertical and horizontal centerlines, and match the orientation of mating flanges.

B. Install piping to equipment without strain.

C. Provide gaskets at all flanged connections suitable for the design and temperature of the fluid contained, and in accordance with Part 2 of this Section.

D. Mate flat face flanges together and raised face flanges together.

3.07 COPPER TUBING CONNECTIONS

A. Provide soldered or brazed in accordance with Part 2 of this Section.

B. Make soldered and brazed connections in accordance with the procedures in the current edition of the Copper Tube Handbook of the Copper Development Association.

C. Qualifications of brazers, brazing procedures, and performance of brazers and brazing operators are required in compliance with the requirements of ASME B31.1, ASME B31.9, and the Boiler and Pressure Vessel Code, Section IX. Keep records and certifications required by the code on file and available for inspection.

D. Make solder joints on all copper water piping with 95/5 solder. Absolutely no lead-based solder will be accepted.

E. Clean joints thoroughly before soldering.

F. Remove excess solder and flux with a cloth or brush to leave a uniform clean fillet.

G. For refrigeration copper tubing connections, comply with ASME B31.5. Make brazed joints on all refrigeration piping.

3.08 CONNECTIONS OF DISSIMILAR METALLIC MATERIALS

A. Isolate connections between dissimilar metallic materials using dielectric connections. Use dielectric unions or flanges that provide a complete isolation of the two ends, including bolts for flanges, using materials suitable for the design pressure, temperature and fluid contained.

3.09 VALVES

A. Provide valves of the same size as the pipe in which they are installed, unless shown otherwise on the Drawings. At pumps, match valve size to pipe size and not pump connection size.

B. Install valves with the stem on or above the horizontal. Install valves with the stem horizontal if requirements of headroom, access or chain operation must be met.

C. Pack valves and adjust glands before final acceptance.

D. Install valve extension stems or chain operators where the center of valve hand wheels is more than 6 feet-6 inches above the floor and valve is 2 ½" and larger. Prove chain hooks where required to prevent fouling of chains on equipment and to clear walkways. Terminate chains approximately 3 feet-6 inches above the floor. Provide worm gear operators or impact hand wheels for all valves 6 inches and larger.

E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation and a protective sleeve that allows operation of the valve without breaking the vapor seal or disturbing the insulation.

F. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

G. Locate valves for easy access and provide separate support where necessary.

H. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.
2. Lift Check Valves: With stem upright and plumb

I. Install butterfly valves with stems horizontal to allow support for the disc and the cleaning action of the disc.

J. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

K. Install balancing valves with lengths of straight pipe upstream and downstream of valve as per manufacturer's instructions such that calibrated accuracy is maintained As a minimum provide straight lengths as per the following table;

REQUIRED STRAIGHT LENGTHS

½"-3"	3	1			
4"-12"	5	2	**Valve Size**	**Upstream (In Pipe Diameters)**	**Downstream (In Pipe Diameters)**

L. Chain wheel Actuators- Valve actuation assembly with sprocket rim, brackets, and chain.

1. Sprocket rim with Chain guides: Ductile Iron (Aluminum for applications exposed to weather), of type and size required for valve.
2. Brackets: Type, number, size, and fasteners required to securely mount actuator on valve.
3. Chain: Stainless steel, of size required to fit sprocket rim.
4. Manufacturers:
   a. Babbitt Steam Specialty Co.
   b. Roto Hammer Industries

3.10 PRESSURE TESTING, FLUSHING AND CLEANING

A. Pressure test piping systems in accordance with applicable codes and as described herein.

B. Pressure testing - Schedule pressure testing so that it may be witnessed by the Architect/Engineer, Owner, or their representative. Perform tests in accordance with the following procedures:

1. Before testing, complete the installation of each pipe line, including final supports, hangers and anchors. Perform testing before insulation or paint is applied for examination during the test. Clean piping and equipment of metal cuttings and foreign matter as they are installed.
2. Codes - Pressure test piping to assure integrity of material and workmanship in accordance with the applicable ASME Code for pressure piping (B31) and New York State Code.
3. Protection of Equipment - Protect equipment, instruments and piping specialties which are not included in the test by either disconnecting from the piping and blanking off the end of the pipe with a blind flange, plug or cap, or isolating by insertion of a line blind or spool piece as required. Disconnect pneumatic control lines and close all openings.
4. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

5. Piping may be tested in sections or circuits as required for the progress of the work.
6. Provide all systems to be pressurized with the appropriate gauges, certified calibrated by the manufacturer, and pressure-relieving devices.
7. Install relief valve set at a pressure no more than 1/3 higher than the test pressure, to protect against damage by expansion of liquid or other source of overpressure during the test. Do not allow test pressure to exceed maximum pressure for any vessel, pump, valve, or other component in system under test.
8. Records - Provide records of all tests showing line designation, test pressure, ambient temperature, date of test, retests and signature of witness.

C. Hydrostatic Test Procedures - Perform hydrostatic testing in accordance with ASME B31.9.

1. Perform test using the pressure indicated under “Pressure Testing Schedule”
2. After hydrostatic test pressure has been applied for at least two hours, examine piping, joints, and connections for leakage while maintaining test pressure. Repeat hydrostatic test until there are no leaks.
3. Repair leaks as specified under “Repair of Line Leaks”

D. Service Testing - Perform service testing in accordance with ASME B31.9.

1. For gases and steam and condensate service not over 15 psig, and for nontoxic, noncombustible, nonflammable liquids at pressures not over 100 psig and temperatures not over 200 degrees F a system test with the service fluid is acceptable. This exemption does not apply to natural gas piping.
2. Bring the piping system up to operating pressure gradually with visual examination at a pressure between one-half and two-thirds of design pressure. Make a final examination at operating pressure.
3. Repair leaks as specified under “Repair of Line Leaks”
4. Repeat service test until there are no leaks.

E. Repair of Line Leaks - Comply with the following procedures for repair of leaks. In each case retest after repairs are made.

1. Soldered/Brazed Joints - Remove solder/brazing alloy and reapply with proper flux.
2. Flanged Joints - Check to determine flange end alignment and that all bolts are uniformly tightened with the required torque. If leak persists, depressurize the line, remove gasket, examine flange end face, and insert new gasket.
3. Threaded Joints - Tighten joint to a required torque. If leak does not stop, replace pipe and/or fittings. Do not use pipe dope, cement or seal weld to stop pipe leaks.
4. Gasketed Joints - Remove existing gasket and insert new gasket.
5. Welded Steel Joints - Repair pipe in accordance with applicable ASME B31 code.
6. Leaks in Material - Leaks located in pipe or fitting material require the replacement of that section of pipe or fitting and a repeat of the entire system using the complete procedure required for that system. Caulking, welding or epoxy is not permitted. Repair all damage caused by leaks.

F. Flushing - Complete pressure testing requirements prior to flushing. Performance of the flushing may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of flushing any system. Perform system flushing in accordance with the following procedures:

1. Flush all main and branch steam and liquid piping systems after pressure testing is complete with new potable water while draining the system at all low points. Isolate all connected equipment and flush individually.

2. Flushing for piping and equipment will be considered complete when water samples taken at all low points indicate clear discharge-with no visible solids. If not clear, continue flushing and sampling until discharge is clear.

G. Cleaning - Complete flushing requirements prior to cleaning. Performance of the cleaning may be witnessed by the Architect/Engineer, Owner, or their representative, provide ample notification to all parties in advance of cleaning any system. Perform system cleaning in accordance with the following procedures:

1. Clean all steam and condensate lines by blowing them out with live steam. Discharge steam and condensate from each main and branch safely to atmosphere for a minimum of five minutes.
2. Clean all compressed air, instrument air, and fuel oil lines with oil-free dry compressed air at design pressure through each section so that they are blown free of dirt and debris.
3. Clean domestic water lines by flushing with water until effluent is visibly as clean as the flushing medium.
4. Clean hot water/chilled water lines as described below:
   a. When flushing discharge is clear, fill piping systems with water and sufficient approved alkaline cleaning material to remove dirt, oil and grease. Include all connected equipment in the cleaning.
   b. Vent system and place in operation, with automatic controls operating at set point temperature or an operating temperature designated by the Architect/Engineer. Circulate the solution through the system for a minimum of 4 consecutive hours.
   c. After 4 hours, drain system and flush with clean water until the pH at the farthest drain matches the clean water input. Keep strainers unplugged during the cleaning operations. Refill system with clean water.
5. Clean temporary pump strainers and strainers at coils, etc. every 2 hours periodically during cleaning procedures. Do not remove temporary strainers until all cleaning steps are completed and the operation of the system indicates that the system is free of all foreign matter.
6. Blow out all piping and equipment after cleaning and final flushing is completed and the system is drained with clean dry instrument air for a minimum of 15 minutes or until all water is expelled from the system. Upon completion seal the system by closing all drains and vents.
7. Following the Architect/Engineers approval of the above flushing and cleaning procedures, immediately fill each system and chemically treat and monitor in accordance with the “Chemical Treatment Systems” specifications.

H. Pressure Testing Schedule:

Service	Test Type	Design Operating Pressure (psig)	Test Pressure (psig)
Fuel Oil Piping	Pneumatic		1.25 times maximum working pressure
Steam Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi

Condensate Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Natural Gas Piping	Pneumatic		1.5 times maximum working pressure but not less than 3 psig
Natural Gas Piping (In Schools)	Pneumatic		Working pressures up to 12” W.C. = 15 psig test pressure for 1 hour. Working pressures above 12” W.C. = 1.5 times the working pressure or a minimum of 50 psig for 1 hour.
Domestic Water Piping	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Condenser Water Supply & Return	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi
Heating Hot Water Supply & Return	Hydrostatic		1.5 times maximum working pressure, but not less than 100 psi

END OF SECTION

SECTION 232003 - THERMOMETERS AND PRESSURE GAUGES **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This section describes the thermometers and pressure gauges for monitoring liquids and gases in mechanical equipment and systems to be provided as part of the Work.

1.02 SUBMITTALS

A. Product Data: Submit manufacturer's catalog sheets and specifications.

B. Certification - Submit certified accuracy for all products specified.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Subject to compliance with the specifications, provide products from the following manufacturers.

1. Weksler Instruments
2. H.O. Trerice Co.
3. Taylor Instrument Co.
4. Moeller Instrument Co.

2.02 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

A. Thermometer Scale Ranges: Provide thermometers, with scale range 1-1/2 times the actual working temperature required for the particular application, as approved. Provide maximum of 2 degrees between graduations and 10 degrees between numerals. When scale ranges are in excess of 100 degrees, the maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.

B. Thermometers: Provide red reading or magnified column industrial type, with wide angle of vision. Thermometers containing mercury are not permitted. Design and materials as follows:

1. Case: Heavy one piece cast aluminum or extruded brass construction, with a clear acrylic plastic or glass lens. (Adjustable Angle)
2. Scale: White enamel background with bold black figures and graduations. Provide 7 inch scale length for installation in piping and 9 inch length for installation in tanks and similar equipment.
3. Separable Thermowell: Provide thermometers with matching brass (for water service) or stainless steel (for steam service) separable socket thermometer wells in accordance with manufacturer’s recommendations.
4. Stem: Swivel neck design.
5. Locking Device: Adjustable case locknut and adjusting screw function independently to provide full 360 degree positioning of thermometer case and stem to provide optimal visibility.

2.03 PRESSURE GAUGES

A. Provide pressure gauges with 4½" dial size with a flangeless stainless steel case, stainless steel friction ring and acrylic window. Provide brass movement with a bronze bourdon tube and brass socket.

B. Dial face: white with black figures; pointer with zero adjustment screw.

C. Accuracy: ±1% of scale range, ASME B40.1 Grade 1A.

D. Approved manufacturers: Trerice No. 620 or approved equal.

E. Provide stainless steel needle valves for all pressure gauges, Trerice or approved equal.

F. Provide steel coil siphons for gauges on steam service, Trerice No. 885 or approved equal.

G. Provide pressure snubbers for gauges on any service where pressure surges or pulsations are possible, Trerice No. 872 or approved equal.

2.04 COMBINATION PRESSURE/TEMPERATURE TEST STATIONS

A. Provide test stations where shown on the Drawings.

B. Test stations: “Pete’s Plug II”, 1/4” solid brass fitting to receive either a 1/8” OD temperature or pressure probe with two valve cores of Neoprene (Max 200°F at 500 PSI), or Nordel (Max 275°F at 500 PSI). Provide fitting with a color coded cap strap with gasket, rated at 1000 PSI at 140°F. Provide material compatible with piping system that test station is installed in as per manufacturer’s recommendations.

C. When installed in insulated lines, test connection provide Pete’s XL plug, extended stem type.

D. Supply to the Owner, upon completion of the Work, a pressure and temperature test kit consisting of a 0-100 PSI, 0-230 ft. of water pressure gauge with a Number 500 gauge adapter attached,. one 25-125°F and one 0-220°F pocket testing thermometer, an extra number 500 gauge adapter, and a protective carrying case.

E. Approved Manufacturer: - Pete’s Plug II by Peterson Equipment.

2.05 RANGES FOR TEMPERATURE AND PRESSURE GAUGES

Thermometer	Hot Water	60° to 240°F
Pressure Gauges	Hot Water	0 to 60 psi
Thermometer	Chilled Water	30° to 100°F
Pressure Gauges	Chilled Water	0 to 60 psi
Thermometer	Steam/Condensate	0 to 60 psi
Pressure Gauges	Steam/Condensate	0 to 60 psi

Note: Select the proper range so that the average operating pressure and temperature falls approximately in the middle of the scale selected. It is the Contractor’s responsibility to determine the average operating range and select the scale appropriately.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Thermometers:

1. Install thermometers, of type and scale range as required for the particular application, at locations indicated on the Drawings or as required by the Specifications.

2. Install thermometers of type, scale range, and with case style, as required for the particular application, at locations indicated on the Drawings or Specified. Angle each thermometer so that it can be easily read from a standing position at floor level.
3. Where thermometers are installed in piping with insulation 2 inches thick or greater, provide thermometer wells with extension necks. Omit extension necks where thermometers are used on bare pipe or pipe with insulation less than 2 inches thick.
4. Where thermometer wells are installed in piping 2 ½ inches and smaller, increase the pipe size by a minimum of one pipe diameter to avoid restricting the flow in the pipe or install thermometers at elbows such that the stems protrude into the flowing medium.

B. Pressure Gauges:

1. Install gages, of type and scale range as required for the particular application, at locations indicated on the Drawings or as required by the Specifications.
2. For measuring liquid pressure, install gauges complete with stop cocks and drain cocks.
3. Install siphon loops on pressure gauges when installing in steam lines.

C. Pressure Snubbers and Impulse Dampers:

1. Install "pressure snubbers" in the piping connections to all gages installed in the suction and discharge piping connections to close coupled and base mounted circulating pumps driven by motors under 10 HP.

END OF SECTION

SECTION 232201 - STEAM SPECIALTIES **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes steam specialties, including trap diffusers, thermostatic air vents, vacuum breakers, pressure reducing valves, moisture separators, and steam leak detection systems for steam and condensate piping systems.

1.02 REFERENCES

A. ASME - Boilers and Pressure Vessel Codes, SEC 8-D-Rules for Construction of Pressure Vessels.

B. ASME B31.1 - Power piping.

C. ASME B31.9 - Building Services piping.

1.03 SUBMITTALS

A. Product Data: Provide product data for manufactured products and assemblies required for the Work. Include component sizes, rough-in requirements, service sizes and finishes. Include product description, model and dimensions.

B. Submit manufacturer's instructions for maintenance and repair.

C. Provide a valve and specialty application schedule.

1.04 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include installation instructions, assembly views, lubrication instructions and replacement parts list.

1.05 RELATED WORK

A. Section 232000 - Pipe, Valves and Fittings

1.06 QUALIFICATIONS

A. Companies specializing in manufacturing products specified with at least 5 years of experience and products that have been on the market for at least 3 years.

PART 2 - PRODUCTS

2.01 THERMOSTATIC AIR VENTS

A. Brass body, seat gasket and cap with stainless steel bellows, seat and spring, threaded connections suitable for 125 psig maximum operating pressure.

B. Approved manufacturers: - Spirax/Sarco Model T202

2.02 SAFETY AND RELIEF VALVES

A. General Requirements: Valves shall be as specified by ASME Code governing manufacture of such valves within scope of their particular usage, i.e., Heating Boilers, Power Boilers, Unfired Pressure Vessels, etc., shall be tested, rated and listed by National Board of Boiler and Pressure

Vessel Inspections and shall bear symbol of ASME and NBB and PVI, unless otherwise specified. Liquid relief valves do not require ASME tagging or marking, or NBB and PVI Certification. Valves for applications specified shall conform to the ASME Code, Section IV, Heating Boilers and the following:

1. Valves for Steam Heating Boilers: (Operating at 16 psig and above) shall be sized in accordance with ASME Boiler Code and the State of New York Department of Labor Code, shall be ASME Standard, ASME tested, and NBB & PVI certified and marked in accordance with ASME requirements. Valve body and yoke shall be cast steel ASTM A 216 Grade WCB and stem, disc, seat bushing or nozzle, adjusting ring, compression screw and other trim parts shall be stainless steel or equivalent material as approved by State. Valves shall have flanged inlet and outlet connections, with inlet connection being 300 lb. class.
2. Valves for steam heating boilers operating at a maximum pressure of 15 psig shall have a maximum pressure setting of 15 psig. Sizing of valves shall be in accordance with ASME Table HG 400.1. Valve bodies shall be bronze or cast iron, with discs and seats of bronze.
3. Valves for Unfired Pressure Vessels: Safety and safety relief valves on secondary side of unfired pressure tanks, water heaters and heat exchangers shall comply with Code requirements governing applicable equipment as outlined in ASME Code, Section IV, Article 4, Paragraph HG 400.3 and as follows: Secondary side of heat exchanger shall be protected by officially rated valves, set for same pressure or temperature as heretofore specified, when secondary side furnishes steam or hot water for purpose equivalent to purposes for which a boiler would be installed; valves for this purpose shall be sized in accordance with Unfired Vessel Code.
4. Relief Valves For Use On The Discharge Side of Steam Pressure Reducing Valve Stations:
    a. When pressure reducing valve station is set to deliver steam at a pressure not to exceed 10 psig, safety relief valves shall comply with the requirements of the ASME Low Pressure Boiler Code, Section 4, Article 4 and shall be sized to relief all steam that reducing valve or by-pass valve can deliver when in a wide-open position, without permitting pressure to rise above 20 psig.
    b. When pressure reducing valve station is set to deliver steam at a pressure in excess of 10 psig, safety relief valves shall be manufactured in accordance with the ASME Power Code, Section 1, but may be sized in accordance with the Unfired Pressure Vessel Code. Valves shall relieve all steam the pressure reducing valve or by-pass valve can deliver, without permitting pressure to rise more than 10 percent above the maximum allowable working pressure.

B. End Connections: Unless otherwise specified, safety valves, relief valves and safety relief valves, in sizes 3/4 inch to 3 inches IPS inclusive, may be furnished with male or female pipe thread inlet and female pipe thread outlet; valves over 3 inches IPS must be furnished with 125 lb. or 250 lb. flanged inlet and may be equipped with female threaded or 125 lb. flanged outlet.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Install Work in accordance with manufacturer’s instructions and as shown on the Drawings.

END OF SECTION

SECTION 232202 - STEAM TRAPS **H2M**

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Pipes, Valves, and Fittings: Section 232000.

1.02 SUBMITTALS

A. Product Data: Manufacturer’s catalog sheets, specifications and installation instructions for each type of trap.

B. Submit manufacturer's instructions for maintenance and repair.

PART 2 - PRODUCTS

2.01 TRAPS - GENERAL

A. Unless otherwise indicated, size combination float and thermostatic, inverted bucket and impulse traps of capacity to continuously discharge 2-1/2 times normal condensate rate of particular equipment or apparatus being served.

B. Combination float and thermostatic, and inverted bucket traps with integral strainers may be submitted for approval, in lieu of separate trap and strainer, if integral strainer and trap meet individual trap and strainer specifications.

2.02 COMBINATION FLOAT AND THERMOSTATIC TRAPS

A. Product Requirements: Design for 125 psig steam pressure, when used in systems up to 30 psig inclusive, and 175 psig steam pressure for systems operating from 31 psig, to 125 psig inclusive. Base maximum ratings on 1/2 psi differential through trap. Size orifices rated for the operating steam pressure. Wearing parts shall be renewable.

B. Materials: Cast iron body and cover; copper or stainless steel float; brass or stainless steel valve mechanisms; stainless steel valve seats and stainless steel or bronze valve heads. Air vent of the balanced pressure type with bronze, monel or stainless steel bellows; stainless steel or hard bronze valve head and seat.

2.03 THERMOSTATIC RADIATOR TRAPS

A. Design and Materials: Balanced pressure volatile liquid filled bellows type, designed to operate at 25 psig steam pressure. Furnish bronze bodies with finished terminals and brass union; thermostatic seamless tubing bellows of phosphor bronze, monel metal or stainless steel, with a minimum of seven folds, stainless steel valve head and seat.

2.04 LIQUID EXPANSION STEAM TRAPS

A. Solidly liquid-filled thermostatic element, and field-adjustable to discharge condensate at a fixed temperature below 212°F.

B. When used for freeze protection install with outlet downwards so trap is self draining.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install traps in accordance with the manufacturer's printed installation instructions.

B. Unless otherwise indicated, install gate valve, strainer, and union upstream from the trap; install union, check valve, and gate valve downstream from trap.

C. When steam trap discharge is elevated, provide a check valve after the trap.

D. Install dirt pockets/ drip legs at all drops and risers of steam condensate lines.

E. Provide steam trap tagging, identification and schedule in accordance with valve tagging specification.

F. When freezing is a possibility, install thermodynamic steam traps in the vertical position otherwise thermodynamic traps may be installed in the horizontal position.

G. When freezing is a possibility, install float and thermostatic steam traps with a Liquid Expansion Steam Trap below the drain tapping of the trap as recommended by the manufacturer.

H. Provide piping upstream and downstream of steam traps (from drip leg connection or equipment outlet connection to condensate return main connection) at least 1 pipe size greater than trap size.

I. Combination Float and Thermostatic Traps:

1. Use to trap equipment controlled by a modulating valve. Do not install inverted bucket traps for this service.
2. Use where indicated, to drip the end of each steam main, and at other points where indicated, for steam systems with operating pressures up to and including 15 psig.

J. Inverted Bucket Traps:

1. Use where indicated, to drip all steam systems operating at pressures in excess of 15 psig, and for trapping equipment with a steam supply pressure in excess of 15 psig, when the steam supply is not modulated by a control valve.
2. Bucket traps may be used, where approved, to drip the end of each steam main, and at other points where combination float and thermostatic traps are indicated, where the steam supply is not controlled by a modulating valve.

END OF SECTION

SECTION 233113 - SHEET METAL WORK **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section describes the galvanized steel, flexible, and aluminum ductwork for HVAC duct systems in accordance with SMACNA Duct Construction Standards, except as otherwise specified.

B. The construction material for each ductwork system shall be as listed in the “Ductwork Material Schedule” at the end of this Section.

C. This Section also describes the fittings, access doors, hangers and supports, manual volume dampers and sealants for each ductwork system as required.

1.02 RELATED WORK

A. Section 230594 - Balancing of Air and Hydronic Systems.

1.03 REFERENCES

A. ASHRAE - Handbook Fundamentals; Latest Edition.

B. SMACNA - HVAC Duct Construction Standards Metal And Flexible (latest issue)

C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

D. ASTM B 209 - Specifications for Aluminum and Aluminum-Alloy Sheet and Plate.

E. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

F. UL 555 S - Fire Dampers & Smoke Dampers.

G. NFPA 96 - Standard for Commercial Cooking Operations

H. New York State Mechanical Code.

1.04 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A and New York State Mechanical Code standards.

1.05 SUBMITTALS

A. Ductwork shop drawings for approval:

1. Coordinate layout duct drawings that differ from ductwork shown on the Drawings.
2. The review of deviations will be for pressure drop only. The review will not address clearances or accessibility to maintain or balance the air systems. No dimensional or coordination check of the shop drawings will be made. The Contractor has the sole responsibility to review the Drawings, coordinate ductwork fabrication, and provide clearances and access for installation, maintenance and balancing of this work, and work of other trades. Unless specifically dimensioned, Drawings indicate approximate locations only. The Contractor has the sole responsibility to locate and route the ductwork.
3. Deviations such as changing direction or transforming or dividing ductwork must maintain ductwork cross-sectional area and not exceed transformation taper of 15 degrees.
4. Plans and section showing all equipment and accessories.

5. Minimum 3/8 in. scale, double line, showing sizes, transverse joints, transitions, elevations, clearances and accessories; sections where required.

B. Shop details and catalog cuts of:

1. Ductwork construction, including gauge and bracing schedule.
2. Supports.
3. Dampers.
4. Turning vanes.
5. Fire dampers.
6. Access doors.
7. Flexible connections.
8. Other accessories.

1.06 QUALITY ASSURANCE

A. Construct all ductwork in accordance with referenced SMACNA Standards, except as otherwise stated. Ductwork pressure classifications shall be in accordance with referenced SMACNA Standards, except as otherwise specified.

B. For all uninsulated ductwork casings and plenums located outdoors, the reinforcement members shall be galvanized steel or stainless steel.

C. Construction pressure classification of ductwork are shown on the Drawings. If not shown, the pressure classification shall be greater than or equal to the maximum operating static pressure (minimum 2" w.c. pressure classification).

D. All ductwork shall be free from pulsation, chatter, vibration and objectionable noise. If any of these defects appear after a system is in operation, correct by removing and replacing, or reinforcing the ductwork, at no additional cost to the Owner.

E. For all galvanized steel ductwork, zinc coating shall be minimum G90 per ASTM A 653.

PART 2 - PRODUCTS

2.01 GALVANIZED STEEL RECTANGULAR DUCTS AND FITTINGS

A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal And Flexible and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification).

B. No ducts shall be less than No. 22 U.S. Gauge.

C. Piping, conduit and structure shall not penetrate ductwork. Where this condition cannot be avoided and with the written permission of the Architect/Engineer, follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transition sections shall slope a maximum of 15 degrees.

D. Provide 90-degree full-radius elbows with a centerline radius 1.5 times the duct width in the plane of the bend.

E. For elbows with centerline radius less than 1.5 times the width of the duct in the plane of the bend, provide turning vanes.

F. Provide square throat elbows with manufactured turning vanes.

G. All dissimilar metals shall be connected with flanged joints made up with fiber or neoprene gaskets to prevent contact between dissimilar metals. Flanges shall be fastened with bolts protected by ferrules and washers made of the same materials as the gaskets.

H. For split fittings, the split shall be proportional to the air flow. Construct per SMACNA HVAC Duct Construction Standards- Metal and Flexible.

I. Transitions and Offsets shall follow SMACNA HVAC Duct Construction Standards Metal and Flexible, except that sides of transitions shall slope a maximum of 15 degrees.

J. All branch take-offs perpendicular to the main shall be a 45 degree entry.

K. Longitudinal seams shall be of the Pittsburgh Lock type outlined in the SMACNA HVAC Duct Construction Standards Metal and Flexible.

L. Duct transverse joints shall be selected and used consistent with the static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions for proper assembly of ductwork outlined in the SMACNA HVAC Duct Construction Standards - Metal and Flexible. Transverse joints T-25a, T-25b (Ductmate) shall only be used. Metal clips will only be allowed (NO PVC). Ductmate shall not be used for the following (use transverse joints T-15 through T-24 in these cases):

1. The Ductmate '45' system shall not be used for applications with duct gauges heavier than 10 or lighter than 22.
2. The Ductmate '35' system shall not be used for applications with duct gauges heavier than 16 GA. or lighter than 26 GA.
3. The Ductmate '25' system shall not be used for application with duct gauges heavier than 20 GA. or lighter than 26 GA.

2.02 TURNING VANES

A. Manufactured with same material as ductwork that it is installed in and to the same pressure classification as ductwork that they are installed in.

B. Provide turning vanes in all square duct elbows and as noted on the Drawings.

C. Vanes shall be single thickness Small Vane as detailed in SMACNA HVAC Duct Construction Standards Metal and Flexible.

D. Where a rectangular duct changes in size at a square-throat elbow fitting, use single thickness turning vanes with trailing edge extensions aligned with the sides of the duct.

2.03 ACCESS DOORS

A. For access doors for use in ductwork receiving Fire Rated Blanket Insulation see Ductwork Insulation Section for requirements. Fabricate all other access doors in accordance with SMACNA Duct Construction Standards Metal And Flexible and as indicated.

B. For HVAC duct systems, construct doors of the same material as the ductwork. Minimum size of access doors shall be 8 inches by 8 inches, unless shown otherwise.

C. Provide walkthrough doors where shown. These doors shall have a minimum clear width of 18 inches. Provide doors with 8 inch square double pane wire glass windows. Locate windows not to exceed 5 feet-6 inches to centerline above finished floor of installed casing. Walk-through doors shall be operable from both sides of the door.

D. Access doors shall be insulated same as duct.

E. Provide with continuous neoprene gaskets around perimeter of access doors for airtight seal.

F. Provide all access doors with cam lock latches.

G. Provide access doors with watertight gaskets in shower room exhaust ductwork. Doors shall be of extra-heavy stainless construction.

H. All access doors serving a fire damper shall be painted red and shall have a label with white letters not less than ½ inch high reading “FIRE DAMPER”. No external ductwork insulation shall conceal a fire damper access door unless there is a label attached to the insulation indicating the exact location of the access door.

I. Provide access doors in following locations:

1. Heaters and coils in ducts: entering and leaving side.
2. Automatic dampers: linkage side.
3. Fire damper, on both sides of ducts.
4. Smoke detection heads.
5. On both sides of ducts where necessary to provide maintenance accessibility to equipment on either side.
6. VAV boxes
7. Heating and Cooling coils.
8. Fan Plenums.
9. In-Line Fans (suction and discharge sides)
10. Other items requiring access for service/maintenance

J. Where duct access doors are concealed the Contractor shall furnish and pay for installation of access doors to be mounted in the fire rated walls and ductwork enclosures. The access doors must be fire resistive and minimum 6” larger on each side then the duct access door for the above mentioned applications.

2.04 MANUAL VOLUME DAMPER

A. Fabricate in accordance with SMACNA Duct Construction Standards Metal And Flexible, and as indicated.

B. Fabricate single blade dampers for duct sizes up to 6 inches in height.

C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes of 4 inches for ducts above 6 inches in height. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

E. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches, provide regulator at both ends.

F. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

G. Volume damper shall be provided at each duct branch and also where shown on the Drawings. Volume dampers must be installed at each branch even if they are not shown on the Drawing.

H. Approved Manufacturers:

1. Ruskin Mfr. Co.
2. Arrow Damper & Louver.
3. Imperial Damper Co.

2.05 BACKDRAFT DAMPERS

A. Dampers shall be low-leakage, parallel-blade type. Damper sizes shall be suitable for duct sizes noted on the Drawings. The dampers shall be suitable for a minimum 4000 fpm velocity.

B. Damper frames shall be minimum No. 12 gauge galvanized steel blades shall be minimum No. 16 gauge galvanized steel or Type 6063-T5 aluminum with press-fit ball bearings.

C. Dampers shall be complete with adjustable counterweights and linkage for duty at .20 inches w.g. and 3500 fpm.

D. Provide neoprene or silicone rubber blade seals.

E. Approved manufacturers - Ruskin Manufacturing Company.

2.06 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.07 DUCT HANGERS AND SUPPORTS

A. Provide trapeze, strap or angle iron hangers meeting SMACNA HVAC Duct Construction Standards Metal and Flexible.

B. Materials of hangers, supports and fasteners shall conform to the manufacturer’s load ratings.

C. Hangers, supports, upper attachments and inserts shall be hot-dip galvanized steel or stainless steel.

D. Fasteners for HVAC duct systems shall be hot-dip galvanized steel, cadmium-plated steel or stainless steel.

E. Secure ductwork hangers attached to concrete structures and slabs with embedded inserts, anchor bolts or concrete fasteners. A safety factor of 5 should be used in selection of all inserts

and expansion bolts (if applicable safety factor shall be determined by analysis of seismic loads and the greater safety factor shall be used).

F. Provide hangers and supports not more than 12 inches from each face of a horizontal elbow.

G. Plenums shall be supported to permit personnel to enter the plenum. If no structural steel design is shown on the Drawings, it is the responsibility of the Contractor to provide the services of a licensed structural engineer in the in which the project is to be constructed to submit a structural design for review.

2.08 SEALANTS

A. Where ducts are not continuously welded or soldered, provide sealants and gaskets as required to meet the specified duct leakage allowance.

B. Provide Gaskets, Sealers, Mastics and Tapes as manufactured by Ductmate.

2.09 FIRE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standard 555, and AMCA Standard 500.

B. Fire Resistance: For penetrations through construction rated less than 3 hours, 1 ½ hours. For penetrations through construction rated for 3 hours or more, 3 hours.

C. Pressure Differential Rating: 4 in. w. g.

D. Velocity Rating: 2000 fpm

E. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades in air stream. Fabricate fire dampers for vertical and horizontal position.

F. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

G. Fusible links, UL 33, shall separate at 165 degrees F.

H. Acceptable Manufacturers:

1. Greenheck Model DFD 150, 200 and 350
2. Ruskin Mfr. Co.
3. Arrow Damper & Louver.
4. Imperial Damper Co.

2.10 COMBINATION FIRE SMOKE DAMPERS

A. Fabricate and install in accordance with NFPA 90A and UL Safety Standards 555 & 555S, and AMCA Standard 500.

B. Fire Resistance: For penetrations through construction rated less than 3 hours, 1 ½ hours. For penetrations through construction rated for 3 hours or more, 3 hours.

C. Leakage Class: Leakage Class II per UL 555S

D. Fusible links, UL 33, shall separate at 165 degrees F.

OR

E. Resettable links shall be provided in lieu of a fusible link. Resettable link shall interrupt power to the actuator causing the actuator's spring return mechanism to cause the damper to close at 165 degrees F. Resettable link to be provided with an electric sensor (thermostat). Sensor to be of the manual reset type and shall be capable of being reset after the temperature has cooled down below the sensor set point.

F. Pressure Differential Rating: 4 In. w. g.

G. Air Flow Velocity: 2000 fpm

H. Elevated Temperature Rating: 350 Deg. F per UL555S

I. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

J. Actuators: 24 VDC, 2-position, external mounting

K. Acceptable Manufacturers:

1. Greenheck Model FSD-200
2. Ruskin Mfr. Co.
3. Arrow Damper & Louver.
4. Imperial Damper Co.

2.11 STANDARD FLEXIBLE CONNECTIONS

A. Provide fabric flexible duct connections.

B. Fabric shall be UL approved, fire-retardant, closely-woven glass, double coated with neoprene, and a minimum of 4 inches wide.

C. Shall be installed at duct connections to all ceiling hung fans and where vibration will be transmitted through ductwork.

D. Approved Manufacturers:

1. "Ventglas" by Vent Fabrics, Inc.

2.12 HEAVY DUTY FLEXIBLE CONNECTIONS

A. Heavy Duty Flexible Connections shall be used in high pressure (greater than 2 in. w.c.), high temperature (greater than 150 degree F) air applications or where the gas is highly corrosive and the duct connector must be leak proof.

B. Flexible Connectors shall be flanged. If installed outdoors, all metallic components shall be stainless steel construction. Provide flexible connector materials of construction as recommended by the manufacturer for the pressure, temperature, and gas that is being used in air handler system.

C. Approved Manufacturers:

1. Mercer Rubber Company

2.13 FLEXIBLE DUCTS

A. Comply with SMACNA HVAC Flexible Duct Construction Standards and NFPA 90A.

B. Provide where indicated on the Drawings Flexmaster Type TL- M Flexible Metal UL181 Class I Air Duct.

C. The duct shall be constructed of .005" thick 3003-H14 aluminum alloy in accordance with ASTM B209.

D. The duct shall be spiral wound into a tube and spiral corrugated to provide strength and flexibility.

E. The internal working pressure rating shall be at least 10" w.g. positive and 10" w.g. negative with a bursting pressure of at least 2½ time the working pressure.

F. The duct shall be rated for a velocity of at least 5500 feet per minute.

G. The duct must be suitable for continuous operation at a temperature range of -40° F to +250° F.

H. Factory insulate the flexible duct with fiberglass insulation. The R value shall be at least 4.2 at a mean temperature of 75° F.

I. Cover the insulation with a fire retardant metalized vapor barrier jacket reinforced with crosshatched scrim having a permeance of not greater than 0.05 perms when tested in accordance with ASTM E96, Procedure A.

J. Install flexible metal duct as per SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition).

K. Flexible ductwork shall only be installed where shown on the Drawings.

2.14 GALVANIZED STEEL ROUND DUCTS AND FITTINGS

A. Construct ducts of galvanized sheet steel meeting ASTM A 653 with G90 coating designation, and in accordance with the latest SMACNA HVAC Duct Construction Standards Metal and Flexible (Latest Edition).and pressure classifications as stated on the Drawings (minimum 2" w.c. pressure classification). When the ductwork pressure classification of these standards is exceeded, construct galvanized steel round exhaust ductwork in accordance with SMACNA Round Industrial Duct Construction Standards.

B. For ductwork through 60 inches in diameter, provide ducts of spiral lock-seam construction.

C. For ductwork over 60 inches in diameter, provide ducts of welded longitudinal seam construction.

D. For ductwork through 36 inches in diameter, use beaded sleeve transverse joints.

E. For ductwork over 36 inches in diameter, use gasketed-flanged Van Stone transverse joints. Gasket shall be “440 Gasket Tape” by Ductmate Industries, Inc.

F. For ductwork under a positive pressure through 96 in. diameter and 10 in. w. g. no reinforcing is required. For ductwork under a negative pressure in exposed areas use duct gauge that will minimize the use of reinforcing as appropriate for the pressures involved.

G. Draw band joints will not be permitted.

H. All elbows shall be constructed with a centerline radius equal to 1.5 times the duct diameter.

I. Provide matching galvanized steel fittings with continuously welded seams and joints.

J. All take-off connections to duct headers shall be made using tee (90 degrees), lateral (45 degrees), tee cross, lateral cross and “Y” branch fittings of the conical type. All fittings fabricated as separate fittings shall have continuous welds along all seams and joints.

K. The use of two-piece mitered, vaned elbows will be permitted only with specific written approval from the Architect/Engineer. Provide turning vanes as per SMACNA HVAC Duct Construction Standards Metal and Flexible.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Install ductwork in accordance with applicable SMACNA Duct Construction Standards Metal And Flexible and approved submittals, and as shown on the Drawings. Duct sizes shown are inside clear dimensions. Where internal duct liners are used, duct sizes shown are inside clear of liner. For ductwork located outside, provide reinforcing sufficient to support wind and snow loads.

B. The Drawings indicate general locations of ducts. Make additional offsets or changes in direction as required at no additional cost to the Owner.

C. Wherever ductwork is divided, maintain the cross-sectional area.

D. Do not exceed 15-degree taper when constructing duct transitions.

E. Close the open ends of ducts during construction to prevent debris and dirt from entering.

F. Secure casings and plenums to curbs according to the requirements of the SMACNA HVAC Duct Construction Standards Metal and Flexible.

G. Make changes in direction with long radius bends.

H. All unused portions of HVAC supply air and exhaust louvers shall be blanked off with Louver Blank Off Panels, see Ductwork Insulation Section.

I. All welded and scratched galvanized steel surfaces shall be touched up with zinc-rich paint.

J. 2 Hr. rated wall penetration: Where small size duct (up to 6 inches x 6 inches) is penetrating a 2 Hr wall the duct shall be constructed of 16 gauge galvanized sheet metal.

K. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

L. Patch and repair all wall penetrations.

M. Insulation: Where Drawings and Specifications indicate that ducts are to be insulated make provisions for neat insulation finish around damper operating quadrants, splitter adjusting clamps, access doors, and similar operating devices. Metal collar equivalent in depth to insulation thickness and of suitable size to which insulation may be finished to be mounted on duct.

3.02 FITTING INSTALLATION

A. Use minimum of four sheet metal screws per joint.

B. Apply approved sealant on duct-to-duct joint before assembly. Apply additional sealant after assembly to make joint airtight.

3.03 HANGER AND SUPPORT INSTALLATION

A. Support ductwork hung from building structure using trapeze, strap or angle iron hangers conforming to SMACNA HVAC Duct Construction Standards Metal and Flexible. Provide supplemental structural steel to span joists where required.

B. Do not support ductwork from furring, hung ceilings, metal floor deck, metal roof deck or from another duct or pipe.

C. Do not hang lighting fixtures or piping from ductwork.

D. Do not use perforated band iron.

E. Support ductwork at each change in direction.

F. Where duct connects to or terminates at masonry openings or at floors where concrete curbs are not used, provide a continuous 1 ½ inch by 1 ½ inch by 3/16 inch galvanized steel angle support around the ductwork. Bolt and seal the supports to the building construction using expansion bolts and caulking compound. Seal shall be watertight at floor or wall and duct such that a spill will no pass down through the opening.

G. Fasten plenums and casings connected to concrete curbs using continuous 1 ½ inch by 1 ½ inch by ¼ inch galvanized steel angle support. Set the angle support in a continuous bead of caulking compound and anchor it to the curb with 3/8 inch diameter anchors on 16 inch centers. Terminate sheet metal at curb and bolt to angle support. Seal sheet metal to curb with a continuous bead of caulking.

H. For insulated ductwork, install hangers on the outside of the insulation. To maintain the insulation value, inset a piece of 1 inch thick, 6 pcf fiberglass board with a foil/scrim/kraft (FSK) jacket at these supports.

3.04 SEALING

A. Where ductwork is not continuously welded, soldered or gasketed, make seams and joints airtight with sealants.

B. Install the sealants in accordance with the sealant manufacturer’s instructions and recommendations.

C. Seal all ductwork seams, joints, fastener penetrations and fittings connections with sealants in accordance with SMACNA Seal Classifications as required by SMACNA Duct Pressure Classification. All ductwork, regardless of pressure classification, shall have a minimum Seal Class B.

D. Completely fill all voids when liquid sealing ductwork. Several applications may be necessary to fill voids caused by shrinkage or runout of sealant.

3.05 DUCT-MOUNTED DEVICES AND ACCESS DOORS

A. Install all dampers, coils, airflow measuring stations, humidifiers and other duct-mounted devices, specified in other sections of the specifications or as shown and provide transformations to dimensions as required. Install devices in accordance with manufacturer's recommendations. Install dampers and coils a minimum of 4 feet away from changes indirection or transitions. Allow five (5) equivalent diameters of straight ductwork upstream and one (1) equivalent diameter of straight ductwork downstream of airflow measuring devices.

B. Install access doors in ductwork, plenums and where specified and as shown. Provide access doors for inspection and cleaning automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 18 x 18 inch size for shoulder access and as indicated. Install access doors in the bottom of the ductwork unless they are inaccessible in this location; then install the access doors in either the side or top of the ductwork, whichever is more accessible.

C. Provide fire damper at locations indicated, and where outlets pass through fire rated components and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway, duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Engineer.

E. Provide flexible connections immediately adjacent to equipment in ducts associated with motorized equipment. Cover connections to medium pressure fans with leaded vinyl sheet, held in place with metal straps.

F. Pilot Ports: Locate pilot ports for measuring airflow in each main supply duct at the downstream end of the straightest run of the main and before the first branch take-off. Form pilot ports by drilling 7/16 inches holes in the duct, lined up perpendicular to airflow on maximum 8-inch centers and at least three to a duct, evenly spaced. Holes to be plugged with plastic plugs. Provide access to these for future rebalancing.

3.06 CONTROL DAMPER INSTALLATION

A. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure 1/4" larger than damper dimensions and shall be square, straight, and level.

B. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be equal ±1/8".

C. Follow manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.

D. Install extended shaft or jackshaft per manufacturer's instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

E. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to assure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

F. Provide a visible and accessible indication of damper position on the drive shaft end.

G. Support ductwork in area of damper when required to prevent sagging due to damper weight.

H. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

I. Dampers that are to be installed with air flow measuring stations shall be installed in duct runs with a minimum amount of straight duct upstream and downstream of the damper to allow accurate flow readings by the air flow measuring station. The Contractor shall verify with the manufacturer the length of straight duct runs required.

3.07 DUCTWORK AND EQUIPMENT LEAK TESTING

A. Leak test each ductwork system within ten working days of ductwork installation and before ductwork is insulated and concealed.

B. All HVAC ductwork shall be tested. Follow general procedures and use apparatus as outlined in the SMACNA HVAC Air Duct Leakage Test Manual.

C. Test all ductwork at 100 percent of the pressure classifications indicated.

D. Air testing during erection shall include separate leakage air tests of air riser, horizontal distribution system, and, after all ductwork is installed and the central stations apparatus is erected, leakage testing of the whole system.

E. Use Appendix C in the SMACNA HVAC Air Duct Leakage Test Manual to determine allowable leakage rates for each duct section tested.

F. All devices, including access doors, airflow measuring devices, sound attenuators, damper casings, sensors, test ports, etc. that are furnished and/or installed in duct systems shall be included as part of the duct system leakage allowance. All joints shall be inspected and checked for audible leakage, repaired, if necessary, and retested. Duct leakage shall be limited to the following:

12 inches or less	10
20 inches or less	15
30 inches or less	25
40 inches or less	30
50 inches or less	30

* (A) = Permissible loss in cfm	**Average Size of Run Diameter or**	***A/100 ft. Run**

	Equivalent	

G. Total system leakage shall not exceed 10 percent of the scheduled design capacity of the system when tested as per SMACNA testing methods.

3.08 PAINTING

A. Upon completion of the installation, remove all protecting materials, thoroughly remove all scale and grease and leave in a clean condition for painting. Ductwork to be painted shall be as shown on the Drawings. Painting shall be in accordance with the requirements of the “Painting” Specification Section.

3.09 DUCTWORK MATERIAL SCHEDULE

Supply, Outside Air & Exhaust Ductwork	Galvanized Steel		
Ductwork Exposed to Weather	Aluminum	**AIR SYSTEM**	**DUCTWORK MATERIAL**

END OF SECTION

SECTION 235133 - PREFABRICATED CHIMNEYS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes prefabricated chimneys and accessories.

1.02 SUBMITTALS

A. Shop Drawings: Scale drawings showing prefabricated chimney components, guy wire layout, and relationship to boiler, equipment, and building structure including all connections.
   1. Submit all job specific design calculations.
B. Product Data: Catalog sheets, specifications and installation instructions for each item supplied, including accessory items such as sealant.
C. Contract Closeout Submittals:
   1. Warranty: Original copy of specified Warranty signed by a current representative of the company.

1.03 QUALITY ASSURANCE

A. Design Services: Engage the services of the chimney manufacturer's engineering department to design the system, including the expansion sections, and guying system and guy tensioners.
   1. Field verify all existing conditions.
   2. Submit all job specific design calculations.
   3. Condensing Appliances: Submit calculations of chimney draft and sizing selection for approved appliances. Draft calculation shall be based upon ASHRAE's Chimney Design Equation.
B. Regulatory Requirements:
   1. Prefabricated chimney shall be designed and installed in accordance with the requirements of the NFPA, and all components shall be UL listed and labeled.
   2. Comply with the applicable requirements of the Sheet Metal and Air Conditioning Contractors National Association, unless otherwise shown or specified.

1.04 WARRANTY

A. Manufacturer's Warranty: Ten year warranty for the prefabricated chimney.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Chimney Design Solutions, 649 Lafayette Avenue,Suite 3, Hawthorne, NJ 07506
B. AMPCO Commercial Products Group, 815 Kimberly Drive, Carol Stream, IL 60188, (800) 624-8642, www.ampcostacks.com.
C. Selkirk Commercial Products Group, 815 Kimberly Drive, Carol Stream, IL 60188, (800) 624-8642, www.selkirkcommercial.com.
D. Van Packer Co., Inc., 302 Mill Street, Buda, IL 61314, (888) 877-8225, www.vpstack.com.

E. Metal-Fab Inc., PO Box 1138, Wichita, KS 67201, (316) 771-4154, www.metal-fabinc.com <http://www.metal-fabinc.com>

F. Approved Equal.

2.02 BREECHING

A. Manufacturer shall provide a factory-built, double-wall, modular, vent system for gas and oil fired appliances. Such system shall be tested and listed by Underwriters Laboratories Inc. (UL) for use on Category I, II, III, and IV Appliances, appliances approved for Type B Gas Vent, Appliances approved for Type L Vents (gas and oil), and Building Heating Appliance Chimneys as required by NFPA-54, NFPA-31, and NFPA-211. The vent system shall be listed in accordance with:

1. UL-1738 Standard for Venting Systems for Gas-Burning Appliances, Categories II, III, and IV, with operating flue gas exhaust temperatures up to 550°F continuous, and/or 480°F continuous.
2. UL-441 Standard for Gas Vents, for appliances listed for use with Type B Gas Vent, with operating flue gas exhaust temperatures up to 480°F continuous.
3. UL-641 Standard for Type L Low-Temperature Venting Systems, suitable for use with appliances approved for use with Type L Venting Systems, with operating flue gas exhaust temperatures up to 570°F continuous.
4. UL-103 Standard for Building Heating Appliance Chimneys, suitable for venting flue gases from gas, liquid and solid fuel fired appliances at a temperature not exceeding 1000°F continuously, 1400°F intermittent, and 1700°F brief.
5. Vent system shall be listed for positive internal pressure applications up to 90 inches W.C. and for temperatures from ambient up to the maximum 1400°F continuous temperature of the UL-2561 testing.
6. Basis of design is Jeremias Model DWFL+2.

B. CONSTRUCTION

1. The double-wall, insulated vent system shall be constructed of stainless steel inner flue, fiber insulation and stainless steel outer jacket. The materials and construction of modular sections and accessories shall be as specified by the terms of the product's UL listing.
   a. 3" through 18"ID = 0.020" minimum thickness stainless steel inner liner.
      1) 20" through 36"ID = 0.035" minimum thickness stainless steel inner liner.
      2) Minimum 1¼" thick fiber insulation.
      3) 0.025" minimum thickness stainless steel outer jacket.
      4) The entire exhaust system, including all accessories (connectors, hardware, anchor plate supports, guides, drains, and terminals), shall be of stainless steel construction.
2. Inner flue shall have steel to steel male/female conical joints that do not require sealant. The joints shall be secured and sealed by means of a locking band.
3. Double-wall vent system shall be constructed so the installed joint does not incorporate any intermittent or continuous steel bridge between the inner and outer walls that conducts heat and causes hot spots in the assembled system.
4. Vent system shall be designed to compensate for all temperature induced thermal expansion, installed to be gastight, and thus prevent leakage of combustion products into a building.
5. All tees shall be lateral (45°) tees; boot tees and 90° are not acceptable.

6. Detailed manufacturer's submittal drawings shall be provided for approval prior to installation of the vent system.
7. All supports and accessories shall be ASTM 304 stainless steel

2.03 2.03 - BREECHING, CHIMNEY LINER

A. Manufacturer shall provide factory-built modular connector, manifold, and stack system tested and listed by Underwriters Laboratories Inc. (UL) for use with building heating equipment and appliances, which may produce exhaust gas at temperatures not exceeding 1000°F under continuous operating conditions and 1400°F under intermittent condition when burning gaseous, solid, or liquid fuels as described in the edition of NFPA 211. The stack system shall also be listed for use with Categories II, III, and IV appliances that may operate in condensing mode that possibly could generate high amounts of acidic condensate in the stack system. UL Listings shall include:
   1. UL-103 Standard, Building Heating Appliance Chimney
      a. UL-103 Standard, Additional Positive Pressure Listing to 90"W.C.
      b. UL-1738 Standard, Venting Systems for Gas-Burning Appliances, Categories II, III, and IV
      c. UL-1777 Standard, Chimney Liners
B. Exhaust system shall be listed for positive pressure applications up to 90 inches W.C. from ambient temperature and up to 1000°F continuous (UL-103 test conditions).
C. Construction
   1. The single-wall exhaust system (Model SWFL) shall be constructed of stainless steel. The materials and construction of modular sections and accessories shall be as specified by the terms of the product's UL listing.
      a. 3" through 5"ID = 0.020" minimum thickness 444 stainless steel inner liner.
      b. 6" through 36"ID = 0.035" minimum thickness 444 stainless steel inner liner.
      c. The entire exhaust system, including all accessories (connectors, hardware, anchor plate supports, guides, drains, and terminals), shall be of stainless steel construction. All tees shall 45-degree (lateral) tees; boot tees and 90-degree tees are not acceptable.
   2. The exhaust system shall have steel to steel male/female conical joints that do not require silicone sealant. The joints shall be secured and sealed by means of a locking band.
   3. The exhaust system shall be designed to compensate for all temperature induced thermal expansion, installed to be gas tight, and thus prevent leakage of combustion products into a building.
   4. Detailed manufacturer's submittal drawings shall be provided for approval prior to installation of the exhaust system.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install prefabricated chimneys in accordance with the manufacturer's printed installation instructions.

3.02 ADJUSTING AND CLEANING

A. Clean breechings internally during installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth.

3.03 PROTECTION

A. Temporary Closure: At ends of breechings and chimneys which are not completed or connected to equipment, provide temporary closure which will prevent entrance of dust and debris until installations are completed.

END OF SECTION

SECTION 235223 - Cast Iron Sectional Boiler **H2M**

SECTION I - GENERAL

1.01 SECTION INCLUDES

A. Boiler
B. Safety Controls
C. Electrical Supply
D. Fuel Burning Equipment

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME) Section IV - Boiler and Pressure Vessel Code.
B. American Society of Mechanical Engineers (ASME) CSD-1 for fuel input of 12,5000,000 Btu/hr or less
C. NY Department of Labor, 12 NYCRR Industrial Code Rule 4
D. Hydronics Institute (HI) - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
E. UL 726 for packaged oil-fired boilers
F. UL 795 Commercial-Industrial Gas-Fired Package Boilers
G. UL Approved Burner

1.03 SUBMITTALS

A. Submit product data, wiring diagrams and near boiler piping schematics for manufactured heating units.

1.04 OPERATION AND MAINTENANCE DATA

A. Submit operations and maintenance data, including manufacturer's descriptive literature, installation instructions, operating instructions and maintenance and repair data.

1.05 WARRANTY

A. Units that do not carry a standard published warranty of ten or more years are not acceptable to this project. Job specific warranties are not acceptable unless executed by an authorized officer of the manufacturer under seal and submitted five (5) working days prior to the bid date of this project.

PART II - PRODUCTS

2.01 ACCEPTABLE MANUFACTUERS:

A. Weil Mcclain
B. Peerless
C. HB Smith
D. Burnham

2.02 GENERAL DESCRIPTION

A. Furnish and install New boiler/burner unit(s) for low pressure Steam heating service and arranged for completely automatic operation firing gas/oil. Boiler shipped Knocked-Down for field assembly by installing contractor.

B. Each boiler shall be furnished complete with an insulated metal jacket; Forced draft burner; Cast iron smoke hood with integral 14 gauge aluminized steel damper; Pressure-tight front and rear flame observation ports with covers; Steel angle floor rails; Cast iron burner mounting plate with insulation and additional controls and devices as hereafter specified.

C. Safety controls and limit devices shall be installed in accordance with the requirements of (NFPA 31), (BOCA), (NFPA 54). In every case, the boiler installation shall be accomplished in accordance with the recommended good practice and installation requirements of the A.S.M.E. Boiler and Pressure Vessel Code. (Section 4)

D. The boiler/burner units shall have been rated in accordance with the Hydronics Institute Testing and Rating Standard for Heating Boilers, and shall be performance tested and listed by I=B=R at +0.10 inches (w.c.) draft as follows:

1. Develop an I=B=R Gross Output of not less than 5810 MBTU/Hr. when fired at a rate of 7216 MBH natural gas or 50 GPH of #2 light oil.
2. The unit shall provide a minimum Thermal Efficiency of 80.5% when burning Natural Gas and minimum Thermal Efficiency of 83% when burning Oil.
3. The boiler shall have a minimum water volume of 0.74 # per MBH of Gross Output, providing thermal mass to reduce burner short cycling.

E. The boiler/burner units shall be Model CC-09 as manufactured by Peerless Boilers.

2.03 STEAM TRIM (BOILER FEED RETURN)

A. Each boiler shall be supplied with a minimum of the following trim:

B. A.S.M.E. Schedule Side Outlet Safety Valve set for 15 P.S.I.G.

C. Pressure Gauge

D. Honeywell L404C Manual Reset High limit

E. Honeywell L404A Operating Temperature Control

F. L91B Modulating Control (Select for Modulation)

G. L404A Low-High-Low Control (Select for LHL)

2.04 COMBUSTION SYSTEM (GAS)

A. The unit(s) shall include a forced-draft flame-retention type burner having a ring of recessed gas ports with an orifice for each port, primary air adjustment and externally mounted gas pilot. Tested by Underwriters Laboratories and complying with the rules and regulations of U.L. as well as the local authorities having jurisdiction. The burners shall be capable of firing a Series G28HE-S- boiler with MBH of natural gas against a furnace pressure of inches of water

column, with supply gas pressure of 14 inches w.c. at the inlet to the main manual shutoff cock. The Burner shall be Power Flame Model Number

B. The gas train shall be U.L. listed and shall consist of the following items:
   1. Main Motorized Gas Valve
   2. Auxiliary Solenoid Gas Valve
   3. Main Gas Pressure Regulator
   4. Maxitrol Pilot Gas Pressure Regulator

C. The burner shall be driven by a HP 3450 RPM, 208 / 240 / 460 volts, 60 hertz, (single) (three) phase, 60 cycle alternating current motor. Control circuit voltage shall be supplied from a separate 115 volt branch circuit.

D. The burner shall be arranged for (Lo-Hi-Off) (Lo-Hi-Lo) (Modulating) firing.

E. Burner shall be equipped with an electronic flame safeguard system and scanner. The control shall be a Honeywell UV Flame System microprocessor-based, burner management control system with self-diagnostics and non-volatile memory.

F. Control Panel: The burner mounted control panel shall include the following:
   1. Indicator lights: Power-On, Main Fuel

2.05 BURNER LIGHTOFF AND WARRANTY SERVICE

A. The contractor shall provide factory certified lightoff for the burners and one year of warranty service on burner controls starting on the lightoff date. The warranty service shall include labor materials to replace any parts or controls, which fail in service as the result of a defect in material or manufacture.

B. The owner shall be responsible for the cost of normal maintenance, such as replacement of filter medium, cleaning, oiling, service control system malfunction, etc., shall be paid for by the owners.

C. The owner's operating personnel shall be instructed in the operation and maintenance of the burner and controls at the time of lightoff. The owner shall arrange to have the people who require training to be present at the lightoff.

PART III - EXECUTION

3.01 BOILER CONSTRUCTION / INSTALLATION:

A. Boiler sections shall be manufactured from a flake graphite eutectic cell cast iron. The sections shall be of the wet base type designed for pressure firing and it shall be constructed and tested for 15 P.S.I.G. steam working pressure in accordance with the A.S.M.E. Section IV Rules for the Construction of Heating Boilers. Individual sections will have been subjected to a hydrostatic pressure test of 200 P.S.I.G. at the factory before shipment and they shall be marked, stamped or cast with the A.S.M.E. Code symbol. Boilers with less than 200 P.S.I.G. pressure test will not be acceptable for this project. Boiler sections shall be cast in the U.S.A. to meet U.S. Steel content requirements.

B. Boiler sections shall be of one-piece design incorporating the furnace space and flue gas collector space with perimeter joints between the sections arranged for permanent pressure sealing with high temperature ceramic fiber rope. Precision CNC machined, upper and lower ports for connecting the water space of adjacent sections shall be sealed by means of a graphite composition port connector. The port connectors will be inert and have a temperature rating of 1800° F in steam. The port connector will meet ASTM F-37 and ASTM F-36 standards for sealability and recovery; Sections shall be assembled with short draw rods, tightened to final torque after the section assembly is complete The boiler shall have an oval upper steam port with a minimum of 53.8 Sq. Ins. of free area above the normal water line to assure positive steam separation.

C. All boiler discharges shall be piped to floor drains as shown on the contract drawings and as indicated by the consulting engineer. Blowdown valves shall be brass, ball type and not less than one-inch IPS and they shall discharge to a floor drain or away from the boiler as directed by the Consulting Engineer. Pipe ends shall be cut at a 45-degree angle to prevent a cap or plug from being installed. Hangars or standoffs to prevent the valve body from undue stress or strain shall support all such discharge piping.

D. Boiler drain valves shall be connected to the lowest water space available and shall be installed with pipe and fittings to connect the bottom blow off full size to drain.

E. All individual sections shall have legs to provide support on both sides. Two 3" X 3" base angles shall be furnished to be set under field assembled boilers to provide level support for the sections when shimmed and grouted to a concrete floor. The base angles shall be tapped to receive the supporting frame for the insulated metal jacket.

F. Insulating metal jacket shall consist of 20-gauge steel panels fitted with 3” 1 1/2 Lb./Cu. Ft. density fiberglass insulation glued to the inside of the panels. Jacket panels shall be finished with blue hammertone paint baked on and shall be arranged with slots and knockouts to accommodate the boiler piping and to allow jacket installation after the piping is in place. Left and right side panels shall be furnished with two recessed handles located above and below the horizontal centerline of the jacket for easy removal and to provide access to the boiler clean out covers and draw rods.

G. Cleanout covers shall be sized and located to allow full access to the extended pin type heating surface areas for cleaning and inspection of the Heat transfer Rods. Cleanout covers shall have grooves to contain high temperature ceramic fiber rope seals for gas-tight fit to the sections and incorporate cast on horizontal baffles to reduce short-circuiting of flue gasses and also enhance performance by maximizing heat transfer.

H. Stop valves of the outside stem and yoke type shall be provided in the supply and return pipe connections to the boiler. Provisions shall be made for the expansion and contraction of the heating mains connected to the boiler by providing substantial anchorage at suitable points and

assisted by the use of swing joints to allow the piping to expand and contract without imposing excessive forces on the boiler castings.

I. Boiler shipped Knocked-Down for field assembly by installing contractor.

J. Boiler installation shall be accomplished within acceptable A.S.M.E. piping practices and requirements and in strict accordance with the boiler manufacturer's recommendations and instructions.

K. A hydrostatic pressure test of one-and-one-half times the working pressure of the boiler shall be conducted on this boiler. Such tests shall be of such duration as necessary and as directed by the engineer to ensure the boiler has been assembled and installed correctly with no leaks or improper operating conditions.

L. The installing contractor shall contact and notify the Boiler Inspections Divisions of the State when the installation of the boiler, burner and controls is substantially complete. Installing contractor shall request an Inspection of the boiler to be conducted by the State Boiler Inspector and to have a Certificate of Inspection issued upon satisfactory inspection.

END OF SECTION

SECTION 235300 - BOILER FEEDWATER EQUIPMENT **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Boiler Feedwater Systems.

1.02 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of feedwater equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with feedwater equipment work similar to that required for project.

C. Codes and Standards:

1. UL and NEMA Compliance: Provide electric motors and ancillary electrical components which are UL-listed and labeled, and which comply with NEMA standards.
2. NEC Compliance: Install feedwater equipment in accordance with applicable electrical requirements of NFPA 70, "National Electrical Code".
3. ASME Compliance: Comply with applicable requirements of ASME Boiler and Pressure Vessel Code.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, current accurate pump characteristic performance curves with selection points clearly indicated, weights (shipping, installed, and operating where applicable), furnished specialties and accessories; and installation and start-up instructions.

B. Shop Drawings: Submit manufacturers' assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

C. Wiring Diagrams: Submit manufacturer's ladder-type wiring diagrams for electrically operated feedwater equipment. Differentiate between portions of wiring that are factory- installed and portions to be field-installed.

D. Maintenance Data: Submit maintenance data and parts lists for each feedwater equipment item, including "trouble- shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

1.04 WARRANTY

A. The equipment shall be guaranteed to be free from defects in material and workmanship for a period of fifteen (15) months after shipment or twelve (12) months from date of installation, whichever period shall first expire.

PART 2 - PRODUCTS

2.01 BOILER FEEDWATER SYSTEMS

A. Furnish and install where shown on plans, one packaged duplex boiler feed system. The system shall be designed to collect condensate returns, blend with required make-up and supply boiler feed water to boiler(s) (quantity and size as indicated on the plans schedule) operating at 8 PSIG. Furnish a rectangular, floor mounted style, non code receiver constructed of 304 stainless steel and necessary pipe connections (including two vents - one internally un-restrictable). The receiver capacity shall be no less than the capacity indicated on the plans. System shall include pumps, control panel and accessories as described below.

B. NOTE: Receiver width must not exceed 34” Receiver height must not exceed 60”. Pumps and control panels may be removed in order to gain access to the boiler room through a standard 36” wide doorway.

C. The entire assembly shall be factory pre-assembled and shall consist of the following components:

1. One (1) - boiler feed tank with accessories as follows:
    a. One (1) 155.8 gallon, rectangular, carbon steel, floor mounted, non-code receiver tank.
    b. One (1) water level gauge glass assembly with shut-off cocks and protective rods to cover the full water level travel.
    c. One (1) electric solenoid make-up valve assembly, including an air gap and a float switch with internal float.
    d. One (1) 3" dial thermometer
    e. One (1) low water cut off switch
2. Boiler feed pumps, close coupled, vertical, flange mounted, centrifugal type for intermittent service, driven by 3500 RPM, 208-230v, 1 phase, 60Hz, ODP, ball bearing motor(s). Each pump shall be sized to deliver not less than 5 GPM at 11 PSIG discharge pressure when pumping 200 deg. F water. Furnish one pump per boiler plus one stand by pump. Example: If the unit is to serve 2 boilers, a total of 3 pumps shall be furnished. Pumps shall be vertical, close coupled centrifugal design with of bronze fitted construction with cast iron casings and bronze impellers. Each pump shall have a mechanical seal rated for 250 degrees F. Butterfly type isolation valves shall be provided for each pump suction. A discharge pressure gauge with shut-off cock and a spring loaded, stainless steel check valve to be included for each pump discharge.
3. NEMA 12 control panel complete with a main disconnect switch, fuse blocks, motor starters, pump control switches (hand-off-auto), and a control circuit transformer. Panel to be mounted and wired for 115/1/60 service. Wiring to be in accordance with the National Electric Code.
4. All accessories shall be factory pre-piped. Some pre-piped items may be removed to facilitate shipment.
5. Boiler feed system shall be Custom Sized Tank as manufactured by Fabtek, or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which the equipment is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.02 INSTALLATION OF EQUIPMENT

A. General: Install equipment in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.

B. Comply with installation requirements of local and state boiler codes, and applicable provisions of NFPA and ASME Boiler Code Standards.

C. Support: Install equipment on 4" high concrete pad, where indicated.

D. Accessories: Install equipment accessories not installed at factory.

E. Connections: Connect as indicated, boiler feedwater piping, vents, drains, condensate piping, and make-up water.

F. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

G. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division-16 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment Installer.

3.03 FIELD QUALITY CONTROL

A. General: Start-up equipment, in accordance with manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

3.04 CLOSEOUT PROCEDURES

A. Training: Provide services of manufacturer's technical representative for one 8-hour day to instruct Owner's personnel in operation and maintenance of equipment.

B. Schedule training with Owner, provide at least 7-day notice to Contractor and Engineer of training date.

END OF SECTION 235300

SECTION 238239 - ELECTRIC HEATERS **H2M**

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Electric Unit Heaters.

1.02 REFERENCES

A. Electric unit heaters shall meet the requirements of the National Electric Code (NEC) and shall be UL listed.

1.03 SUBMITTALS

A. Submit under provisions of Section 013300 - SUBMITTALS.

B. Submit manufacturer's product data and installation instructions to Engineer.

C. Submittal data shall include capacity and size of each heater and wiring instructions.

PART 2 - PRODUCTS

2.01 ELECTRIC UNIT HEATERS

A. Electric unit heater shall be Model MUH Architectural Series as manufactured by QMark or approved equal. Heater shall be suitable for horizontal or vertical mount. Refer to equipment schedule for mounting type.

B. Heater to be of the KW rating, voltage and phase specified in the schedule.

C. Unit Casing: Unit shall have heavy gauge die-formed steel casing with a corrosion resistant finish. Top of casing shall have two threaded holes for threaded rod suspension. Bottom of casing shall have a hinged panel for service access to wiring and controls.

D. Heating Elements: Aluminum-finned, copper clad steel sheath heating element. Elements shall have kilowatt rating as specified. Provide automatic reset linear thermal cut-out, capillary type, to provide protection over entire length of element areas.

E. Fan Delay Control: Fan control shall delay fan start up of the fan motor until the heating elements have warmed up. It shall maintain motor operation air heating elements have been de-energized to dissipate residual heat.

F. Motor and Fan: The motor shall be totally enclosed, continuous duty, with automatic resetting, thermal-overload protection. Propeller fan shall be directly connected to the motor shaft and be statically balanced. Motor mounted with rubber vibration absorbing material.

G. Electrical: All units shall have built-in contactors and low voltage control circuit transformers to provide single-source power connection. Built-in fuse blocks and factory supplied fuses shall be installed on all models with a 208-volt single-phase power supply. Factory mounted disconnect switches shall be provided. A wiring diagram and grounding lug shall be included in each control compartment.

H. Air Deflectors: Removable and adjustable horizontal air deflectors shall be furnished on all models.

I. Thermostat: Each unit shall be furnished with a remote wall mounted, low voltage thermostat, range 40°F to 80°F. Thermostat shall be UL listed.

J. Supports: Stainless steel hanger rods, double nuts, and ceiling/wall bracket.

K. Provide other accessories as described on the contract drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install unit in accordance with manufacturer's published installation instructions.

B. Do not install horizontal unit heaters closer than 12 inches to combustible materials in any direction.

C. Do not install vertical unit heaters closer than 18 inches from ceiling and 24 inches horizontally from combustible materials in any direction. The bottom of the unit must be a minimum of 8 feet above the floor.

END OF SECTION

SECTION 260000 - ELECTRICAL **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation and backfill for electrical work.
B. Demolition of existing electrical systems.
C. Primary power wiring and distribution system.
D. Secondary power wiring and distribution system.
E. Lighting, including lamps.
F. Wiring devices.
G. Electrical control systems and interlock wiring.
H. Wiring for built-in equipment.
I. Switchboards and switchgear.
J. Distribution panels and switches.
K. Automatic transfer switches.
L. Instrumentation and Controls.

1.02 RELATED WORK

A. Foundations and pads required for equipment furnished under this division of specifications.
B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.
C. Flashing and sealing of conduits through outside walls.
D. Cutting and patching for electrical work, except for errors and omissions under this Division.

1.03 QUALITY ASSURANCE

A. It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the special and general provisions of the contract.
B. Electrical equipment provided under this Division shall be turned over in operating condition. Instruction on further operation and maintenance shall be included in the operating and maintenance instructions.

1.04 REFERENCES

A. Perform work in accordance with standards listed below. Where these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Engineer.
    1. New York City Electrical Code (NYCEC)
    2. New York City FIre Code
    3. New York City Energy Conservation Code (NYCECC)
    4. New York City Building Code
    5. New York City Administrative Code

6. Applicable New York City Ordinances.

1.05 PERMITS AND FEES

A. The Contractor shall obtain and pay for all permits, construction charges, fees, licenses, certificates, inspections and other use charges required in connection with the work.

B. Such permits include, but are not limited to:

1. Transportation and disposal of debris.
2. New York City Department of Buildings (DOB), or a pre-approved electrical inspection agency.
3. Road opening permits.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications shall have UL listing and label. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Engineer's approval.

PART 3 - EXECUTION

3.01 COORDINATION

A. Carefully examine specifications, drawings and project site to be thoroughly familiar with items which require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled for exact sizes.

B. Notify other Contractors of any deviations or special conditions necessary for the installation of work. Interferences between work of various contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner. Engineer to be mediating authority in all disputes arising on project.

C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between contract documents and these recommendations, a clarification shall be requested of the Engineer for decision before preceding with such work.

D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.

E. FIRE ALARM – For any facilities that utilize an existing fire alarm system, the contractor shall coordinate with the owner and fire alarm monitoring company prior to removing or disabling any devices. It shall be the contractor’s responsibility to provide fire watch as per the latest addition of the New York City Fire Code. The contractor shall provide fire watch for all areas of a facility

while occupied and unoccupied when any device or part of the fire alarm system is de-activated or put into “test mode”.

3.02 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of work under this Division.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs to be properly sealed, fire proofed and waterproofed.

D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 TESTS

A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Engineer. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

B. Furnish Engineer with a copy of such tests including identification of each circuit and readings recorded, as well as the main service ground resistance test as described in Section 260526 of these specifications. Test information to include ampere readings of all panels and major circuit breakers, isolation resistance reading of motors and transformers.

3.04 IDENTIFICATION OF EQUIPMENT

A. Properly identify the following:

1. Switchgear and switchboards, including all individual devices.
2. Distribution panels.
3. Disconnect switches.
4. Transfer switches.
5. Individually mounted circuit breakers.
6. Relays.
7. Pilot lights and control switches.
8. Service entrance equipment and main circuit breaker.
9. Transformers.

B. Use permanently attached black phenolic plates with 1/4-inch white engraved lettering on the face of each, attached with two sheet metal screws.

C. Panelboard identification plates shall indicate panel by name.

3.05 INSTALLATION

A. The Contractor shall carefully move and replace existing equipment, appliances and all related items, as required to conduct proposed work.

B. Install and conduct all work per applicable NEC, State and local codes.

END OF SECTION

SECTION 260010 - ELECTRICAL DEMOLITION **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of temporary work.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, safety of structure and dust control.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct egress width to exits.

E. Do not turn off electric equipment without authorization from Owner.

F. Conform to procedures applicable when discovering hazardous or contaminated materials.

G. Obtain a utilities mark-out of all buried underground utilities for telephone, electric, gas, sewer and water, including all customer owned utilities.

1.04 SCHEDULING

A. Schedule Work to coincide with new construction.

PART 2 - PRODUCTS

2.01 NOT USED.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify field circuiting arrangements at Building 62.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition drawings are based on visual field observation. Report discrepancies to the Engineer before disturbing existing installation.

D. Beginning of demolition means installer accepts existing condition.

3.02 PREPARATION

A. Coordinate service outages with Owner and Owner's Representative.

B. Provide power, wiring and connections to maintain all existing power, control and telemetry systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction, as indicated on drawings.

B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

D. Repair adjacent construction and finishes damaged during demolition and extension work.

E. Provide caps and filler plates/plugs for all openings in equipment and enclosures after removal of conduits.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Remove demolished materials from site as work progresses.

H. Completely remove and dispose of all electrical power, control, and telemetry feeds including conduits, conductors, boxes and supports not scheduled to remain after new construction is tested and operational.

I. Where existing devices and equipment are called to be removed, Contractor shall maintain circuit continuity to all existing devices and equipment remaining on that circuit. Contractor shall provide all required conduit, conductors and boxes as required.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Remove temporary work.

END OF SECTION

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wires and cables.

B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:

1. 600V power and control cable
2. Communication cables

C. All conductors to be continuous from origin to panel or equipment termination without splices.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NYCEC - New York City Electrical Code.

C. NECA Standard of Installations.

D. ANSI / UL 2196 "Tests for Fire Resistive Cables” .

E. CSA C22.2#124.

F. UL Fire Resistance Directory.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

1.04 QUALITY ASSURANCE

A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Engineer as specified herein and in accordance with the General Conditions.

B. Contractor shall submit the following information pertaining to the manufacturer(s):

1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.
2. Location of closest service office from which this equipment shall be serviced.
3. Location of closest parts inventory for item installation.

1.05 COORDINATION

A. Coordination:

1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.
2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.
3. Notify other Contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.06 PROJECT CONDITIONS

A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.
B. The Contractor shall be present at all concrete pours made by the General Contractor.
C. In general, conductor sizes are based on copper at 75°C.
D. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.
E. Field verify destination location to determine cable routing.
F. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Engineer.

PART 2 - PRODUCTS

2.01 GENERAL USE LOW VOLTAGE CONDUCTORS

A. Install products in accordance with manufacturer's recommendations.
B. Single copper conductors with 600-volt insulation.
C. Minimum size of feeder and branch conductors and grounds shall be No. 12 AWG.
D. Insulation: ANSI/NFPA 70, Type THWN-2 for conductors installed on interior of building. Provide ANSI/NFPA 70, Type XHHW-2 for conductors installed on exterior.
E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.
F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.
G. Manufacturers shall be GENERAL CABLE, SOUTHWIRE, OKONITE, or approved equal.
H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 FIRE RATED CABLE TYPE MI

A. Manufacturers:
    1. nVent Raychem
    2. Approved equal.
B. References:
    1. ANSI / UL 2196 "Tests for Fire Resistive Cables”
    2. UL Fire Resistance Directory
C. Requirements and Listings:
    1. 2-hour fire rated minimum
    2. Listed in the UL Fire Resistance Directory

D. Specifications:

1. Description: ANSI/NFPA 70 Type MI
2. Conductor: solid high conductivity copper
3. Insulation Material: magnesium oxide
4. Sheath Material: Seamless soft-drawn copper
5. Fire Rating: complete cable system shall have a 2-hour fire rating as listed and classified by underwriters Laboratories, Inc.

E. Components:

1. Mineral Insulated cable components shall be cCSAus Certified.
2. Mineral Insulated cable terminations shall consist of nVent: PYROTENAX Model PyroPak (Installation Sheet H58872) or PYROTENAX Model QuickTerm Termination (Installation Sheet H58264 or H58290).

2.03 4-PAIR CATEGORY 6 UNSHIELDED TWISTED PAIR CABLE

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:

1. Belden Corporation, Carmel, IN (800) 246-2673.
2. Avaya, Basking Ridge, NJ (800) 344-02232.
3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.

B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends

1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.
2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 6 cable performance specification.
3. Overall Nominal Diameter: .365 x .165 in.
4. Nominal Impedance: 100 ohms plus or minus 15 percent.
5. Certified capable of performing to minimum 350 MHz.

C. Mechanical Characteristics

1. Operating temperature: -20°C to +80°C
2. Bulk cable weight: 29 lbs./1000 ft.
3. Maximum recommended pulling tension: 45 lbs.
4. Minimum bend radius: 1 in.

D. Flame test: UL1666 Riser

E. Electrical Characteristics:

1. Nom. Mutual Capacitance @ 1 KHz 15.0 pF/ft
2. Maximum Capacitance Unbalance (pF/100 m) 49.2 pF/100 m
3. Nominal Velocity of Propagation 70 %
4. Maximum Delay (ns/100 m) 510 @ 100MHz ns/100 m
5. Maximum Delay Skew (ns/100m) 25 ns/100 m
6. Maximum Conductor DC Resistance @ 20 Deg. C 9 Ohms/100 m
7. Maximum DCR Unbalance @ 20 Deg. C 3 %
8. Max. Operating Voltage - UL 300 V RMS

2.04 MECHANICAL CONNECTORS

A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.

C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.

D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.
2. Splices are not allowed in the underground duct and manhole systems. If splices are required, the Contractor shall obtain approval in writing from the Engineer prior to splicing.
3. All splices shall be in made in terminal boxes.

B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Engineer. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.

C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. Coordinate wiring schemes with equipment schematics.

D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, the Contractor shall assign wire numbers. Wire numbers shall not be duplicated.

E. Cable Identification Tags: The Contractor shall furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or other approved identification number or symbol. All cables shall be temporarily tagged with its full ID number immediately after it has been pulled.

F. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Engineer shall be used. Friction tape shall be in accordance with ASTM D69.

G. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.

H. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 degrees F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

I. All cables and wires shall be installed within the raceways as shown on the Contract Drawings. They shall be carefully handled so as to avoid twists or kinks in the conductors or damage to the insulation.

J. The Contractor shall ensure that the manufacturer’s recommended cable bending radii and pulling are not exceeded and that the number of conductors permitted in a conduit are in accordance with the latest applicable section of NFPA 70 National Electrical Code.

K. No splices shall be permitted between terminals except at approved junction or terminal boxes. Boxes shall be provided as shown on the Contract Drawings or as required by Code for the pull lengths. No more than two terminations shall be made at each terminal point. Cable and wire runs shall be looped through pull boxes without cutting and splicing where possible. All splices below grade, in manholes, hand holes and wet locations shall be water proofed.

L. No splicing of instrument wiring shall be permitted. Instrument wiring shall be extended by use of field termination boxes employing labeled terminal strips. Shield continuity shall be maintained. Ultimate shield termination (ground) shall be at one end only.

M. Cables shall be installed complete with proper terminations at both ends. For each motor circuit, Contractor shall ensure proper phase sequence and motor rotation.

N. Wire and cable contained within a single conduit shall be pulled simultaneously using insulating pulling compounds containing no mineral oil.

O. Pulling tension on medium voltage cables shall be continuously monitored using a calibrated Dynamometer type device, having a calibration label within six months of its use.

P. Cables shall be installed with maximum slack at all terminal points, boxes, and manholes.

Q. Color Coding:

1. Conductor jacket shall be color coded as follows:

AC POWER

Phase A	Phase A	Phase A	Phase A	Phase A

Brown	Blue	Black	Blue	Black					
Phase B Orange	Phase B Black	Phase B Red	Phase B Black	Phase B Orange (HiLeg)					
Phase C Yellow	Phase C Red	Phase C Blue	Phase C Orange	Phase C Blue					
Neutral White	Neutral White	Neutral White	Neutral White	Neutral White					
Ground Green	Ground Green	Ground Green	Ground Green	Ground Green	**480V/277 Volt 3 phase**	**208Y/120 Volt 3 phase (PSEGLI)**	**208Y/120 Volt 3 phase (NEC)**	**240/120 Volt 3 phase (PSEGLI)**	**240/120 Volt 3 phase (NEC)**

2. Control (Per ICEA Method 1, K-2):

1	Black		
2	Red		
3	Blue		
4	Orange		
5	Yellow		
6	Brown		
7	Red With Black		
8	Blue With Black		
9	Orange With Black		
10	Yellow With Black		
11	Brown With Black		
12	Black With Red		
13	Blue With Red		
14	Orange With Red		
15	Yellow With Red		
16	Brown With Red		
17	Black With Blue		
18	Red With Blue		
19	Orange With Blue	**WIRE NUMBER**	**COLOR**

3. DC Power
   a. Positive Lead - RED
   b. Negative Lead - BLACK
4. Equipment Ground - GREEN

R. Communication Cable Installation:

1. Where instrumentation cables are installed in panels, etc., arrange wiring to provide maximum clearance between cables and other conductors. Communication cables shall not be installed in same bundle with conductors of other circuits.
2. Special communication cable shall be as specified or recommended by the vendor of the equipment or instruments requiring such wiring. Installation, storage, terminations, etc., shall be per manufacturer's recommendations.

3.02 IDENTIFICATION

A. Each wire shall be labeled at each termination point and each splice location. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification stamped on terminal boards when provided or the cable so it is visible around the cable’s circumference.

B. Each wire shall be identified in junction boxes, cabinets, and terminal boxes. Where no termination is made, use a plastic-coated, self-adhesive, wire marker. Where termination is made, use a plastic, pre-printed sleeve wire marker. Paper, self-adhesive wire markers shall not be used.

C. In manholes, each power wire shall be identified by a laminated plastic tag located so that it can be seen from center of manhole without moving adjoining wires. Bundle and mark control wires as listed in cable and conduit schedule.

3.03 FIELD TESTING

A. After installation, all 600 volt and below wire and cable shall be field tested. The field tests shall be performed by the Contractor who shall furnish all testing equipment. The field tests shall be witnessed by the Engineer and certified by the Contractor. The Contractor shall provide a report identifying the tests performed and the results obtained.

B. Each electrical circuit shall be tested after permanent cables are in place to demonstrate that the circuit and equipment are connected properly and will perform satisfactorily and that they are free from improper grounds and short circuits. The tests shall consist of the following:

1. 600 volt wire and cable mechanical connections shall be individually tested after installation and before they are put in service with a calibrated torque wrench. Values shall be in accordance with manufacturer’s recommendations.
2. 600 volt and below wire and cables shall be individually tested for insulation resistance between phase and from each phase to ground. Test after cables are installed and before they are put in service with a Megger for one minute at a voltage rating recommended by the cable manufacturer or in accordance with NEMA and ICEA standards.
3. The insulation resistance for any given conductor shall not be less than the value recommended by the cable manufacturer or in accordance with NEMA and ICEA standards. Any cable not meeting the recommended value or which fails when tested under full load conditions shall be replaced with a new cable for the full length.
4. Shielded instrumentation cable shields shall be tested with an ohmmeter for continuity along the full length of the cable and for shield continuity to ground.
5. Connect Shielded instrumentation cables to a calibrated 4-20 milliamp DC signal transmitter and receiver. Test at 4, 12, and 20 milliamp transmitter settings.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. Adjust accordingly to meet recommended values.

D. Field Testing:

1. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.
2. If tests reveal defects or deficiencies, the Contractor shall make the required repairs or shall replace the cable as directed by the Engineer, without additional cost to the Owner.
3. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

E. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.

F. Insulation-Resistance Tests:

1. 600V power and control cables and wires shall be tested for their insulation-resistance values. Test shall utilize a megohmmeter with applied voltage to be 1000VDC for one (1) minute. Insulation-resistance test shall be performed on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.

3.05 TYPE MI CABLE EXECUTION

A. EXAMINATION

1. Verify that the factory installed temporary end seals are intact.
2. Verify that no moisture has entered cable insulation.

B. STORAGE

1. Cables shall be shipped from the manufacturer with ends sealed against moisture.
2. Protect the exposed cable ends with shrinkable, molded polyolefin end caps or other suitable means such as standard conduit sealing compound and PVC tape.
3. Cable shall be stored in a clean dry location.

C. HANDLING

1. Cable shall be uncoiled by rolling or rotating supply reel.
2. Take precautions necessary to prevent damage to cable from contact with sharp objects, such as when pulled over foreign material on sheaves.

D. INSTALLATION

1. The wiring cable shall be installed according to the manufacturer’s recommendations, the instructions in the Installation Specification or Manual and the requirements of the UL Fire resistance Directory listing.

E. FIELD QUALITY CONTROL

1. Inspect cable for physical damage and proper connection.
2. Measure tightness of any bolted connections and compare torque measurements with manufacturer’s recommended values.
3. Verify continuity of each conductor.
4. Prior to energizing cables, measure insulation resistance of each cable. Tabulate and submit for approval.

5. Provide certification from cable manufacturer that installation is in accordance with their requirements.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NYCEC - New York City Electrical Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70 and NYCEC.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Ground clamps: OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG", or equal by STEEL CITY or APPLETON.

B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.

C. Rod Electrode: Copper, 3/4-inch diameter, 10 feet long.

D. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:

1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.
2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.
3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.
4. Install service entrance building ground as per NYCEC requirements.
5. Service entrance shall be bonded to street side of first flange or coupling of incoming main water line with heavy duty ground clamp. Bonding conductor to be sized in accordance with NYCEC.
6. Building steel shall be bonded to ground bus on main service with a conductor the same size as in B.1 below.
7. Install new service grounds and grounding systems for new service as per NYCEC requirements.

8. Generators shall have a dedicated grounding system for a separately derived system for switching neutrals.

B. Feeder/Branch Circuits:

1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NYCEC. Minimum size of conductor shall be No. 12 AWG.
2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

C. Transformers:

1. Transformers shall be grounded and grounding conductors and conduits sized in accordance with NYCEC.

3.02 TEST

A. Test ground on main service. Ground system resistance shall be no greater than 10 ohms using test equipment similar to a "Biddle" test. Test data to be submitted to the Engineer for approval and such approved test data to become a part of the Record Documents.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, safety switches, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NYCEC - New York City Electrical Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70 and NYCEC.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

A. Provide appropriate corrosion-resistant supporting devices and hangers for electrical equipment, as manufactured by ERICO PRODUCTS, INC., CADDY FASTENERS, STEEL CITY, MINERALLAC or equivalent.
   1. "Z" purlin clips.
   2. Conduit clips.
   3. Beam clamps (universal and vertical flange).
   4. Beam clamps (set screw type).
   5. Combination push-in conduit clips.
   6. Combination conduit hanger clamps.
   7. Flexible conduit clips.
   8. Special combination conduit clips.
   9. One hole steel straps.
   10. Conduit hangers.

B. Provide materials, sizes and types of anchors, fasteners and supports to carry the loads of equipment, wire in conduit and conduit.

2.02 CHANNEL SUPPORT SYSTEM

A. Channel systems and supports shall be manufactured by KINDORF/THOMAS & BETTS, or approved equal.

B. Channels shall be 1-1/2" x 1-1/2".

C. Channels and all associated accessories and bolts shall be hot dipped galvanized.

D. Channels shall have 9/16" bolt holes on 1-1/2" centers.

E. Provide end caps for all channels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secure conduits to within 3 feet of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed 10 feet in accordance with currently effective edition of the National Electric Code.

B. In seismic zones, support conduits 1 inch and smaller at 6 foot intervals.

C. Install clamps secured to structure for feeder and other conduits routed against structure. Use drop rods and hangers to support conduits run apart from the structure.

D. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.

E. Provide concrete anchors and associated accessories where indicated on drawings and where required to securely mount supporting devices and equipment to existing and new concrete structure.

F. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. Prepainted or galvanized support material is not required to be painted or repainted, unless cut to specific size in field in which case exposed edge(s) shall be painted.

G. Do not use chains, perforated iron, baling wire or tie wire for supporting conduit runs. Use of clips to support conduit to top of t-bar ceiling grid will not be permitted.

H. Obtain permission from Engineer before drilling or cutting structural members.

I. Install surface mounted cabinets and panelboards with a minimum of four anchors, or as recommended by equipment manufacturer.

J. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.

K. Install products in accordance with manufacturer's instructions.

END OF SECTION

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit system with associated couplings, connectors and fittings. Conduits to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
   1. Conduit Use - Rigid Galvanized Conduit:
      a. All interior circuits including concrete encased vertical riser for interior primary feeders.
   2. Conduit Use - PVC Sch. 40:
      a. For use within exterior concrete encased duct banks only.
   3. Conduit Use - Flexible Liquid-tight Metal Conduit:
      a. Connecting motors, generators and other equipment subject to vibration, maximum length - 3 feet.
      b. Passing through building expansion joints.

B. Device Boxes: Provide each fixture switch, receptacle and other wiring device with a box of appropriate size and depth for its particular location use unless indicated otherwise.

C. Pull boxes, junction boxes and wire troughs

1.02 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NFPA 70 - National Electric Code.

C. NYCEC - New York City Electrical Code.

D. NECA Standard of Installation.

E. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

F. NEMA TC 3 - PVC Fittings for use with Rigid PVC conduit and tubing.

G. ANSI/NEMA OS1 - Sheet-steel outlet boxes, device boxes, covers and box supports.

H. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Conduit routing and box locations:
   1. Submit for review and comment scaled working drawings showing proposed routing of all conduits, inclusive of conduits routed above and/or below grade on interior and/or exterior, and embedded in structural concrete. Drawings shall show locations of all pull and junction boxes and all penetrations in walls and floor slabs.
   2. Contractor shall not proceed with installation of any cable, conduit, raceway, boxes, etc. until written approval is received from Owner and Engineer.

C. Structural Design Calculations:
   1. Submit for review and comment construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed and sealed by a NYS Licensed Professional Engineer.

2. Perform structural design calculations for all conduit and boxes supported from existing and new structure. Submit proposed mounting and attachment methods signed and sealed by NYS Licensed Professional Engineer for review and approval.
3. Structural design calculations sealed by a P.E. registered in the State of New York. Design calculations for manholes shall include confirmation structures adequately resist flotation when they are totally empty and subjected to groundwater full height of structure.

1.04 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc.

B. Conform to requirements of ANSI/NFPA 70, NEC, NYCEC.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 017839.

B. Accurately record actual routing of all conduits.

1.06 FIELD SAMPLES

A. Provide under provisions of Section 014500.

B. Provide field sample of conduit two each at 2 feet in length.

C. Provide field sample of expansion/deflection fitting, two each.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products in accordance with manufacturers' recommendations.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.08 PROJECT CONDITIONS

A. Verify all conduit routings by field measurements.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes and fittings.

PART 2 - PRODUCTS

2.01 RIGID GALVANIZED CONDUIT

A. Rigid conduit shall be hot dipped, galvanized, or electro-galvanized steel by WHEATLAND, ALLIED, O-Z/GEDNEY or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., ALLIED, O.Z. GEDNEY CO., WHEATLAND, or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.

D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.

E. Sealing fitting locknuts shall be Series 142SL.

F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.

G. Entrance ells shall be Series 1491 or approved equal.

H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

2.02 EXPANSION AND DEFLECTION FITTINGS:

A. Expansion and deflection fittings shall be made up of non-corrodible parts and shall provide for ample longitudinal and lateral movement. A suitable bond shall provide a low resistance, continuous longitudinal path for ground currents.

B. Expansion and deflection fittings shall be watertight cast iron, malleable iron or hot dipped galvanized. Fittings shall be corrosion-resistant, UL listed and compatible with the conduit system.

C. Expansion /deflection fittings shall provide both expansion and deflection in a single fitting in accordance with the following:

1. Axial expansion or contraction up to 3/4-inch.
2. Angular misalignment up to 30 degrees.
3. Parallel misalignment up to 3/4-inch.

D. Expansion fittings shall provide expansion /contraction with eight inch total movement.

E. Expansion and deflection fittings shall be by Crouse Hinds, Appleton Electric or equal to be approved by the Engineer.

2.03 CONDUIT BUSHINGS:

A. Conduit bushings shall be insulated, grounding type with lay-in-lug connection. Two locknuts shall be provided for each bushing.

B. The conduit bushing and locknuts shall be steel, malleable iron or zinc. The bushing shall include a 90 degree C insulating surface.

C. Conduit bushings and locknuts shall be by 0-Z Gedney, Thomas and Betts or equal to be approved by the Engineer.

D.

2.04 PVC CONDUIT

A. PVC conduit shall be manufactured by ALLIED, CANTEX, CARLON or approved equal.

B. Description: NEMA TC 2; Schedule 40 PVC. For installation within concrete encased duct bank only.

C. Fittings and Conduit Bodies: NEMA TC3.

2.05 DUCT SEAL

A. Duct seal shall be a soft, fibrous non-hardening sealing compound for sealing between cables and conduits.

B. Duct seal shall be by O-Z Gedney, Ideal Industries or equal to be approved by the Engineer.

2.06 THRUWALL SEALS AND BUSHINGS:

A. Thruwall seals and bushings shall be in accordance with the following:

1. For conduits and cables in new construction and passing through exterior subsurface walls and exterior concrete walls, thruwall seals shall be used. Thruwall seals shall be Type WSK and WSCS manufactured by O-Z/Gedney or equal to be approved by the Engineer.
2. For conduits and cables in new construction and passing through concrete floors and floor slabs, floor seals shall be used. Floor seals shall be type SK and FSCS manufactured by O-Z/Gedney or equal to be approved by the Engineer.
3. For conduits passing through exterior block walls or installed in existing construction passing through exterior subsurface walls, exterior concrete walls, floor slabs and roof slabs for use in core bit-drilled holes sealing bushings shall be used. Sealing bushings shall be Type CSMI at the inside of the structure and Type CSMC at the outside of the structure, within the same core drilled hole. Sealing bushings shall be manufactured by O-Z/Gedney or equal to be approved by the Engineer.
4. For conduits passing through existing interior concrete walls or floors and interior block walls sealing bushings shall also be used. Sealing bushings shall be CSMC or CSMI type as manufactured by O-Z/Gedney or equal to be approved by the Engineer.
5. For conduits passing through fire rated floors and walls fire stop fittings shall be used. Fire stop fittings shall be CFS and/or CFSI type as manufactured by O-Z/ Gedney or equal to be approved by the Engineer.
6. For multiple conduit runs passing through interior or exterior and fire rated walls thru- wall barriers shall be used. Thru- wall barriers shall be TW series by Crouse-Hinds or equal to be approved by the Engineer.

2.07 FLEXIBLE LIQUID-TIGHT METAL CONDUITS AND FITTINGS

A. Liquid-tight flexible metal conduit shall be ANACONDA or approved equal.

B. Description: Interlocked steel construction with PVC jacket.

C. Provide flexible liquid-tight conduits and fittings as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO. or approved equal. Catalog numbers used below are those of the THOMAS & BETTS CORP., based on 3/4" size and are to be considered as standards by which equivalents are to be judged. All conduit shall be liquid-tight flexible type, UL type UA, or suitable for exposure to continuous or intermittent moisture.

D. Flexible liquid-tight connectors shall be Series 5333 or approved equal.

2.08 OUTLET AND DEVICE BOXES

A. Acceptable Manufacturers: Raco, O-Z/Gedney, Cooper, Appleton, or approved equal.

B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OSI, galvanized steel:

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Provide 1/2" male fixture stubs where required.

C. Concrete Ceiling Boxes: Concrete type.

D. Cast Boxes: All exposed surface mounted boxes shall be NEMA FB1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer.

2.09 ELECTRICAL MANHOLES

A. Manholes shall be pre-cast type of reinforced concrete.

B. Concrete for manholes shall be Class 40 concrete in accordance with related sections of these specifications. Manholes shall be constructed to withstand ground water pressure when completely submerged by rising water table.

C. Steel reinforcement shall be as shown on the details on the Contract Drawings and in accordance with related sections of these specifications.

D. Manholes shall have dimensions as shown on the Contract Drawings, as required by the current applicable edition of the National Electrical Code (NEC) and New York City Electrical Code (NYCEC), and shall be provided with all duct entrances sized and located to suit duct banks.

E. Concrete floor shall be sloped towards the drain sump at the center of each manhole.

F. All manhole hardware shall be hot dipped galvanized steel.

G. Minimum structural design loading for manholes shall be as indicated in ASTM C857, unless otherwise noted herein.

H. Walls of manholes shall be designed for a minimum vertical surcharge of 100 psf.

I. Manholes shall be designed to resist floatation when totally empty and subjected to groundwater full height of manhole.

J. Manholes shall be waterproofed using waterproofing membrance sealant: ConSeal or approved equal.

K. Manhole Covers:

1. Manholes shall be designed for H-20 traffic loading and be provided with H-20 Cast-Iron Watertight Traffic Load Cover. Covers shall be annealed, high quality, gray cast iron, free from blowholes, sandholes, scabs, fins, scales and other defects. They shall be uniform in form and dimensions, and shall be approved by the Engineer.
2. The frames of the covers shall be set so that the completed installation will provide a proper alignment of the outside covers with the roadeways or other surrounding areas. Manhole covers shall fit the frame without undue play.
3. The following words shall be cast in the top of all manhole covers "ELECTRIC POWER, MEDIUM VOLTAGE".

L. Cables Supports:

1. Manholes shall be furnished with cable racks, cable hooks, and insulators to effectively support all cables indicated for present and future installation. Cable racks shall be non-

metallic fiberglass channels with ample strength to support cables. Racks shall be firmly anchored to walls with stainless steel hardware. Cable hooks shall be made from stainless steel. Insulators shall be made of high-grade dry-process porcelain with smooth glazed surfaces and shall fit hooks in such manner as to prevent wobbling and insecure minimum movement.

M. Pulling Irons:

1. Stainless steel pulling irons shall be provided for each manhole. Pulling irons shall be cast in the wall opposite to the centerline of each incoming duct bank and 12 inches below centerline of bottom line of ducts.

N. Grounding:

1. Each manhole shall be provided with a grounding system. The grouding system shall consist of grounding rod and cable in accordance with the details shown on the Contract Drawings.
2. Ground rod and cable shall be in accordance with the requriements of specification 260526.

2.10 JUNCTION BOXES

A. Acceptable Manufacturers: RACO, THOMAS & BETTS, APPLETON, or approved equal.

B. Sheet metal boxes: NEMA OS1, galvanized steel.

C. Covers: Galvanized steel.

2.11 WIRE TROUGH

A. Wireways shall be manufactured by Square D, Class 526, rain tight trough or approved equal.

B. Wireway shall be completely enclosed with removable covers.

C. Construction: 16 Gauge Galvanized Steel. 8-inch and 12-inch wire trough shall be 14-gauge galvanized steel.

D. Finish: ANSI-49 epoxy paint applied by cathodic electro-deposition paint process over a corrosion resistant phosphate preparation.

E. UL listed.

2.12 EXTERIOR WIRE TROUGH

A. Wire troughs shall be manufactured by SQUARE D, COOPER B-LINE, HOFFMAN, or approved equal.

B. Wire troughs shall be completely enclosed with removable covers.

C. Construction: Wire trough shall be constructed of Type 304 stainless and shall have stainless steel screw clamps, and oil resistant gaskets.

D. All hardware, bolts, brackets, and supports shall be constructed of Type 304 stainless steel.

E. Wire troughs shall be rain tight for exterior applications.

2.13 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT THREAD COMPOUND

A. KOPR-SHIELD or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUITS

A. Minimum size of conduits shall be 3/4-inch.

B. Minimum below grade conduit depth shall be 24" below grade, measured to the top of the conduit on exterior underground installations.

C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.

D. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.

E. Make bends or offsets with standard ells or field bends with an approved bender.

F. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.

G. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.

H. Install conduit in accordance with NECA Standard of Installation.

I. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

J. Complete all conduit systems before pulling conductors.

K. Support conduits under provisions of Section 260529.

L. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.

M. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19, and any applicable NYCEC amendments.

N. Provide No. 12 AWG copper pull wires or nylon cord in all empty spare conduits. Steel wire not acceptable as pull wire.

O. Install conduit in a menner which preserves fire resistance rating of partitions and other elements.

P. Ground and bond conduit under provisions of Section 260526.

Q. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.

R. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated bullet hub, complete with recessed sealing "O" ring, shall be used, Series 370-379 . DO NOT use die cast material.

S. In concrete slabs block up conduit from forms and securely fasten in place. All conduits in slabs shall be installed below concrete slab.

T. Where conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint

to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

U. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

V. Arrange supports to prevent misalignment during wiring installation.

W. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers; unless otherwise noted on drawings and/or in specifications.

X. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

Y. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

Z. Do not attach conduit to ceiling support wires.

AA. Arrange conduit to maintain headroom and present neat appearance.

BB. Route exposed conduit parallel and perpendicular to walls.

CC. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

DD. Route conduit in and under slab from point-to-point.

EE. Do not cross conduits in slab.

FF. Maintain adequate clearance between conduit and piping.

GG. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F (40°C).

HH. Bring conduit to shoulder of fittings; fasten securely.

II. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.

JJ. Install no more than equivalent of three 90-degree bends on interior locations between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.

KK. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

LL. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

MM. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a Buna-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

NN. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.

OO. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.

PP. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.

QQ. Allow sufficient slack conduit to reduce the effect of vibration.

RR. Complete all conduit systems before pulling the conductors.

SS. Support in accordance with requirements of National Electric Code.

3.02 INSTALLATION OF BOXES

A. Install boxes concealed in finished walls, where applicable.

B. Locate boxes to prevent moisture from entering or accumulating within them.

C. Support boxes independently of conduit, as required by the National Electric Code.

D. Provide 4" x 1-1/2" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square ceiling outlet boxes.

E. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.

F. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed concealed in concrete block walls. For increased cubic capacity, provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gang-type outlet boxes only in drywall construction.

G. Provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge plaster rings for plastered walls for telephone outlets. Single gang device boxes are not acceptable.

H. Provide fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.

I. Provide condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

J. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.

K. Effectively close unused openings in boxes with metal plugs or plates.

L. Set boxes so that front edges are flush with finished surfaces.

M. Support boxes from structural members with approved braces.

N. Install blank device plates on outlet boxes left for future use.

O. Provide bushings in holes through which cords or conductors pass.

P. Install boxes so that the covers will be accessible at all times.

Q. Electrical boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearance between such boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than 16 square inches so as not to interfere with the wall rating.

3.03 INSTALLATION OF PULL BOXES, JUNCTION BOXES AND WIRE TROUGHS

A. Provide junction boxes as shown on Drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-inch square and 2-1/8-inches deep. Provide screw covers for junction boxes.

B. Install boxes in conduit runs wherever necessary to avoid long runs or too many bends. Do not exceed 100-foot runs without pull boxes. Install pull boxes at all 90-degree bends.

C. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.

D. Install boxes with covers in accessible locations. Size boxes in accordance with the National Electric Code and New York City Electrical Code.

E. Do not install pull boxes or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box, and permitted as per the cable manufacturer's installation instructions.

F. Coordinate installation of exterior pull boxes with General contractor to establish elevations of finished grades and pavements. All castings shall have chimney adjustment of + 6”.

3.04 CONDUIT LOCATIONS

A. Route all conduit concealed in walls or above finished ceilings in all finished spaces. Provide boxes and conduits concealed in walls for all power and controls in finished spaces.

B. Surface mounted conduits will only be allowed in unfinished spaces.

C. Contractor shall not route conduits over pump motors, roof hatches and trolly beams which would prevent removal of equipment, access to hatches, movement of trolly, etc.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Nameplates and labels.

B. Wire and cable markers.

C. Conduit markers.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

B. NYCEC - New York City Electrical Code.

1.03 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Provide catalog data for nameplates, labels and markers.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Underwriters Laboratories, Inc. Include instructions for storage, handling, protection, examination, preparation and installation of product.

D. Provide physical sample of each type of nameplate, label, marker, etc. that is to be provided in accordance with this specification for review and approval of Engineer and Owner.

E. Provide two laminated copies of final cable and conduit schedule for Building 127 at completion of project. One copy shall be permanently affixed to wall in locaiton selected by BNY, provided binding rings as required for multiple pages. The second copy shall be provided to BNY for their records.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70, NEC, and NYCEC.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background. Punched or drilled for screw mounting.

B. Locations:

1. Substations.
2. Switchgear and Switchboards.
3. Enclosed switches and circuit breakers.
4. Mimic panel and control panels.
5. Junction boxes, pull boxes, and electrical enclosures.
6. Distribution panelboards.

7. All control switches and pilot light devices.
8. Transfer Switches.

C. Letter Size:

1. Use 1/4 inch (6 mm) letters for identifying all control pilot lights.

2.02 WIRE MARKERS

A. Manufacturers:

1. 3M ELECTRICAL SPECIALTY DIV., Product Scotch Code.
2. THOMAS & BETTS CORP., Product E-Z Code.
3. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Epoxy film tape type wire markers.

C. Locations: Each conductor at each source and each load connection.

D. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings and cable & conduit schedule.
2. Control Circuits: Control wire number indicated on interconnection diagrams on drawings.

2.03 CONDUIT MARKERS

A. Manufacturers:

1. SETON SETMARK PIPE MARKERS
2. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: Snap around conduit markers.

C. Colors:

1. 600V or less: black letters on white background.
2. More than 600V: black letters on orange background.

D. Content:

1. 600V or less: Conduit name/number indicated on drawings and cable & conduit schedule.
2. More than 600V: Conduit name/number indicated on drawings and cable & conduit schedule plus separate label with warning reading "DANGER CONCEALED HIGH VOLTAGE WIRING".

E. Location: Furnish markers for each conduit longer than 6 feet (1.8 m).

F. Spacing: 20 feet (6 m) on center, minimum of one in each space that conduit passes through.

2.04 UNDERGROUND WARNING TAPE

A. Manufacturers:

1. THOMAS & BETTS CORP., Model NAF-0700.
2. Seton
3. Ideal
4. Substitutions shall be permitted only after receiving written approval from the Engineer.

B. Description: 6 inch (150 mm) wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

2.05 FLOOR MARKING TAPE

A. 2-inch wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.06 WARNING LABELS AND SIGNS

A. Comply with NYCEC, NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)." Modify working clearance based on applicable code sections.
3. Other warning labels required for arc-flash, multiple services, etc. Refer to applicable specification section(s) for additional detail.

PART 3 - EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

A. Install nameplate and label parallel to equipment lines.

B. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Secure nameplate to equipment front using screws, rivets or adhesive in accordance with manufacturer's instructions.

D. Apply conduit markers at 20 foot (6 m) intervals, minimum of one in each space that conduit passes through.

E. Identify underground conduits in duct bank(s) using underground warning tape. Install one tape per trench at 3 inches (75 mm) below finished grade or as identified on drawings.

3.03 ELECTRICAL EQUIPMENT IDENTIFICATION

A. The Contractor shall identify all existing circuits in existing distribution panels, switchboards and disconnect switches to remain.

B. Label all circuits identifying the load served including all individual circuit breakers in accordance with Cable & Conduit Schedule.
C. Label all new circuit breakers and switches used for new feeder and branch circuits.
D. Contractor shall furnish a minimum of 5 custom engrave three-layer laminated plastic labels with up to 20 words per label as directed by the engineer/owner in addition to the required labels.

END OF SECTION

SECTION 262400 - PANELBOARDS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Distribution panelboards.

B. Retrofit panelboards.

1.02 RELATED SECTIONS

A. Section 262915 - Motor Control Centers.

B. Section 260526 - Grounding and Bonding for Electrical Systems.

C. Section 260529 - Hangers and Supports for Electrical Systems.

D. Section 260553 - Identification for Electrical Systems.

1.03 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installation.

C. NEMA AB1 - Molded Case Circuit Breakers.

D. NEMA PB1 - Panelboards.

E. NEMA PB1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

F. NEMA ICS2 - Industrial Control Devices, Controllers and Assemblies.

G. NEMA KS1 - Enclosed Switches.

1.04 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. New Panelboards

1. Panelboards shall be manufactured by Siemens.
2. Approved equal.

2.02 PANELBOARD REQUIREMENTS

A. Provide panelboards of circuit breaker, dead-front safety type, UL labeled, and meeting all applicable requirements of the National Electrical Manufacturers Association.

B. Provide panelboards with lugs (both main lugs and branch circuit lugs) suitable and UL approved for both aluminum and copper conductors.

C. Provide electrically isolated neutral bars.

D. Provide separate ground bars complete with lugs or connectors on bar.

E. Provide key operated door and door lock. Door shall prevent access to operate circuit breakers.

F. Provide panelboards with sequence phased bus bars or distributed phase bussing for voltage and phase as indicated on drawings.

G. Refer to drawings for numbers of branch circuits, their ratings, number of poles, arrangements, etc.

H. Provide typed circuit directory cards.

I. Provide front filler plates for unused breaker knockouts.

J. Refer to drawings for Ratings and Features.

K. All bus bars, including ground bars shall be tin-plated copper.

L. All circuit breakers shall be bolt-on type.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Ground separate ground bars to panel boxes and to the main service entrance ground bus with a code-sized grounding conductor installed in the same conduit as the phase and neutral conductors under provisions of Section 260526.

B. Install all circuits using a common neutral bus bay in accordance with the National Electric Code. Balance all circuits to achieve not greater than 7% unbalanced neutral current in panel feeders.

C. Provide six circuit breaker handle lock-on devices for each lighting and miscellaneous power panelboard for installation by the contractor on circuits as directed by the Engineer to prevent unauthorized personnel from turning off circuits to controls, unit heaters, autodial alarm system, etc. Provide spare lock-on devices over to the Engineer.

D. Install panelboards in accordance with NEMA PB 1.1.

E. Install panelboards plumb.

F. Height: 6 feet (2 m) to top of panel board.

G. Provide typed circuit directory for each branch circuit panelboard. Handwritten circuit directory cards will not be accepted. Revise directory to reflect circuiting changes required to balance phase loads.

H. Provide a typed circuit directory in accordance with NEC sections 110.22 and 408.4. Circuits shall be labeled with detailed information describing the switches function and equipment location.

I. For all existing circuits terminated to a new panelboard, contractor shall trace out and update the circuit directory in accordance with NEC sections 110.22 and 408.4. Include all costs for this work in base bid.

J. Revise directory to reflect circuiting changes required to balance phase loads.

K. Provide engraved plastic nameplates under the provisions of Section 260553.

L. Panelboards shall be factory installed in the motor control center by the manufacturer of Motor Control Center where indicated on drawings.

3.02 FIELD QUALITY CONTROL

A. Maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

SECTION 262726 - WIRING DEVICES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Switches, receptacles, thermostats, device plates and other wiring devices as indicated on Drawings.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NYCEC - New York City Electrical Code.

C. NEMA WD1 - General Purpose Wiring Devices.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Include device locations in conduit routing and box location submittal.

C. Provide manufacturer's catalog information showing dimensions, colors and configuration.

1.04 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 SWITCHES

A. Manufacturers: HUBBELL, LEVITON, PASS & SEYMOUR.

B. Single pole, 20 amp, 120/277 VAC, NEMA WD-1, heavy duty, UL20.

C. Device Plate: Stainless steel.

2.02 RECEPTACLES

A. Manufacturers: HUBBELL, LEVITON, PASS & SEYMOUR.

B. 20 amp, 125 VAC, NEMA WD-1, heavy duty.

C. 20 amp, 125 VAC, NEMA WD-1, heavy duty, ground fault circuit interrupter.

D. Duplex type.

E. Device Plate: Stainless steel.

2.03 MANUAL MOTOR RATED THERMAL SWITCH

A. Acceptable Manufacturers: SQUARE D, Class 2510, Type KG1A, Type KG2C (3-pole, 600V) or approved equal.

B. Contractor shall coordinate voltage, phase and current rating with equipment.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mounting:
   1. Mount all switches 46-inches above finished floor to center line of switch unless noted otherwise.
   2. Mount all receptacles 18-inches above finished floor to center line of receptacle unless noted otherwise.
   3. Install switches with OFF position down.

B. Polarity: Properly wire all receptacles so that the hot wire, the neutral wire and the ground wire connect to the proper terminal on all receptacles.

C. Grounding: Install all devices in boxes specified under Section 260533 and install a No. 12 green ground wire from device grounding terminal to the outlet box in accordance with the National Electric Code.

D. Install device plates on switch, receptacle and blank outlets in full contact with wall surface.

E. Provide new SO cord for all chemical pumps and install plug end to match receptacle.

3.02 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

END OF SECTION

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Disconnect switches.
B. Fuses.
C. Enclosed Circuit Breakers.

1.02 REFERENCES

A. NEMA KS-1 - Enclosed Switches.
B. ANSI/UL 198C - High Intensity Capacity Fuses, Current Limiting Types.
C. ANSI/UL 198E - Class R Fuses.
D. FS W-S 865 - Switch, Box (Enclosed), Surface Mounted.
E. NEMA AB1 - Molded Case Circuit Breakers.
F. NYCEC - New York City Electrical Code.
G. ANSI/NFPA 70 - National Electric Code.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.
B. Include equipment locations in conduit routing and box location submittal.
C. Include outlet drawings with dimensions and equipment ratings for voltage, capacity, horsepower and short circuit current ratings.

1.04 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

A. Disconnect switches shall be GENERAL ELECTRIC, heavy-duty Type TH or approved equal.
B. 75ºC conductor ratings.
C. Ratings: 600VAC
D. Quick-break, quick-make, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
E. Suitable for use as service entrance equipment.
F. UL listed for Class R 200,000 RMS amps, symmetrical IC.
G. Class R fusing kit.

H. Enclosures: Refer to drawings.

2.02 FUSES

A. Fuses shall be Littlefuse KLNR Class RK1 or approved equal.

B. Fuses shall be rated for 600 volts AC.

C. Interrupting Rating: 200,000 RMS amps.

2.03 EXTRA MATERIALS

A. Provide one complete set based on number of poles of spare fuses for each fused disconnect switch. Provide to Owner.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Removed temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Provide switches/enclosed circuit breakers at locations as indicated on drawings.

D. Refer to disconnect switch schedule on drawings for ampacity ratings, fuse sizes, number of poles and enclosure ratings.

E. Install fuses in fusible devices.

F. Install engraved nameplates on each switch and enclosed circuit breaker identifying the following:

1. Switch designated.
2. Load served.
3. Power origination.
4. Fuse size as indicated on drawings.

3.02 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit breaker trip ranges.

END OF SECTION

SECTION 265000 - LIGHTING **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Interior and exterior luminaries and accessories.

B. Emergency lighting and units.

1.02 REFERENCES

A. NEMA WD 6 - Wiring Devices - Dimensional Requirements.

B. NFPA 70 - National Electric Code.

C. NYCEC - New York City Electrical Code.

D. NFPA 101 - Life Safety Code.

E. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products

F. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Shop Drawings: Indicate dimensions and components for each luminaire.

C. Product Data: Provide dimensions, ratings, performance data and installation instructions.

D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

E. All foot candle calculations and photometrics must be provided with substitute products. Photometrics shall include a room by room analysis showing walls, room names and room numbers. Calculation points shall be 2 feet on center, measured at 30" above the floor. Maintained foot candle levels shall meet or exceed IES recommended light levels for the type of space. On each drawing, provide a table showing the Room Name, Room Number, Maximum Light Level, Minimum Light Level, Average Light Level, Min:Max Ratio and, IES File Model Number, and IES recommended light level with specific references.

F. All substitute LED light fixtures and LED retrofit lighting kits must be Design Lights Consortium (DLC) qualified.

G. All substitute LED replacement lamps must be listed by Energy Star as Certified Light Bulbs.

1.04 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70 and NYCEC.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.05 EXTRA PRODUCTS

A. Section 017800 - Closeout Submittals.

B. LED Fixtures: At completion of installation, deliver to Owner.

1. Four (4) additional fixtures for each type specified listed on the light fixture schedule.

PART 2 - PRODUCTS

2.01 LIGHTING UNITS

A. Refer to LIGHTING FIXTURE SCHEDULE on drawings for fixture manufacturer, catalog number, and fixture description.

B. All fixtures equipped with emergency battery packs shall have label, test light, and switch accessible and visible from the room floor.

2.02 LIGHTING FIXTURE NOTES

A. MOUNTING: Electrical Contractor is responsible for reviewing all mounting arrangements prior to ordering any products. Electrical Contractor is responsible for ordering all of the proper fixtures, mounting hardware and miscellaneous fasteners to complete project. Fixtures to be secured to the structure from a minimum of two points, at opposing ends of the fixture when ceiling recessed or surface mounted. Four points shall be secured where necessary for the fixture to be parallel and tight to underside of ceiling. All recessed fixtures to fit tight to ceiling to eliminate all light leaks. Trim kits, when not secured internally to fixture, shall be secured to structure at a minimum of two points.

B. MOUNTING: Prior to submitting and ordering any light fixture, Contractor is responsible for verifying adequate mounting clearances for all light fixtures that are to be recessed into a grid type ceiling. Where new ceilings are to be installed, contractor shall coordinate with ceiling installers for exact mounting heights and required mounting spaces.

C. FINISHES: All exposed portions (permanent or adjustable) of fixtures to be finished by the manufacturer in a finish as specified.

D. Fixtures shall come pre-assembled and complete with all sockets (incandescent to be spring supported), lamp ends, ballasts, transformers, fixture ends, trim rings, plates, and low density mounting kits (as required) for a complete installation.

E. LAMPS: SYLVANIA, PHILLIPS or GENERAL ELECTRIC, as selected by the Electrical Contractor. Note, all lamps for one project to be furnished by the same manufacturer unless otherwise specified. At the end of the project, the Electrical Contractor shall turn over to the Owner one lamp envelope from each type installed. The Contractor shall be responsible for replacing all lamps which burn out during construction and up to ninety (90) days after Owner occupancy of the building.

F. VOLTAGE: As noted on the LIGHTING FIXTURE SCHEDULE. Contractor is responsible for field verifying available voltage(s) and ordering fixtures, ballasts, and transformers accordingly.

G. ORDERING: It is solely the responsibility of the Contractor to order fixtures, lamps, mounting brackets and accessories so that the fixtures will be installed and operating upon Owner

Occupancy opening. Contractor is responsible for all delays because of his/her lack of effort to order the products in a timely manner.

H. SHIPPING: The light fixture manufacturer shall mark the fixture type as indicated on the contract drawings and/or shop drawings on the respective carton when shipping luminaries. The Contractor shall be responsible for checking each carton immediately upon receipt for verification that fixtures are undamaged and no contents are missing. All discrepancies must be reported to shipper and manufacturer immediately; otherwise the Contractor shall be responsible for items which are lacking or damaged.

2.03 WARRANTY

A. All light fixtures shall have a 5-year manufacturer’s warranty. Warranty shall begin on date of substantial completion.

2.04 SUBSTITUTIONS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install fixtures in accordance with manufacturer's instructions.

B. Mount fixtures in locations as shown on drawings and as called for in schedule on electrical drawings. Determine type of ceiling to be installed in each space from drawings and schedules and furnish fixtures suitable for the exact type.

C. Joints in fixture wiring shall be made using wire nuts, pre-insulated Scotch locks, or other approved mechanical means of connection.

D. Adjustable type fixtures shall be adjusted by the Contractor to illuminate intended area to satisfaction of the Engineer.

E. Surface fixtures in or on plastered or drywall ceilings shall be supported from pieces of support channel spanning across main support channels and shall not depend on ceilings for support.

F. Coordinate fixture locations to clear diffusers, ductwork, piping, etc.

G. Maintain integrity of enclosures on all enclosed and gasketed fixtures. Minimize number of enclosure penetrations and make such penetrations water and dust tight with appropriate gasketing and fittings.

H. Fixtures are to fit tight against construction to eliminate light leaks.

I. Recessed downlights are to be provided with adjustable mounting bars/frames for drywall or lay-in ceilings as required. Fixtures shall be securely fastened to the ceiling framing member by mechanical means such as bolts, screws, rivets, or listed clips identified for use with the type of ceiling framing members and fixtures.

J. Support recessed fixtures 2 foot x 2 foot and larger using a minimum of four independent wire hangers, one on each corner, of same gauge as ceiling suspension system supported from

building structure independent of ceiling framing. Install earthquake clips to secure recessed grid-suspended luminaries in place.

K. Wall-mounted fixtures shall be mounted plumb with building lines and installed with proper box and cover hardware.

L. Surface-mounted fixtures are to cover mounting hardware. Use a canopy that is no longer than the length and width of the fixture and at a height that is no higher than required to mount the fixture absolutely vertical. Fixtures shall be plumb and shall align with building lines and with each other. Support surface mounted luminaries on grid ceiling directly from building structure. Secure to prevent movement.

M. Stem-mounted fixtures are to be mounted to be absolutely vertical or horizontal. Install suspended luminaries using pendants supported from swivel hangers or in accordance with details shown in drawings. Provide pendant length required to suspend luminaire at indicated height. Support stem-mounted fixtures directly from the building structure.

N. Install recessed luminaries using accessories and firestopping materials to meet regulatory requirements for fire rating. In fire rated ceilings, recessed luminaries must carry one-hour UL fire rating classification.

O. Install all accessories specified with each fixture. Install recessed luminaries to permit removal from below.

P. Bond products and metal accessories to branch circuit equipment grounding conductor.

Q. At completion of installation and before turning over to owner, clean and remove all dirt and smudges from all lighting fixtures including lenses, louvers and reflectors.

R. Relamp luminaries that have failed at completion of project.

END OF SECTION

SECTION 316615 - HELICAL FOUNDATION PILES **H2M**

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Helical piles and appurtenances for support of building foundations and valve vaults.

1.02 SUBMITTALS

A. Submit under provisions of DASNY General Requirements.

B. Product Data: Provide data on helical piles and appurtenances including washers and nuts.

C. Shop Drawings: Indicate profiles, sizes, spacing and locations of helical piles, attachments, fasteners, connections, and rated loads. Design service life shall be 50 years. Provide erection and fabrication drawings. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths. Shop drawings and erection drawings shall bear the seal and signature and a Licensed Professional Engineer registered in the State of New York.

D. Written Installation Record (field log) of each helical pile prepared by a Special Inspector under the supervision of a Professional Engineer registered in the State of New York. The pile log shall bear the seal and signature and a Licensed Professional Engineer registered in the State of New York. These records shall include:

1. Project name and location.
2. Name of contractor’s foreman or representative who witnessed the installation.
3. Date and time of installation.
4. Location and reference number of each pile.
5. Description of lead section and extensions installed.
6. Overall depth of installation referenced from bottom of foundation.
7. Torque reading for the last three (3) feet of installation, if practical. In lieu of this requirement, the terminal torque shall be recorded as a minimum.
8. Any other information relating to the installation.

E. Welder’s Certificates: Submit certificates certifying that welders employed on the work have met AWS qualifications within the previous 12 months.

F. Submit copies of calibration reports for each torque indicator or torque motor, and all load test equipment to be used on the project. The calibration tests shall have been performed within forty-five (45) working days of the date submitted. Helical Pile installation and testing shall not proceed until the Owner has received the calibration reports. These calibration reports shall include, but are not limited to, the following information:

1. Name of project and Contractor
2. Name of testing agency
3. Identification (serial number) of device calibrated
4. Description of calibrated testing equipment
5. Date of calibration
6. Calibration data

G. As-built Drawings: Submit for record purposes as-built drawings signed and sealed by a licensed professional engineer in New York. Indicate profiles, sizes, and locations of piles, attachments, fasteners, connections and rated loads.

H. Manufacturer's Certificates: Certify that products meet or exceed specified requirements.

1.03 QUALIFICATIONS

A. Fabricator: Company specializing in performing the work of this section with minimum 5 years documented experience.

B. Installer: Company specializing in performing the work of this section with minimum 3 years documented experience.

C. Design connections, not detailed on the drawings, shall be prepared under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of New York.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under the provisions of this Section.

B. Schedule deliveries of materials to the site at intervals, which will ensure uninterrupted progress of the work.

C. Do not store or handle materials in a manner that will damage or distort materials or supporting structures.

D. Do not store materials directly on the ground.

E. Store materials in a manner that will permit easy access for inspection and identification.

1.05 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on the plans and approved shop drawings.

B. The Contractor is responsible for the proper location and elevations of the work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Helical Piles: Shall be designed to support the nominal compressive load as shown on the plans. The overall length, helix configuration and minimum effective torsional resistance of a helical pile shall be such that the required geotechnical capacity is developed by the helix plate(s) in an appropriate bearing stratum.

1. Helical piles, extensions and appurtenances shall be hot-dip galvanized steel in accordance with ASTM-A153.
2. Shaft: Solid steel square up to 2-1/4 inches or hollow shaft round.
3. The helical pile shafts and plates shall receive a hot-dip galvanized steel coating to protect against corrosive elements in the soil.

B. Grout Sleeve: a 5-inch diameter uncased flowable grout sleeve shall be placed around the pile shaft to protect against lateral buckling and provide additional protection against corrosion.
   1. Cement shall be Portland Type I or II conforming to ASTM C150, pre-packaged non-shrink grout. Minimum compressive strength at 28 days shall be 3000 psi.

C. Structural Steel Members: ASTM A36.

D. Welding Materials AWS D1.1: type required for materials being welded.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work of this Section.

B. Beginning of installation means installer accepts existing conditions.

3.02 INSTALLATION

A. All helical piles should be installed as shown on the approved shop drawing. All changes in pile location shall be approved by the Contractor's engineer prior to installation.

B. The Contractor shall obtain the services of a licensed Professional Engineer registered in the State of New York to supervise all helical pile operations. The supervisory engineer shall keep a complete record (log) of the pile installation operation.

C. Helical piles shall be installed to a minimum torque of 5000 ft. lbs. subject to the following provisions:
   1. If the minimum torque requirement has not been satisfied at the minimum depth level, the Contractor shall have the following options:
      a. Install the pile deeper using additional extensions until the specified torque level is obtained.
      b. Remove the existing pile and install a pile with larger and/or more helices. The revised pile shall be installed beyond the termination depth of the original pile, as directed by the engineer.
      c. Add additional piles as recommended by the Engineer.
      d. Prior to the installation of the new helical piles, contractor shall perform existing conditions survey to document existing cracks in flooring, foundation, brick facade, etc. and identify any potential impacts.
   2. If the maximum torque rating of the pile and/or installing unit has been reached prior to satisfying the minimum depth requirement, the Contractor shall have the option to:
      a. Increase the terminal torque to a maximum of 10,000 ft. lbs.
         or
      b. After consulting with the Engineer of record, the Contractor may reduce the size of the helix as required to achieve the minimum depth while still achieving the minimum torque.
   3. Installation equipment shall have clockwise and counter-clockwise rotation capabilities and be capable of applying adequate down pressure and torque simultaneously to suit project soil conditions and load requirements.

D. If underground obstructions are encountered during installation, the Contractor shall have the option of removing the obstruction if possible or relocating the pile with the Engineer’s approval the later option may require the relocation of adjacent piles.

E. The helical pile shall be connected to the structure using a PTS approved steel bracket or slab-supporting channel as shown on the Engineer's Plan. These connection devices shall be capable of safely transferring the structural loads to the helical pile.

F. Helical Pile Installation shall comply with the Building Code of New York City as well as NYC Building Code Bulletin 2014-20.

3.03 FIELD QUALITY CONTROL

A. Field supervision by a Licensed Professional Engineer registered in the State of New York shall be provided by the Contractor. The cost for the supervision will not be eligible under the cash allowance for testing.

B. Field inspection will be performed under provisions of this Section.

C. Helical pile plumbness shall be within 2 degrees of design alignment.

D. Top elevation of helical pile shall be within +1 inch to -2 inches of design vertical elevation.

END OF SECTION

APPENDIX - A

Geotechnical Engineering Report

BNYDC - Design Services for Boilers, Substations, and Isolated Electrical Work

Brooklyn, New York

PREPARED FOR:

H2M Architects + Engineers
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PREPARED BY:

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February 7, 2020
MFS Project No. 1119060

Geotechnical Engineering Report

BNYDC - Design Services for Boilers, Substations, and Isolated Electrical Work

Brooklyn, New York

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February 7, 2020
MFS Project No. 1119060

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INTRODUCTION

This report presents the results of the MFS Consulting Engineers and Surveyor, DPC (MFS) geotechnical engineering study for the Brooklyn Navy Yard Development Corporation (BNYDC) Design Services for Boilers, Substations, and Isolated Electrical Work Project in the borough of Brooklyn, New York. The purpose of this study is to investigate the subsurface conditions at the project site and develop recommendations for the design and construction of restoration and flood mitigation measures at the Brooklyn Navy Yard. Our study includes a review of available information, a subsurface investigation, an engineering evaluation, and recommendations for the proposed restoration and mitigation efforts. A summary of our findings and recommendations are presented herein.

Work included in this study was performed in general accordance with the executed Sub Consultant Services Work Letter between MFS and H2M architects + engineers (H2M) for H2M Project Numbers.: BNYD 1901, 1902, 1904, 1905, and 1907 dated 21 October 2019 and executed on 23 October 2019. All elevations referenced herein are in units of U.S. survey feet and reference the North American Vertical Datum of 1988 (NAVD88).

PROPOSED DEVELOPMENT

The Brooklyn Navy Yard is located on Block 2023, Lot 1 in the borough of Brooklyn, New York as identified on the New York City tax maps. The specific buildings at the Brooklyn Navy Yard that are the subject of this report are presented on the "USGS Topographic Site Location Map" in Figure 1 and are identified as buildings 41A, 62, 234, 293, and 386.

The entire Brooklyn Navy Yard consists of six (6) dry docks, five (5) piers with several inclusive berths, and 55 buildings for which the BNYDC is responsible. The BNYDC is also responsible for operating, maintaining, and repairing all of the electrical substations, distribution centers, feeder lines, and associated equipment leading into the utility rooms. During Hurricane Sandy, floodwater levels averaged four (4) feet above grade throughout the Brooklyn Navy Yard and saltwater caused extensive damage to electrical components.

It is our understanding that the project consists of activities to repair damage from Hurricane Sandy and mitigate against future flood-related losses at utility substations and boilers in the Brooklyn Navy Yard. Specifically, the focus of this project involves work on five (5) buildings at the Brooklyn Navy Yards, denoted as Buildings 41A, 62, 234, 293, and 386. It is our understanding that flood mitigation strategies at each of the subject buildings will consist of raising existing roofs to accommodate elevated equipment, building platforms within each building footprint to bring the electrical equipment or boilers above the design flood elevation, and/or construction of flood walls to limit the flood loads on the existing structures. In order to support structures as part of the flood mitigation strategies, new or modified/reinforced foundations are proposed.

The specific scope of work that is the subject of this report are described in six (6) FEMA Public Assistance PA Project Worksheets (PWs): PWs 4307, 4273, 4275, 3820, 4388, and 4270.

SUBSURFACE INVESTIGATION

MFS 2019 BORINGS

MFS completed a subsurface investigation consisting of seven (7) geotechnical borings. Each of the borings were completed in the vicinity of the existing buildings that are the subject of this report. Each boring is designated by the building number corresponding to each respective boring location. The seven (7) borings completed are denoted as B-41A-1, B-41A-2, B-62-1, B-234-1, B-293-1, B-386-1, and B-386-2. Note that borings B-41A-1, B-234-1, and B-386-1 were completed in multiple boreholes due to encountering obstructions in the subsurface including utilities, pipes, railroad tracks, and debris. Re-attempted borings are denoted as "(A)" for the first attempt, "(B)" for the second attempt, and "(C)" for the third attempt. The as-drilled boring locations are shown on the "As-Drilled Boring and As-Dug Test Pit Location Plans" presented in Figure 2 with dimensions provided from existing fixed site features. In addition to the borings, available information from the regional geology described below was used to assist in our investigation.

Each of the seven (7) borings were drilled by Craig Geotechnical Drilling, Inc. from 13 December 2019 to 26 December 2019 under the full-time special inspection of MFS. A truck mounted CME-75 drill rig was used to advance each boring at the project site. Each boring was hand cleared using a hand auger to a depth of 6 feet below grade and sampled thereafter via Standard Penetration Testing (SPT)[1]. Grab samples were collected during the hand auger process for classification and testing purposes. Following hand clearing, all borings were sampled via SPT continuously in the upper 12 feet below grade and at five (5) foot intervals thereafter until each respective boring termination depth. Each of the borings were advanced using a 4-inch inner diameter steel casing and the mud rotary drilling technique. Where cohesive materials were encountered, Shelby tube (undisturbed) samples were obtained in general accordance with ASTM D1587. Bedrock was not encountered or sampled during the field investigation. Upon completion of each boring, the borehole was backfilled with the soil cuttings and hole plug and the surface grade was patched to match existing conditions.

Recovered soil samples were visually examined and classified in the field in accordance with the Unified Soil Classification System (USCS) and the New York City Building Code (NYCBC). Soil classifications, standard penetration resistances, action of the drill rig, and other observations during drilling operations were recorded in the field boring logs. The boring logs were compiled using gINT geotechnical engineering software and are provided in Appendix A.

MFS 2019 TEST PITS

MFS completed a subsurface investigation consisting of five (5) test pits. Each of the test pits were conducted adjacent to the existing buildings that are the subject of this report. Each test pit is designated by the building number corresponding to each respective test pit location. The five (5) test pits completed are denoted as TP-41A-1, TP-41A-2, TP-62-1, TP-293-1, and TP-386-1. The as-dug test pit locations are shown on the "As-Drilled Boring and As-Dug Test

[1]The Standard Penetration Test is a measure of the soil density and consistency. The SPT N-value is defined as the number of blows required to drive a 2-inch outside diameter split-barrel sampler 12 inches, after an initial penetration of 6 inches, using a 140-pound hammer free falling from a height of 30 inches in general accordance with ASTM D1586.

Pit Location Plans" presented in Figure 2. Each of the test pits were hand excavated, backfilled, and restored by MFS Construction, LLC from 2 December 2019 to 6 December 2019 under the full-time controlled special inspection of MFS. Where encountered, concrete surfaces were demolished using a Stihl MS-420 cut-saw and a Bosch Brute electric jackhammer. Subsequently, shovels and hand augers were used to hand excavate each of the test pits to their respective termination depths.

Throughout the duration of the field test pit operations, the MFS engineer visually examined and classified the soil encountered in accordance with the USCS and the NYCBC. In addition, the conditions and extents of the existing foundations were observed and documented, as well as other notable features including utilities and concrete slab reinforcement, where encountered. The subsurface conditions, results of the investigation, test pit plan and elevation sketches, and other observations during the test pit operations are shown in the "Test Pit Plan and Sections" presented in Appendix B. Photographs taken during the test pit operations and upon completion/site restoration are provided in Appendix C.

GEOTECHNICAL LABORATORY TESTING

All samples obtained during the 2019 MFS Subsurface Investigation were brought back to our office for further evaluation and selection of samples for geotechnical laboratory testing. Soil classifications were verified by a senior level geotechnical engineer and select soil samples were sent to a certified geotechnical testing laboratory for further testing. The purpose of the testing is to confirm the visual classifications and define several of the relevant material properties for use in the evaluation and design of the restoration and flood mitigation measures on site.

Selected soil samples were tested by our certified geotechnical laboratory, RSA Geolab, LLC, to determine their physical and engineering properties and to aid in our analysis and material evaluation. The testing on soil samples in this investigation includes moisture content (ASTM D2216), sieve and hydrometer analyses (ASTM D422), Atterberg limits (ASTM D4318), organic content (ASTM D2974), bulk unit weight (ASTM 7263), and unconsolidated undrained triaxial testing (ASTM D2850). The geotechnical laboratory testing results are provided in Appendix D.

SUBSURFACE CONDITIONS

PHYSIOGRAPHY AND HISTORIC CONDITIONS

The project site is located along the boundary of two (2) physiographic provinces; the Manhattan Prong and the Atlantic Coastal Plain. These physiographic provinces share an irregular border that trends southwest-northeast from southern Staten Island to the Long Island Sound and follows the alignment of the East River. The Atlantic Coastal Plain Province consists of the terminal moraines and the associated outwash deposits beyond the terminus of a large ice sheet that covered a majority of the northern United States approximately 18,000 years ago. The entire province has very low relief of approximately 400 feet and the moraine consists of irregular deposits of sand, compact till, and stratified drift, with scattered large boulders from local and upstream sources. The Manhattan Prong consists of a belt of worn-down complex mountains reduced to a plain lying between the Atlantic Coastal Plain and the Hudson Highlands. It includes the northern portion of Staten Island, all of Manhattan

Island, a small portion of western Long Island, and most of Westchester County. The ridges and valleys trend north-northeast and south-southwest and are composed of heavily metamorphosed crystalline rock such as gneiss, marble, schist, and granodiorite. Topography in the Manhattan Prong is predominantly controlled by bedrock with superimposed glacial, alluvial, and swamp deposits. Based on our review of available geologic resources, bedrock at the project site is anticipated at approximately 100 to 150 feet below grade, however deepened borings were not completed during the 2019 MFS Subsurface Investigation to confirm the presence and depth of bedrock.

Historic USGS topographic maps of the project site are shown in Figures 1.1 and 1.2 from 1947 and 1956, respectively. It is observed from the 1947 USGS topographic map that the existing location of Buildings 293 and 386 at the Brooklyn Navy Yard was once marshland and water at the extent of the old piers within the navy yard basin. Between 1947 and 1956, it is assumed that the area was infilled, new piers were constructed to further extend out into Wallabout Channel, and Buildings 293 and 386 appear to have been constructed. Based on the historic topographic maps and the results of the MFS 2019 Subsurface Investigation, the overburden at the existing Brooklyn Navy Yards consists of made land, or fill that was used to fill in the Wallabout Channel and associated marshland underlain by glacial deposits. The greatest extent of fill was identified in the borings completed at buildings 293 and 386. The fill strata was less extensive at the other buildings investigated which is expected based on the historic topographic maps.

MFS 2019 BORINGS

The following is a description of each strata in the order that it was encountered below grade within the borings conducted at the project site.

Surface Course

Asphalt was encountered at existing site grade in borings B-41A-1, B-41A-2, B-293-1, B-386-1, and B-386-2. The thickness of the asphalt ranged between 3 inches in boring B-41A-2(B) and 12 inches in boring B-386-2. Concrete was encountered at existing site grade in boring B-62-1 and B-234-1 and below the top asphalt layer in boring B-41A-2. The concrete ranged in thickness between 5 inches in boring B-234-1 and 12 inches in boring B-62-1.

Fill (Class 7)

Fill comprised primarily of brown, grey, and black sand with varying amounts of silt, gravel, clay, and organics was the uppermost strata encountered in each of the borings below the surface course. The fill also contained varying amounts of miscellaneous debris including brick, wood, security glass, shell, and metal fragments. The fill layer was observed to range between approximately 15 to 47.7 feet thick. Note that the greatest extent of fill was identified in borings B-293-1, B-386-1, and B-386-2, which is expected based on the historic USGS topographic maps presented in Figures 1.1 and 1.2. In borings B-293-1, B-386-1, and B-386-2, the fill layer was identified from elevations EL. +5.1± to -43.1± at the project site. A less extensive fill strata was identified on the remaining borings which ranged from 15 feet to 27.2 feet in thickness. The fill strata on the remaining borings was identified from elevations EL. +7.6± to -22.8± at the project site. The relative density for the fill layer was very loose to very dense based on SPT N-values ranging between 1 blow per foot to refusal and an average value

of approximately 9 blows per foot excluding the refusals. Note that the refusals are anticipated to be obstructions located within the fill layer and are not representative of the actual soil relative density.

Clay/Organic Clay (Class 4 and Class 6)

Black, brown, dark grey, and grey clay and organic clay with varying amounts of sand, gravel, and silt was encountered in each boring except borings B-386-1 and B-386-2. The clay layer was identified directly below the fill layer in borings B-41A-1 and B-62-1 corresponding to EL. -11.3± and EL. -7.4±, respectively, and directly beneath the silt layer in borings B-41A-2, B-234-1, and B- 293-1 corresponding to EL. -32.8±, EL. -42.0±, and EL. -57.1±, respectively. The thickness of the clay layer was noted to range between approximately 3.4 feet and 14.5 feet. The relative density for the clay layer was very soft to medium stiff based on SPT N-values ranging between weight of hammer (WOH) to 8 blows per foot and an average value of approximately 3 blows per foot.

Sand (Class 6 and Class 3)

Brown, light brown, tan, black, and grey sand with varying amounts of silt, gravel, clay, and organics was encountered in each of the borings. The sand layer was identified directly below the organic clay and silt, and encountered again at the termination depth of borings B-41A-1, B-62-1 and B-234-1. An additional sand layer was encountered interlayered between the silt and clay layers in boring B-62-1. In borings B-41-2, B-293-1, and B-386-1, sand was encountered directly below the top fill layer and at termination depth of the borings. In addition, a sand layer was interbedded between the silt layers in boring B-293-1 and interbedded between the gravel and silt layers in boring B-386-1. In boring B-386-2, sand was encountered between a gravel and silt strata near the boring termination depth. The sand layers were observed to range between approximately 0.8 feet to 17.5 feet thick. The sand strata was identified at elevations ranging from EL. -20.3± to the termination depth of each boring except B-386-2. The relative density for the sand layer was loose to dense based on SPT N-values ranging between 6 blows per foot to 64 blows per foot and an average value of approximately 20 blows per foot.

Silt/Organic Silt (Class 5 and Class 6)

Light brown, brown, grey, tan, and olive silt and organic silt with varying amounts of sand, clay and gravel was encountered in borings B-41A-1, B-41A-2, B-62-1, B-234-1, B-293-1, and B-386-1 interlayered with the sand and clay layers. In boring B-386-2, silt was encountered from EL. -52.5 to the boring termination depth corresponding to EL. -54.2±. An additional organic silt and silt layer was encountered in boring B-234-1 directly below the fill layer from elevation EL. -12.0± to EL. -26.5±. The thickness of the silt layer was noted to range between approximately 0.8 feet and 24 feet. The relative density for the silt layer was very soft to hard based on SPT N-values ranging from WOH to 64 blows per foot and an average value of approximately 13 blows per foot.

Gravel (Class 2 and Class 6)

Brown and grey coarse to fine gravel with varying amounts of sand and clay was identified below the fill layer in boring B-386-2. The gravel strata was identified from elevations EL. -37.7± to EL. -51.7±. The relative density for the gravel layer was loose to dense based on SPT

N-values ranging from 8 blows per foot to 40 blows per foot and an average value of approximately 24 blows per foot.

MFS 2019 TEST PITS

The following is a detailed description of the subsurface conditions encountered in each test pit conducted as part of the 2019 MFS subsurface investigation. Note that blow counts were not obtained during test pit operations and therefore NYCBC Soil Classes have not been assigned to the soil layers with the exception of NYCBC Class 7 fill.

Test Pit TP-41A-1

Test Pit TP-41A-1 was excavated at the exterior northwestern corner of Building 41, directly southwest of Building 41A. The test pit had approximate plan dimensions of 3 feet by 4.25 feet and was excavated to a depth of approximately 6.92 feet below existing site grade at the deepest depth. The footing was encountered below the concrete bearing wall of Building 41 and sloped away from the wall at an approximate slope of 1:6 Horizontal:Vertical (H:V). The bottom of the footing was not encountered as it was beyond the extents of the test pit. A 5-inch ductile iron pipe was identified approximately 3.2 feet below existing grade and ran parallel to the wall and concrete footing.

The existing surface grade consisted of a concrete sidewalk with a thickness ranging between 7.5 inches and 11 inches. Below the concrete sidewalk, the upper soil layer in test pit TP-41A-1 consisted of NYCBC Class 7 fill comprised of brown/light brown fine to coarse sand, some fine to coarse gravel, little silt, and debris including brick, concrete, and metal fragments from below existing surface course to 5.3 feet below existing grade. At the groundwater table (5.3 feet below existing grade), the subsurface conditions changed to poorly graded sands consisting of brown/grey fine to coarse sand, little fine to coarse gravel, and trace silt and extended to the termination depth of the test pit.

Test Pit TP-41A-2

Test Pit TP-41A-2 was excavated at the exterior face of the southeastern wall of Building 22, directly north of Building 41A. The test pit had approximate plan dimensions of 3 feet by 4.17 feet and was excavated to a depth of approximately 5.25 feet below existing site grade. The existing surface grade consisted of concrete sidewalk identified at EL. +5.83± with a thickness of 5.5 inches. The concrete footing was identified directly below the concrete sidewalk offset approximately 1.3 feet from the exterior wall of Building 22 and sloped away from the wall at an approximate slope of 1.75:6 H:V. The bottom of the concrete footing was not identified as the footing extended deeper than the extent of the test pit. A 14-inch ductile iron pipe was identified 3.5 feet below existing grade and ran parallel to the wall and concrete footing.

The soil strata encountered in test pit TP-41A-2 was NYCBC Class 7 fill consisting of brown fine to coarse sand, some coarse to fine gravel, little silt, and debris materials including brick, glass, asphalt, concrete, and metal fragments.

Test Pit TP-62-1

Test Pit TP-62-1 was excavated at the exterior face of the southeastern wall of Building 62 and the exterior face of the northeastern wall of the concrete masonry unit (CMU) boiler room that abuts Building 62. The test pit had approximate plan dimensions of 4 feet by 2.92 feet

and was excavated to a depth of approximately 3.5 feet below existing site grade at EL. +5.42±. The top of the footing for the southeast bearing wall of Building 62 was identified approximately 0.6 feet below existing grade corresponding to EL. +8.34± and the bottom of the footing was identified 3.25 feet below grade corresponding to EL. +5.67±. The boiler room appeared to be founded on a one (1) foot thick concrete slab-on-grade. A 3.5-inch ductile iron pipe was identified 2 feet below existing grade and ran parallel to and offset approximately 2.54 feet from the exterior wall of Building 62.

The existing surface grade was encountered at EL. +8.92± and consisted of 9-inch thick concrete sidewalk. A 4-inch thick layer of pea gravel was identified below the slab-on-grade for the boiler room. The subsurface conditions in test pit TP-62-1 consisted of NYCBC Class 7 fill comprised of brown fine to medium sand, some coarse to fine gravel, little silt, and brick and mica fragments. In addition, cobbles were identified within the subsurface.

Test Pit TP-293-1

Test Pit TP-293-1 was excavated at the north interior corner of the electrical room of Building 293. The electrical room is located along the southwest wall of Building 293. The test pit had approximate plan dimensions of 5.17 feet by 2.38 feet and was excavated to a depth of approximately 3.25 feet below existing site grade to EL. +3.69±. No footing was identified below the northwest CMU wall of the electrical room. A CMU wall located 1.25 feet below the top of the existing electrical room slab supported by a strip footing was identified and ran parallel to the northwest wall of the electrical room. The extents and bottom of the strip footing was not identified within the test pit at the test pit completion depth.

The existing concrete slab varied in thickness throughout the extents of the test pit. The concrete slab from the northwest wall of the electrical room to an offset 1.83 feet from the wall consisted of a 10-inch thick concrete slab with welded wire reinforcement and #7 reinforcing steel encountered within. The concrete slab offset 1.83 feet to 3.45 feet from the northwest wall of the electric room has a thickness of 15 inches with welded wire reinforcement and #4 reinforcing steel. The remaining slab encountered comprised of a 12-inch thick concrete slab underlain by 5 inches of asphalt and 9 inches of subbase consisting of grey gravel and sand. The 12-inch concrete slab contained welded wire reinforcement and #4 reinforcing steel. Where welded wire reinforcing steel was identified, the reinforcement was 6 inches below the top of the slab and had a center to center spacing of 6 inches in both directions. Where #4 reinforcing steel was identified, the reinforcement was 10 inches below the top of the slab and had a center to center spacing of 10 inches in both directions. Where #7 reinforcing steel was identified, the reinforcement was 3 inches below the top of slab and had a center to center spacing of 12 inches in the one direction observed. A C4X7.25 steel channel and flat bar was observed embedded within the concrete slab. The soil strata encountered in test pit TP-293-1 was NYCBC Class 7 fill comprised of brown fine to medium sand, some coarse to fine gravel, little silt, and brick and metal debris.

Test Pit TP-386-1

Test Pit TP-386-1 was excavated at the exterior face of the southeast wall of Building 386. The test pit had approximate plan dimensions of 3 feet by 4 feet and was excavated to a depth of approximately 7.33 feet below existing site grade corresponding to EL. -1.73±. The

concrete foundation wall extended to 7 feet below grade at EL. -1.4± where a foundation was observed to extend outward 8 inches from the face of the foundation wall. The bottom of the footing was not identified as it was beyond the extents of the test pit.

The uppermost strata in test pit TP-386-1 consisted of NYCBC Class 7 fill comprised of dark brown coarse to fine gravel, some fine to coarse sand, and little silt. This fill was encountered from grade at elevation EL. +5.60± to approximately 2.33 feet below grade corresponding to elevation EL. +3.27±. From EL. +3.27± to the bottom of the test pit at elevation EL. -1.7±, the soil strata consisted of brown fine to coarse sand, some silt, little coarse to fine gravel, cobbles, and brick and ceramic debris classified as NYCBC Class 7 fill.

Water Table

As the Brooklyn Navy Yard is located on the Wallabout Channel and the Navy Yard Basin, the water table is tidally influenced. Due to the project vicinity to water bodies and the tidal influence at the subject buildings, MFS determined the tidal datums at the project site. Based on our review of available tidal datums in the area and the use of the Vertical Datum Transformation software (VDatum) developed by the National Oceanic and Atmospheric Administration (NOAA), it is anticipated that the mean higher high water (MHHW) elevation at the project site is EL. +2.22± and the mean lower low water (MLLW) elevation is EL. -2.63±.

During the 2019 MFS Subsurface Investigation consisting of borings and test pits, the groundwater table was identified from elevations EL. +2.07 ± to EL. -0.90±. Our water table observations are based upon increased moisture in soil samples collected during the field subsurface investigation, the presence of standing water during test pit operations, as well as water readings obtained directly after the completion of drilling operations using a Solinst water level indicator. Soil moisture and groundwater conditions should be expected to fluctuate with seasons, tides, precipitation amounts, utility leaks, and other on-site and offsite factors including site utilization.

Flood Zone

As indicated on the FEMA Flood Insurance Rate Map (FIRM) in Figure 3, the majority of the Brooklyn Navy Yard, including each of the buildings that are the subject of this report, are located in special flood hazard zone AE, defined as areas subject to flooding by the 1% annual chance flood. It should also be noted that each of the subject buildings at the project site with the exception of Building 41A are located within the limit of moderate wave action. Within the limit of moderate wave action, Zone AE is defined as a Coastal A Zone subject to wave heights of 1.5 to 3 feet. Based on our review of the FIRM, the design flood elevation varies from EL. +11 to EL. +13 at the project site. Building 234 is located in Zone AE with a base flood elevation of EL +13. Buildings 62, 293, and 386 are located in Zone AE with a base flood elevation of EL. +12. Building 41A is located in Zone AE with a base flood elevation of EL +11.

MFS recommends that a minimum design water elevation of the base flood elevations specified herein for each building be used. If the design flood elevation is to be adjusted for sea level rise and freeboard height, MFS recommends that the recommendations in the NYC Mayor's Office of Recovery and Resiliency Climate Resiliency Design Guidelines be used based on the design life and criticality of the structure. It is our understanding based on a review of Attachment A – Detailed Scope of Services included in the Request for Proposals

for the subject project that preliminary design water elevations (Mitigation Design Elevations (MDE)) were determined at the buildings to include freeboard height and sea level rise. The MDE elevations at each building consider the FIRM design flood elevation plus 1-foot of freeboard and 2.5 feet of sea level rise.

EVALUATION AND DESIGN RECOMMENDATIONS

SEISMIC EVALUATION

This section presents the results of our seismic evaluation for the site according to the provisions outlined in the NYCBC and provides recommended parameters for use in seismic design of the proposed site development.

Soil Liquefaction

The NYCBC requires that non-cohesive soils and cohesive soils with a plasticity index less than 20 below the groundwater table and less than 50 feet below the ground surface be considered for liquefaction. The subsurface profile underlying the project site consisted of very loose to very dense fill, soft to stiff clay and silt marshland, and loose to very dense glacial outwash sands within the upper 50 feet of overburden and below the groundwater table. As such, liquefaction of the overburden soils should be considered by the structural engineer of record. MFS has plotted the SPT N_{60} values from each of the borings conducted on Figure 1813.1 from the NYCBC; see Figure 4. Based on this plot, it is seen that the subsurface profile at the project site is susceptible to liquefaction.

MFS performed a site-specific evaluation for the potential of soil liquefaction using the "simplified procedure" initially established by Seed and Idriss (1982) and later updated by Youd et al (2001). This analysis compares corrected N-values $[(N_1)_{60}]$ to the calculated critical $(N_1)_{60}$ values. The corrected N-value $[(N_1)_{60}]$ is the measured N-value normalized for overburden pressure and for drive hammer efficiency. The critical $(N_1)_{60}$ value is considered the minimum N-value, at a given depth, corresponding to a factor of safety of 1 for liquefaction. Based on the liquefaction analysis of the subsurface data recorded during the 2019 MFS Subsurface Investigation, the minimum factor of safety against liquefaction was determined to be under 1 based on a design earthquake having a magnitude of 5.75; see Figure 5. Therefore, it is our recommendation that soil liquefaction be considered by the design engineer of record for the proposed construction at the project site.

Mapped Spectral Accelerations

As liquefiable and organic soils were identified at the project site during the 2019 MFS Subsurface Investigation, the site is assigned as Site Class F in accordance with Table 1613.5.2 of the NYCBC. As such, a site-specific evaluation is required in accordance with ASCE 7-10 and NYCBC Section 1813. As outlined in Section 20.3.1 of ASCE 7-10, structures having fundamental periods of vibration equal to or less than 0.5s do not require a site response analysis, and a site class is able to be determined in accordance with ASCE 7-10 Section 20.3. Based upon the nature of the proposed construction at the project site, MFS has assumed that the exception requirements of ASCE 7-10 20.3.1 are met for this project, however this should be verified by the structural engineer of record. If the exception requirements of ASCE

7-10 20.3.1 are not met, a site response analysis shall be performed in accordance with ASCE 7-10 Section 21.1 and the following seismic recommendations are not to be followed.

Assuming that the exception requirements of ASCE 7-10 20.3.1 are met and based upon the limited geotechnical investigation performed, the site is assigned as Site Class E (Soft Soil Profile) in accordance with Table 1613.5.2 of the NYCBC and based on average soil properties (i.e. N-values and soil undrained shear strength). The mapped maximum considered earthquake response spectra for the short period (S_S) is 0.281g, the one-second period (S_1) is 0.073g, and the peak ground acceleration adjusted for site class effects (PGA_M) is 0.33g for Site Class E in New York City according to the NYCBC.

Site Classification

The corresponding seismic factors and the design spectral response accelerations at short period (S_{DS}) and at one-second period (S_{D1}) are calculated based on site class and the mapped spectral response accelerations. The maximum design spectral acceleration at short periods (S_{DS}) is 0.444g and one-second period (S_{D1}) is 0.170g. The site is classified within the NYCBC as Seismic Design Category C under Risk Categories I, II, and III. If the subject buildings are considered essential facilities as outlined in NYCBC Table 1604.5, it is classified as Seismic Design Category D under Rick Category IV.

FLOOD LOADS

MFS recommends that any new building envelopes or platform structures that will be subject to flooding be designed to resist flood lateral hydrostatic, lateral hydrodynamic, uplift loads, debris impact, and wave action loads. It is recommended that the flood loads be determined in accordance with the FEMA Coastal Construction Manual P-55 (Fourth Edition), Volume II, dated August 2011 and ASCE 7-16. In addition, MFS recommends that the structural engineer analyze the existing buildings which will not be demolished to determine if they can withstand the flood loads mentioned herein.

FOUNDATION RECOMMENDATIONS

General Understanding of Proposed Development

Our understanding of the proposed strategies for flood mitigation at each subject building is referenced from Attachment A – Detailed Scope descriptions included in the BNYDC Request for Proposals for the subject project. At the time that this report was prepared, MFS has not been provided any as-build or design drawings that accurately depict existing structures foundations types, sizes, or conditions. The flood mitigation strategies at each subject building in this report are summarized below:

- Building 41A – Scope of work includes the restoration to repair flood damage to damaged equipment. As part of this task, we understand that the existing Building 41A may be demolished and reconstructed. Additional scope of work may include the construction of a floodwall for hazard mitigation. MFS recommends that if Building 41A is being demolished and reconstructed, that the new exterior building walls and bottom slabs be designed and constructed as the flood walls and pressure slabs, respectively to prevent the infiltration of water into the structure, or the building be elevated above the MDE elevation.

- Building 62 – The existing boiler room is a separate structure that was added on southeast wall of Building 62. The scope of work includes raising the elevation of the prefabricated roof and installing a platform supported on new steel girders installed though and bearing on the existing CMU walls and foundations of the boiler room. The boiler shall be elevated on the newly constructed platform supported on the new steel girders above the MDE. In addition, a new OSHA compliant staircase will be constructed beginning on the south face of the building and turning to the west face to access the new door.
- Building 234 – Scope of work includes relocating the boiler to a new adjacent electrical substation elevated platform constructed above the MDE. It is our understanding that the existing building will be demolished and new raised platforms will be constructed to elevate the replaced equipment. The new platform may be supported on the existing foundations or may be supported on new pile foundations. In addition, a new chain link security fence is proposed to be constructed around the new substation platform.
- Building 293 – Scope of work includes relocating the electrical equipment to a new elevated metal framed platform within Building 293. The proposed platform will be constructed above the MDE and will be supported on a pile foundation system. The platform will be comprised of a metal flamed platform with grate deck, metal railings, and stairs. In addition, a new chain link security fence is proposed to be constructed around the new substation platform.
- Building 386 – Scope of work includes relocating the electrical equipment to a new elevated platform in the location of the existing electrical equipment within Building 386. The new platform is to be constructed above the MDE and supported on a pile foundation system. Once constructed, the existing building encasing the new platform and the old equipment will be demolished.

Frost Depth

The frost depth at the project site is 4 feet below grade per the NYCBC. As such, the base of all foundations proposed on site are required to extend a minimum of four (4) feet below the lowest adjacent permanent exposed grade or below the calculated scour depth (to be determined by others). Alternatively, the foundations may be constructed in accordance with ASCE-32 (Design and Construction of Frost Protected Shallow Foundations). Grade beams, if used, shall extend a minimum of 18-inches below the lowest adjacent permanent exposed grade.

Existing Foundation Analysis

As described above, it is proposed to construct a new elevated platform for the boilers/electrical equipment to be supported on the existing foundations at Building 62 and potentially building 234. MFS recommends that the structural engineer analyze the existing foundations to determine if they are adequate to support the loads incurred due to the proposed elevated platforms. If the existing foundations are not suitable, the existing foundations shall be altered, reinforced, and/or reconstructed to support the additional loads. Based on the test pit conducted at the northeast face of the concrete masonry unit (CMU) boiler room that abuts Building 62, it is believed that the boiler room is founded on a one (1)

foot thick concrete slab-on-grade as no foundation walls or others footings were identified. Information on the existing boiler room foundation at Building 234 is not known as a test pit was not conducted at this location and no as-built drawings have been provided for MFS review.

As the existing foundation at the boiler room in Building 62 did not appear to be constructed to bear below the design frost depth based upon the results of the test pit conducted on site, MFS recommends that the proposed elevated platform be constructed on a new foundation system due to the presence of liquefiable soils encountered onsite, MFS recommends that the new foundations be designed and constructed using the deep foundations recommendations provided herein.

Any existing shallow foundations, bearing a minimum of 4 feet below grade shall be analyzed using an allowable bearing pressure of 0.5 tons per square foot (tsf). The existing slabs-on-grade shall be analyzed using a modulus of subgrade reaction 50 psi/inch (based on a 12-inch square plate). MFS recommends that any existing deep foundation be analyzed using a recognized method of analysis in accordance with the NYCBC and the recommendations for the deep foundations provided herein.

If reinforcing of the existing foundations is required, MFS recommends underpinning the existing foundations using helical screw piles following the recommendations in the "Deep Foundations" sections of this report.

Security Fence Shallow Foundations

It is our understanding that proposed security fences will be constructed around the proposed raised platforms in the vicinity of Buildings 234, 293, and 386. The subsurface conditions at borings B-234-1, B-293-1, B-386-1, and B-386-2 typically consisted of loose to medium dense granular fill in the upper 10 feet of each boring. Based on the subsurface conditions and relatively light loads anticipated from the fence structures, MFS recommends the proposed security fences be supported on shallow sonotube type piers in accordance with NYCBC Section 1805.5.7. The piers shall have a minimum plan dimension of 2 feet. Piers founded 4 feet below grade on the fill soils shall be designed using an allowable bearing pressure of 0.5 tsf. The pier foundations shall be designed to resist the lateral design loads. MFS recommends the minimum embedment depths of the piers to resist the lateral loads be completed using the embedded post and poles calculation in IBC Section 1807.3. The lateral analysis shall be performed by the structural engineer of record using the soil design parameters outlined in the *Soil Design Parameters* section of this report.

Deep Foundations

MFS recommends that all of the proposed elevated platforms and associated structures be designed and constructed on a deep foundation system. Based upon the results of the 2019 MFS Subsurface Investigation and our project understanding, we recommend that the deep foundation elements be drilled or augured elements due to the proximity of existing structures and utilities as this method will induce minimal vibrations during the installation/casting process compared to driven or vibratory piles. The deep foundation elements may be designed in accordance with the stated NYCBC section as one of the following pile types:

- Drilled or augered uncased piles (NYCBC 1810.3) – The minimum diameter of drilled or augered uncased piles shall be 12 inches. The piles may develop their geotechnical capacity through a combination of skin friction (concrete/grout to soil/rock) and end bearing.
- Micropiles (NYCBC 1810.8) – The piles shall have an outside diameter between 5 and 14 inches. Micropiles shall develop their geotechnical capacity by means of a bond zone in soil (concrete/grout to soil) and shall not consider end bearing.
- Helical piles (NYCBC 1812) – Steel elements consisting of a shaft and one or more helical bearing plates screwed into the ground by application of torque on the shaft. Refer to the *Helical Piles* section below for detailed pile considerations.

Drilled or Augured Uncased Piles and Micropiles

The piles shall be designed for lateral and axial capacities using a recognized method of analysis in accordance with the NYCBC and shall achieve their capacity bearing in soil with Class 4 or better that are not susceptible to liquefaction. MFS recommends completing the drilled or augered pile design using the Naval Facilities Engineering Command (NAVFAC) design manual in conjunction with applicable analysis software including AllPile or LPile. The deep foundation elements shall be designed assuming that the soil immediately below the pile caps and grade beams do not support any vertical loads. The pile caps may be designed to transfer the loads to a single pile or multiple piles. The axial capacity of the drilled or augered piles shall be designed with a minimum factor of safety of two (2) in compression and three (3) in tension. As large amounts of fill and subsurface obstructions (i.e. boulders, debris, etc.) were encountered at the project site, the drilled or augered elements would allow for installation with minimal concern for pile refusal or being pushed out of plumb or alignment.

It is recommended that vertically loaded piles be designed and constructed to have a minimum pile center-to-center spacing of 3 times the nominal pile diameter. Pile group effects from soil on lateral pile strength shall be accounted for where the pile center-to-center spacing in the direction of the lateral force is less than 8 pile diameters. Any piles installed in a group shall have the appropriate reductions applied based on the group configuration to account for the group effects.

Helical Piles

Helical piles, if used, shall be designed to support axial (compressive and tensile) and lateral loads using a recognized method of analysis in accordance with NYCBC Section 1812 and shall achieve their capacity bearing in soil with an SPT N-value of 10 or better that are not susceptible to liquefaction. Increased lateral capacity of helical piles may be achieved by utilizing grade beam construction to brace the helical pile caps. Battered piles will allow for increased lateral resistance, however as down drag forces are expected due to the compressible clay layers, the battered piles will be subject to additional loads that may cause pile bending and distortion. Battered helical piles within the compressible clay layers, as described below, shall be designed to resist the increased loads. In addition, helical piles shall be installed to the specified embedment depth and torsional resistance criteria as determined by a registered professional engineer in the state of New York. MFS recommends that the helical pile installation torque correlation demonstrates a factor of safety of 2.5 on the

allowable load and the maximum axial compressive load does not exceed 10 tons. If each of these requirements are met, MFS recommends that compressive pile load tests not be required on the helical piles. If these requirements are not met, compressive pile load tests shall be conducted as outlined below. The helical pile foundations shall be designed using a minimum factor of safety of 2 in compression, and a minimum factor of safety of 3 in tension. It is recommended that the minimum spacing between the center lines of helical piles shall be four (4) times the largest helix plate diameter in accordance with NYCBC Section 1812.10.

As the helical piles will be installed through soft/loose Class 6 and Class 7 material which offer minimal lateral resistance, the structural engineer of record shall ensure the helical piles be designed within an allowable factor of safety for buckling. A buckling analysis shall be completed in accordance with NYCBC Section 1812.7.

It is anticipated that the subsurface conditions will allow for the installation of the helical piles based on the borings and test pit conducted. However, it should be noted that if subsurface obstructions (i.e. boulders, debris, etc.) are encountered during the installation of helical piles, the helical piles will not work as an effective deep foundation element and different pile types will be required.

Pile Load Tests

The piles constructed to support the proposed elevated platforms and associated structures shall be subject to load testing in accordance with the requirements of NYCBC Section 1808 and NYCBC Section 1812.4. The allowable geotechnical axial compressive capacity shall be demonstrated by load tests unless the exceptions of NYCBC 1808.3.1 or NYCBC Section 1812.4.1.1 are met for the given pile type. If required, the compressive load test procedures must be completed in accordance with ASTM D1143 - Standard Test Methods for Deep Foundations Under Static Axial Compressive Load and Section 1808.4.1.3 of the NYCBC.

The allowable uplift for a single pile shall be determined in accordance with accepted engineering practices based on a minimum factor of safety of 3 or by uplift load tests per NYCBC section 1808.3.4 and 1812.4.2 for the given pile type. The maximum allowable lateral load of a pile shall be 1 ton, unless verified by lateral load testing per NYCBC section 1808.3.5 and 1812.4.3 for the given pile type. The piles may require compressive, uplift, and lateral load testing depending on the design methods used and design loads. If load tests are required, the quantity of each type of load test to be performed and load testing procedures shall be determined in accordance with NYCBC Section 1808.4 or 1812.4 depending on the pile type used.

Down Drag

The highly compressible organic soft clay and silt identified in borings B-41A-1, B-62 and B-234-1(C) during the subsurface investigation will induce a down drag force on the shaft of the installed piles due to consolidation settlement of the organic clay/silt layer. The down drag load should be included with the proposed structure loads when analyzing the piles for axial capacity. Based on the thickness of the clay layers, we estimate a down drag force of approximately 7000*P lbs., where P is equal to the pile shaft unit surface area (ft^2/ft).

Liquefaction induced down drag shall be considered by the design engineer due to the soils susceptible to liquefaction identified in all borings performed at the project site with the exceptions of building 41A and 234. During liquefaction, down drag occurs because of increases in effective stress caused by pore pressure dissipation and settlement by the liquefiable soil layer relative to the pile. Based on the thickness of the fill layer susceptible to liquefaction, we estimate a down drag force of approximately 16,250*P lbs., where P is equal to the pile shaft unit surface area (ft^2/ft).

Foundation Layout

The design engineer shall consider the site layout, depth, and location of all proposed foundations so as to prevent the undermining of existing foundations or utilities and to minimize any additional incurred loads on the existing buildings foundation elements. MFS recommends that an influence line having a slope of 1.5H:1V be used to determine if the proposed construction will influence the existing foundations. If the excavation for the proposed foundations is planned to extend beyond the influence lines of the existing foundations as defined herein, underpinning shall be required to prevent undermining of the foundations during excavation and to avoid differential settlement of the existing structure. If the new foundations will bear below the existing adjacent foundations, lateral surcharge loads on the new foundations shall be considered. It is recommended that any new foundations bear, at a minimum, at the same elevation as the existing adjacent foundations. If the foundations of the proposed mitigation strategies are proposed to abut existing foundations, MFS recommends that a Styrofoam or similar bond breaker be installed between the existing and proposed foundations to reduce any additional loading on existing foundation due to the proposed foundation.

SOIL DESIGN PARAMETERS

MFS recommends that the soil properties tabulated below be used for the design of the proposed flood mitigation strategies foundations. In addition to earth pressures, appropriate surface surcharge pressures such as potential construction, adjacent structures, adjacent roadways, and other appropriate surcharge loads should be considered. It is also recommended that flood lateral hydrostatic, lateral hydrodynamic, uplift loads, debris impact, and wave action loads be considered for the design of the proposed structures that are located within the limit of moderate wave action.

Axial Design

The following design parameters shall be used for the geotechnical axial design capacity of drilled deep foundations:

Material	Maximum Allowable Bearing Capacity (tsf)	Pressure Grouted Ultimate Bond Stress (Soil to Concrete/Grout) (psi)[1, 2]	Gravity Grouted Ultimate Bond Stress (Soil to Concrete/Grout) (psi)[1, 2]
Sandy Gravel and Gravel • Class 2a • Class 2b	 10 6	 50 40	 15 10
Granular Soils • Class 3a • Class 3b	 6 3	 40 30	 15 10
Clay and Clayey Soils • Class 4c	 2	 10	 7
Silts and Silty Soils • Class 5a • Class 5b	 3 1.5	 30 20	 7 5
Nominally Unsatisfactory Bearing Materials (Class 6)	N/A	5	3
Uncontrolled fills (Class 7)	0.5	5	3

Note:
1. The ultimate bond stresses for soil to concrete/grout are provided for pressure grouted and gravity grouted piles. The values provided are ultimate bond stresses and need to be divided by an appropriate factor of safety. It is recommended that a factor of safety of 2 be used for compressive capacity and a factor of safety of 3 be used for tensile capacity.
2. In order to limit or eliminate load testing on select pile elements, the bond stress may be reduced to the allowable limits outlined in NYCBC Section 1810.

Lateral Design

It is recommended that the lateral deflection at the top of any deep foundations be calculated using a modeling software such as LPile. The following design soil and rock parameters should be used for the lateral analysis of the pier and deep foundations:

Material	γ (pcf)	γ' (pcf)[1]	ϕ (°)	C (psf)	K (pci)	K' (pci)[1]	ε_{50} (-)
Gravel							
• Class 2	125	62	34	---	210	120	---
• Class 6	105	42	29	---	35	20	---
Sand							
• Class 3a	125	62	34	---	220	125	---
• Class 3b	120	57	33	---	100	60	---
• Class 6	105	42	29	---	30	20	---
Organic Clay/Clay							
• Class 4c	115	52	---	800	190	175	0.0109
• Class 6	95	32	---	300	20	15	0.0316
Organic Silt/Silt							
• Class 5a	130	67	33	---	275	150	---
• Class 5b	120	57	29	1,000	400	400	0.0079
• Class 6	100	37	25	300	80	80	0.0138
Fill							
• N>10	115	52	33	---	45	30	---
• N<10	100	37	27	---	15	13	---

Note:
1. Effective unit weight and coefficient of static lateral subgrade reaction shall be used for all soils below the design water elevations.

Where,

γ = design total unit weight (pounds per cubic foot)
γ' = design effective unit weight (pounds per cubic foot)
ϕ = angle of internal friction (degrees)
C = undrained shear strength (pounds per square foot)
K = coefficient of static lateral subgrade reaction (pounds per cubic inch)
K' = effective coefficient of static lateral subgrade reaction (pounds per cubic inch)
ε_{50} = axial strain of soil corresponding to one-half of the maximum principal stress difference

The coefficient of friction between concrete foundations and the fill shall be 0.35. If clean crushed stone is used, the coefficient of friction between the concrete foundations and the stone may be taken as 0.55.

SETTLEMENT

The settlement of the various foundations on site will be a function of the structural loads, type of foundation, and is dependent on the layout and stiffness of the respective foundations. In addition, settlement will depend on variations in the subsurface profile, thickness of compacted fill, and quality of earthwork operations. At the time that this report was completed, no design loads have been provided and therefore a detailed settlement analysis was not performed. Based on the allowable bearing capacities and soil design parameters provided herein, it is anticipated that the total settlements of all foundations may be designed and managed to be less than approximately 1 inch. Differential settlement will vary depending on the foundation systems used, but are anticipated to be less than approximately 1/2-inch for a given structures as long as similar foundation elements are used to support the entirety of the structure. MFS recommends that a detailed settlement analysis be performed when the foundation design is being performed.

FOUNDATION CONSTRUCTION CONSIDERATIONS

PILE INSTALLATION METHOD

Based upon the results of the 2019 MFS Subsurface Investigation and our review the historic USGS topographic maps presented in Figures 1.1 and 1.2, it is anticipated that the proposed piles will need to be installed through a thick fill layer comprised of sand, gravels, cobbles, and miscellaneous debris at Building 293 and Building 386. It is likely that boulders will also be encountered during the installation of the proposed piles.

Based on our project understanding and due to the proximity of existing structures and utilities we recommended that the piles be drilled or augured elements as they will induce minimal vibrations during the installation/casting process. It is anticipated that any proposed piers will be installed/constructed using standard excavation or drilling methods. The contractor shall be prepared to advance the installation of piles and piers through potential boulders, cobbles, and miscellaneous debris that may be encountered in the top fill layer. The drilling equipment shall have sufficient power, torque, and downward thrust to advance the piles through the soil overburden and bedrock, if required, on site. During drilling, all soil shall be removed from within the casing using augers or reverse circulation methods to keep the wash water return inside the casing (internal flush). Flushing that results in circulation outside of the casing shall not be permitted and can result in the reduced lateral and axial capacity of the pile. Any external flush should be immediately brought to the attention of the engineer of record. Any temporary or permanent casings used during installation of piles shall be extended to the full depth of the drilled pile during construction. Removal of the casing, if performed, shall be completed so that the level of the concrete/grout within the casing is at least 2 feet above the bottom of the casing at all times. Due to the shallow groundwater table, tremie methods shall be used to properly displace the water during the placement of grout and/or concrete for the pile construction installation, if required/selected.

The contractor shall ensure all piles are installed within the project tolerances for location and plumbness to avoid the potential for increased lateral forces and decreased axial capacity of the piles.

During construction, if any load tests are performed, the same equipment, methods, and procedures that were used to advance the test piles shall be used to install the production piles. In addition, the tested piles and production piles shall be of the same type, size, and shape and be installed to the same bearing stratum. If there is a change to the pile type, size, and/or shape, additional load testing will be required.

TEMPORARY EXCAVATION SUPPORT

If sonotube piers are used for the security fence foundations, temporary excavation support will likely not be required. The excavation for the construction of the concrete sonotube piers will be performed using either an auger or other drilling techniques to be determined by the contractor. One benefit of this construction method is that it limits the disturbance at the project site. Using an auger or other drilling method to construct the pier foundations will limit the excavation size to the size of the foundations being constructed and limit large excavations, benching, or shoring. The annulus outside of the sonotube shall be backfilled with lean concrete to allow for compact backfill around the foundations.

Construction of the pile caps and deep foundation system for the elevated platforms will likely require temporary excavation support. As the anticipated excavations are relatively shallow, lateral support of the soil overburden will likely consist of benching or shoring. A benched slope out at 1.5H:1V can be performed if site clearance and adjacent structures and/or utilities are not interfering with the excavation. If there are obstructions on site that do not allow for the soil overburden to be benched, MFS recommends that pre-engineered trench boxes or timber shoring be used to excavate to the required depths to construct the proposed foundations. The contractor shall determine the most appropriate temporary excavation support system to fulfill their means and methods of construction.

In addition to earth and hydrostatic pressures, appropriate surface surcharge pressures such as potential construction loads should be considered when evaluating the temporary excavation support systems. The design of all temporary support of excavation systems shall be performed by a professional engineer licensed in the state of New York. The contractor shall be responsible for ensuring the installation of the excavation support so as not to adversely impact any existing utilities or other structures in the area. It is recommended that the project specifications require that the contractor be responsible for all damage and repairs (or replacement, as necessary) to existing utilities resulting from their work. If existing utilities fall within the limits of excavations for the proposed construction, the contractor shall take all the necessary precautions to monitor and prevent the undermining of the existing utility. In addition, barriers shall be placed along the extend of the excavation and shall be detailed in a maintenance and protection of traffic (MPT) plan for both pedestrians and vehicular safety.

TEMPORARY GOUNDWATER CONTROL

Based on the anticipated depths of the excavations required for the construction of the foundations and groundwater depth at the project site, it is likely that the construction will require localized dewatering within the extents of the excavations in certain areas of the site. Additionally, the water table is tidally influenced and is likely to fluctuate from the groundwater observations at the time of the investigation. If the groundwater table is encountered during excavation operations, the groundwater should be maintained at least one (1) foot below the final excavation depth. The contractor shall be prepared to perform dewatering activities in advance of excavating to maintain stable excavation subgrades and slopes. The contractor shall be responsible for determining the means and methods of dewatering. It is recommended that the dewatering system be designed by a professional engineer licensed in the state of New York. The designs shall be completed to ensure that dewatering does not result in any softening or loss of soil at the proposed foundation subgrade elevations and so that the system do not adversely affect any existing adjacent structures.

Where piers are proposed to extend to depths below the groundwater level, the piers shall be constructed by a method that will provide accurate preparation and inspection of the subgrade in dry conditions.

Discharge of dewatering effluent may not be placed into sewers without a permit from the NYCDEP. Contaminated water, if present, will need to be treated prior to discharging into the storm or sanitary sewers.

Furthermore, the site should be graded during construction to facilitate proper drainage and minimize ponding during precipitation events. All areas of disturbed soil shall be compacted and sealed at the end of each work day to reduce the risk of subgrade softening.

SUBGRADE PREPARATION

Excavation within the last foot from final sonotube pier and pile cap subgrade elevations should be performed with care to minimize soil disturbance. The exposed subgrade surface should be level and free of loose soil, debris, standing water, or other unsatisfactory material. The exposed subgrade condition should be verified and approved by the geotechnical engineer responsible for special inspections before any foundation construction takes place.

Where shallow sonotube piers are proposed, MFS recommends the foundations be constructed on a minimum of 6 inches of 3/4-inch clean crushed stone.

Prior to concrete placement, except within the piers, the subgrade areas should be compacted with at least five (5) passes of a 2-ton-walk-behind smooth drum vibratory roller. If the accessibility for large compaction equipment is limited, a rammer or vibratory plate shall be used. Any areas exhibiting excessive weaving, rutting, or pumping should be removed and replaced with crushed stone or compacted controlled fill, as described below. The pile caps and foundations should be poured and/or installed the same day they are excavated to minimize possible subgrade deterioration. If this is not possible, MFS recommends that the base of all excavations be protected with a minimum 6-inch thick layer of 3/4-inch clean crushed stone, or a thin concrete mud mat, to protect against subgrade deterioration. Prior to pouring concrete, all water, debris, and ice/snow shall be removed from the subgrades. Any unprotected subgrade exposed to rain or snow events should be re-inspected by the geotechnical engineer responsible for special inspection prior to concrete placement.

FILL MATERIAL, PLACEMENT, AND COMPACTION CRITERIA

If needed, all imported fill should be controlled fill as defined by the NYCBC. Controlled fill shall be well-graded sand and gravel having not more than 10% by dry weight passing the No. 200 sieve. The maximum particle size should be 3 inches. The fill should be free of organics, clay, and other deleterious or compressible materials.

Controlled fill material should be placed in uniform 12-inch-thick loose lifts and compacted using a 2-ton-walk-behind vibratory roller to at least 95% of its maximum dry unit weight as determined by ASTM test designation D1557. In restricted areas where only hand-operated compactors can be used, the maximum lift thickness should be limited to 6 inches. The appropriate water content at the time of compaction should be plus or minus 2 percentage points of optimum as determined by the laboratory compaction tests of proposed fill material. No fill should be placed until all unsuitable material is removed and the underlying material has been compacted. No backfill material should be placed on areas where free water is standing or on frozen subsoil areas.

SOIL REUSE

As the uppermost soils encountered on site consisted primarily of NYCBC Class 7 fill sands with relatively high fines content and debris, MFS recommends that the soil on site shall not be re-used as controlled fill. The fill may be used as uncontrolled fill in locations that are not

required for support of structures, roadways, or other site features. In order for any existing fill and native soil to be reused as uncontrolled fill, it is recommended that the contractor be required to complete gradation and compaction testing on representative soil samples and submit the results to the geotechnical engineer for approval prior to reuse. Prior to reuses as uncontrolled fill all particles larger than 3-inches across, any organic materials, and miscellaneous debris material should be removed prior to construction.

MONITORING OF ADJACENT STRUCTURES

During the construction of the deep foundations, it is recommended that a vibration and optical monitoring program be implemented to monitor the existing utilities and structures adjacent to the proposed construction. It is recommended that a detailed monitoring plan be prepared by a professional engineer licensed in the state of New York. The plan should show the locations of the seismographs and optical monitoring points, outline thresholds for maximum allowed peak particle velocity and movement, and provide project procedures in the event of a vibration or movement exceedance to limit damage to existing structures or utilities in the vicinity of the project.

CONSTRUCTION DOCUMENTS AND QUALITY CONTROL

Technical specifications and design drawings should incorporate our recommendations to ensure that subsurface conditions and other geotechnical issues at the site are adequately addressed in the construction documents. MFS should assist the design team in preparing specification sections related to geotechnical issues such as earthwork and deep foundations. MFS should also review foundation drawings and details, and all contractor submittals and construction procedures related to geotechnical work.

All foundation work for this project shall be subject to special inspections as required by the NYCBC. We recommend that MFS provide special inspections during construction to verify that the foundation design is implemented and to provide timely responses to field questions and changes.

FURTHER INVESTIGATION

As the 2019 MFS Subsurface Investigation was conducted during the preliminary design stage of the envisioned project, the subsurface investigation was planned to obtain general subsurface conditions and to identify the extents of the existing foundations at the specific subject properties.

Once designs of the proposed strategies to mitigate against future flood-related losses at the electrical substations and boilers in the Brooklyn Navy Yard at the specific subject properties are finalized, MFS recommends the evaluation of the requirements set forth in NYCBC Section 1802.4 to determine if additional geotechnical borings are required. As the subsurface conditions varied significantly between borings B-41A-1 and B-41A-2 at the project site, we recommend that one (1) additional boring, preferably in the footprint of the proposed reconstructed building, be performed to better delineate the subsurface profile in the vicinity of Building 41A.

As the intended test pit to be conducted at Building 234 was not performed and a structural analysis of the existing foundation is required, MFS recommends one (1) test pit be performed

to determine the extents of the existing foundation. Additionally, the extents of the existing foundations were not encountered within the limits of the performed tests pits at Buildings 41A, 293, and 386. If existing as-built drawings are not available, MFS recommends that additional deepened test pits with dewatering be performed to identify the extents of the existing foundations.

LIMITATIONS

The conclusions and recommendations provided in this report are based on subsurface conditions inferred from the seven (7) borings and five (5) test pits conducted as part of the 2019 MFS Subsurface Investigation at the Brooklyn Navy Yard located in the borough of Brooklyn, New York. Recommendations provided are contingent upon one another and no recommendation should be followed independent of the others.

This report has been prepared to assist the Owner and Structural Engineer and is only applicable to the envisioned project discussed herein. The recommendations herein are specifically for the proposed strategies to mitigate against future flood-related losses at the electrical substations and boilers in the Brooklyn Navy Yard at the specific subject properties that were part of our investigation. Our recommendations may not be applicable to additional improvements at buildings that were outside of the scope of our study. Any changes in the proposed development should be brought to our attention so that we can determine whether such changes affect our recommendations. MFS cannot assume responsibility for use of this report for any areas beyond the limits of this study or for any projects not specifically discussed herein.

Information on subsurface strata shown on the boring logs and test pit sketches represent conditions encountered only at the location indicated and at the time of investigation. If different conditions are encountered during construction, they should immediately be brought to our attention for evaluation as they may affect our recommendations.

Environmental issues (such as potentially contaminated soil and groundwater) are outside the scope of this study and should be addressed in a separate study. In addition, seismic response analyses, dynamic loading conditions, soil corrosivity testing, corrosivity considerations, and flood wall design recommendations were not considered as part of this study.

FIGURES

1 USGS 1947 HISTORIC TOPOGRAPHIC SITE LOCATION MAP

Scale: 1" = 1000'

0 1000' 2000'

LEGEND

PROJECT LOCATION

NOTE:
1. THE BASE MAP USED FOR THIS FIGURE IS THE 1947 USGS 7.5 MINUTE TOPOGRAPHIC MAP FOR BROOKLYN, NY

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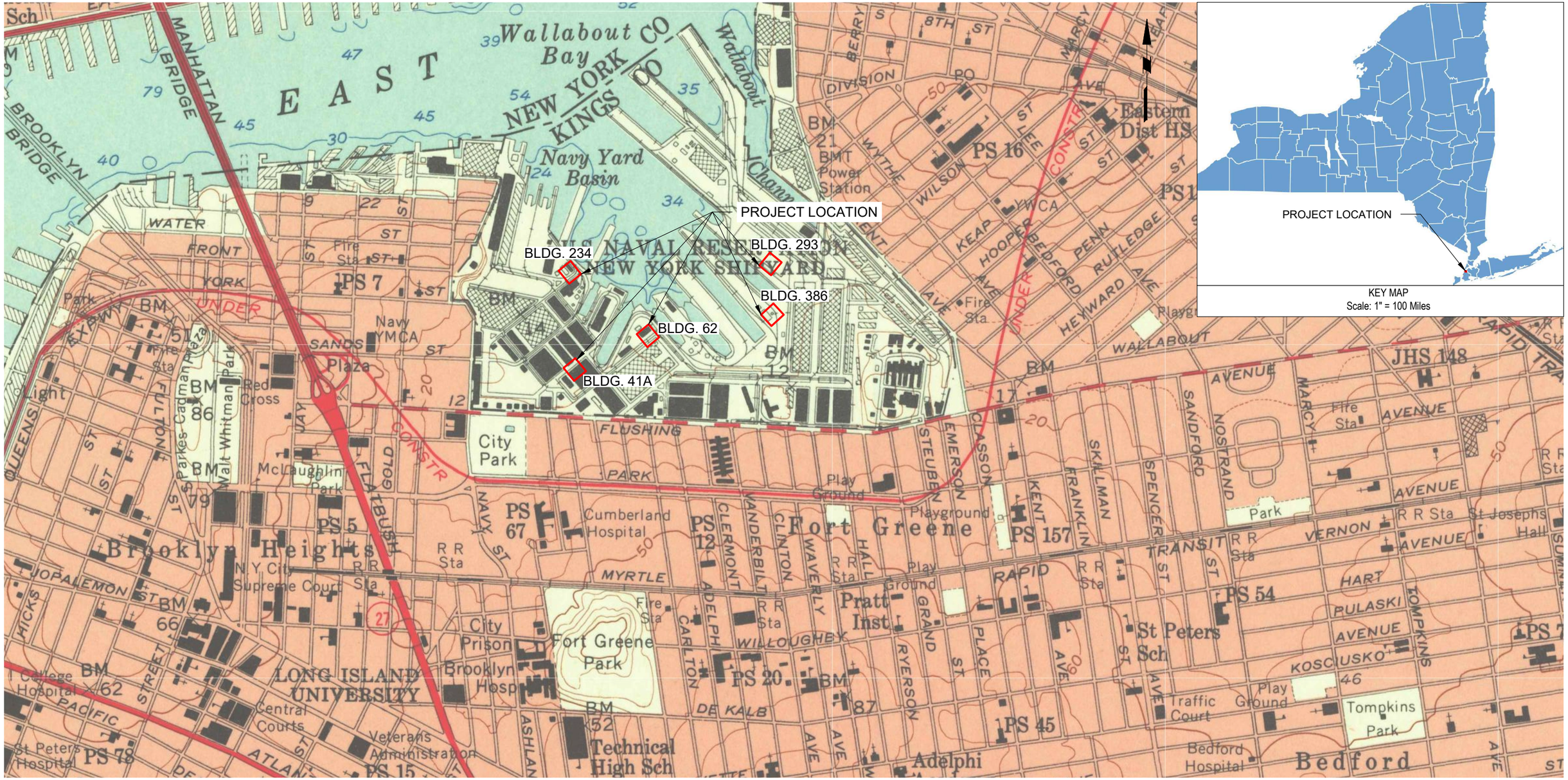
PROJECT NAME
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
HISTORIC USGS TOPOGRAPHIC SITE LOCATION MAP (1947)

PROJECT NO.	1119060	SHEET NO.
DATE	11/26/2019	FIG. 1.1
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	1 OF 3



2 USGS 1956 HISTORIC TOPOGRAPHIC SITE LOCATION MAP

Scale: 1" = 1000'

0 1000' 2000'

LEGEND
PROJECT LOCATION

NOTE:
1. THE BASE MAP USED FOR THIS FIGURE IS THE 1956 USGS 7.5 MINUTE TOPOGRAPHIC MAP FOR BROOKLYN, NY

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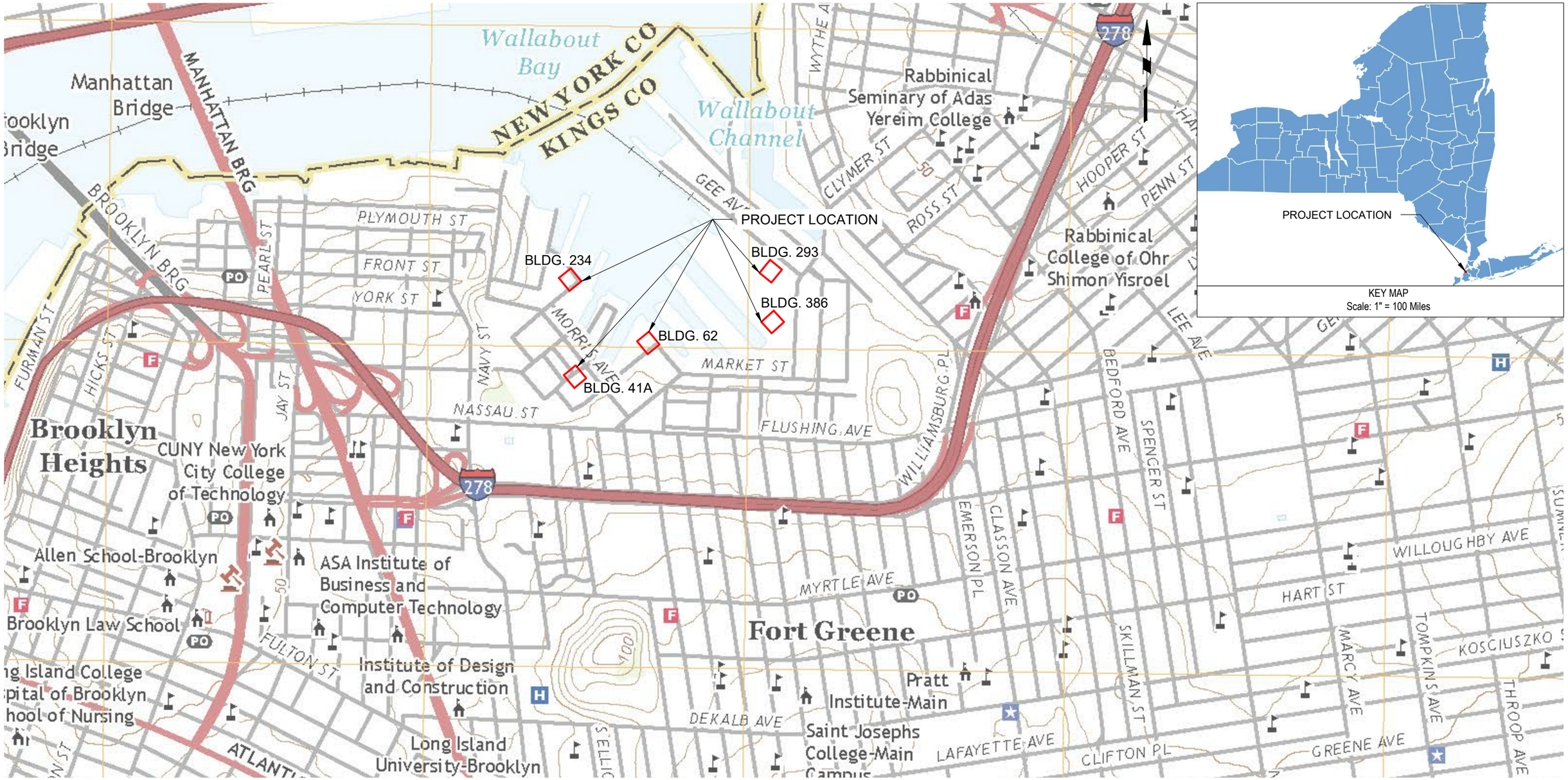
N.Y. CERTIFICATE OF AUTHORIZATION: 0007564

PROJECT NAME
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
HISTORIC USGS TOPOGRAPHIC SITE LOCATION MAP (1956)

PROJECT NO.	1119060	SHEET NO.
DATE	11/26/2019	FIG. 1.2
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	2 OF 3



3 USGS 2019 TOPOGRAPHIC SITE LOCATION MAP

Scale: 1" = 1000'

0 1000' 2000'

LEGEND

PROJECT LOCATION

NOTE:
1. THE BASE MAPS USED FOR THIS FIGURE IS THE 2019 USGS 7.5 MINUTE TOPOGRAPHIC MAP FOR BROOKLYN, NY: USGS - NATIONAL GEOSPATIAL TECHNICAL OPERATIONS CENTER

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PROJECT NAME
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
USGS TOPOGRAPHIC SITE LOCATION MAP (2019)

PROJECT NO.	1119060	SHEET NO.
DATE	11/26/2019	FIG. 1.3
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	3 OF 3

GENERAL NOTES:

1. ALL AS-DRILLED BORING LOCATIONS REFERENCE THE FIELD SUBSURFACE INVESTIGATION COMPLETED BY CRAIG GEOTECHNICAL DRILLING, INC. UNDER THE FULL TIME ENGINEERING SPECIAL INSPECTION OF MFS CONSULTING ENGINEERS AND SURVEYOR, DPC (MFS) FROM 13 DECEMBER 2019 TO 26 DECEMBER 2019.
2. ALL TEST PIT LOCATIONS REFERENCE THE FIELD SUBSURFACE INVESTIGATION COMPLETED BY MFS CONSTRUCTION, LLC UNDER THE FULL TIME ENGINEERING SPECIAL INSPECTION OF MFS FROM 2 DECEMBER 2019 TO 6 DECEMBER 2019.
3. THE BACKGROUND IMAGES USED FOR THIS SUBSURFACE INVESTIGATION PLAN WERE OBTAINED FROM THE NEW YORK STATE DISCOVER GIS DATA NY 2018 ORTHOIMAGERGY (TILES 987192, 987195, 990192, 990195, 992192, AND 992195).
4. THE PARTIAL BACKGROUND SURVEY WAS OBTAINED FROM THE ELEVATION SURVEYS PERFORMED BY MFS DATED 17 SEPTEMBER 2019. THE SURVEY REFLECTS CONDITIONS AS SURVEYED BY MFS BETWEEN 22 AUGUST 2019 AND 29 AUGUST 2019.
5. COORDINATES AND BEARINGS ARE BASED ON NEW YORK LONG ISLAND STATE PLANE COORDINATE SYSTEM (NAD83) AS DETERMINED BY GPS OBSERVATIONS.
6. ELEVATIONS ARE BASED ON NAVD1988 DATUM AS DETERMINED BY GPS OBSERVATIONS.
7. DIMENSIONS ARE NOT TO BE SCALED. ALL DIMENSIONS SHALL BE TAKEN AS EXPLICITLY WRITTEN ON DRAWINGS.

1 KEY PLAN

Scale: 1" = 500'-0"

0 500' 1000'

LEGEND

B-#	AS-DRILLED BORING LOCATION
TP-#	TEST PIT LOCATION

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PROJECT NAME

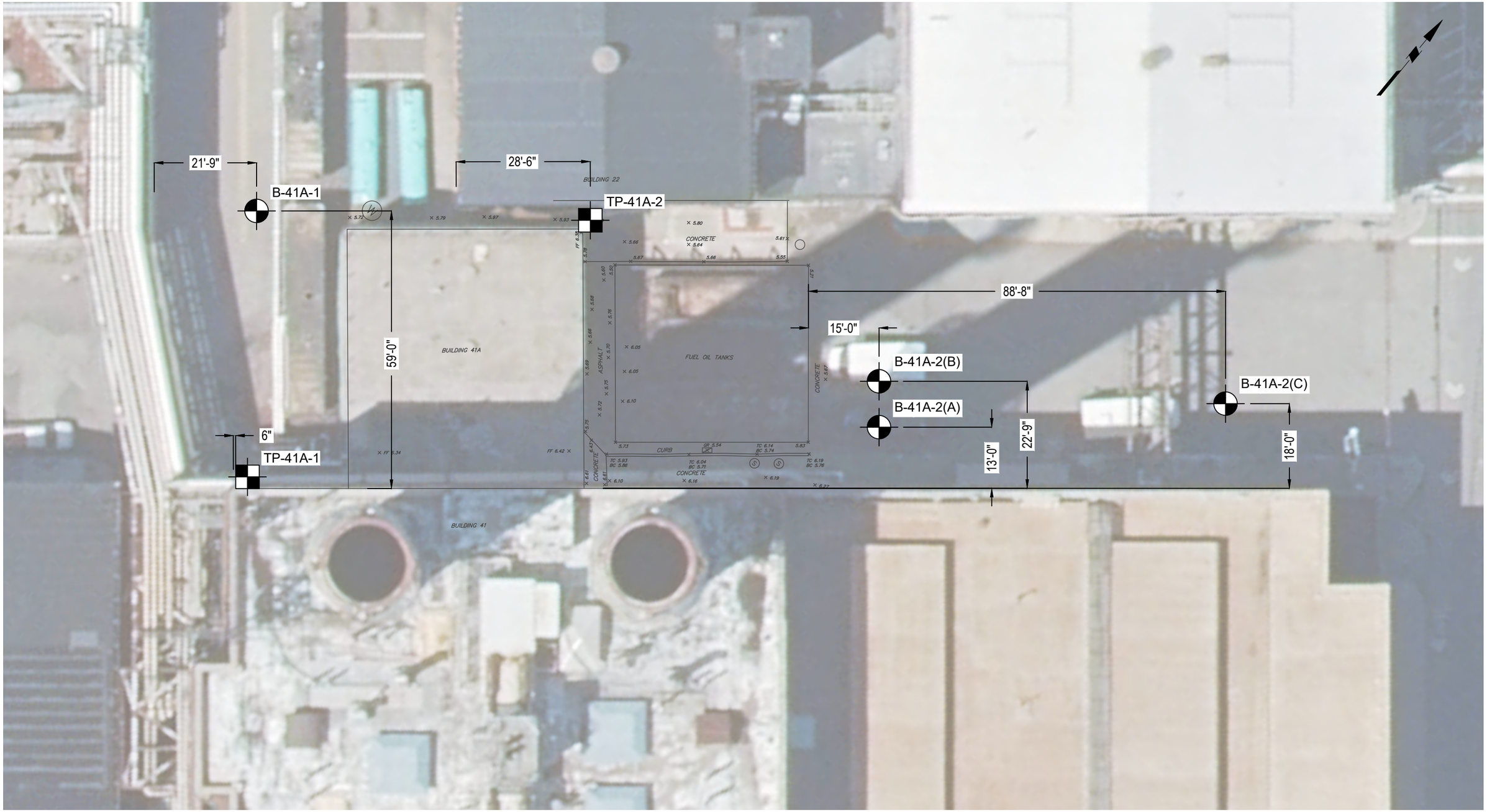
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE

NOTES AND KEY PLAN

PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	FIG. 2.0
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	1 OF 4



1 BORING AND TEST PIT LOCATION PLAN - BUILDING 41A

Scale: 1" = 20'-0"

0 20' 40'

NOTES:

1. SEE SHEET FIG. 2.0 (SHEET 1 OF 4) FOR ALL GENERAL NOTES.

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PROJECT NAME

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DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

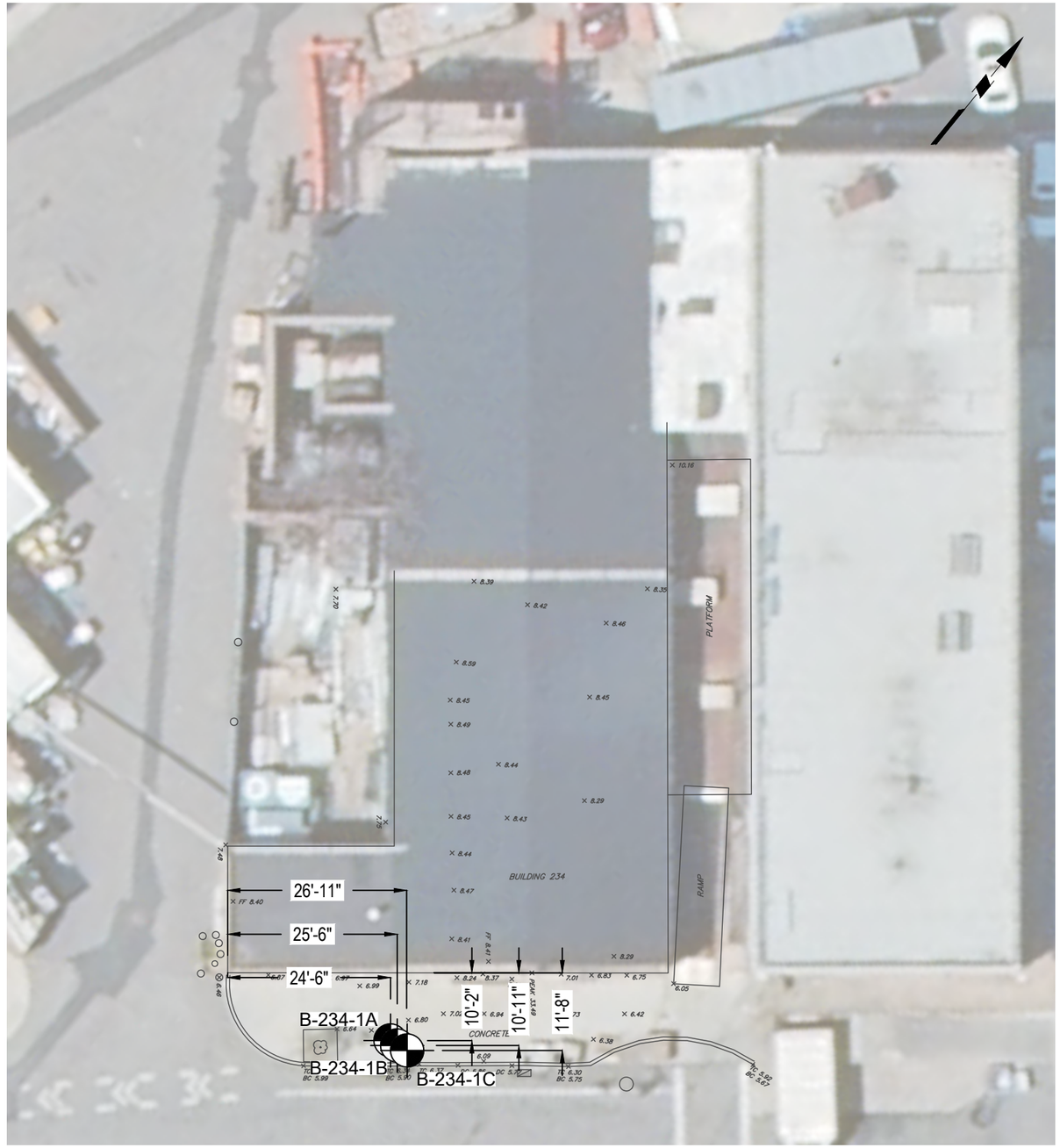
DRAWING TITLE

AS-DRILLED BORING AND AS-DUG TEST PIT LOCATION PLAN

PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	
SCALE	AS_NOTED	FIG. 2.1
DRAWN BY	ATG	
CHECKED BY	MLM	2 OF 4

1 BORING AND TEST PIT LOCATION PLAN - BUILDING 62

Scale: 1" = 20'-0"



2 BORING LOCATION PLAN - BUILDING 234

Scale: 1" = 20'-0"

0 20' 40'

NOTES:

1. SEE SHEET FIG. 2.0 (SHEET 1 OF 4) FOR ALL GENERAL NOTES.

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PROJECT NAME

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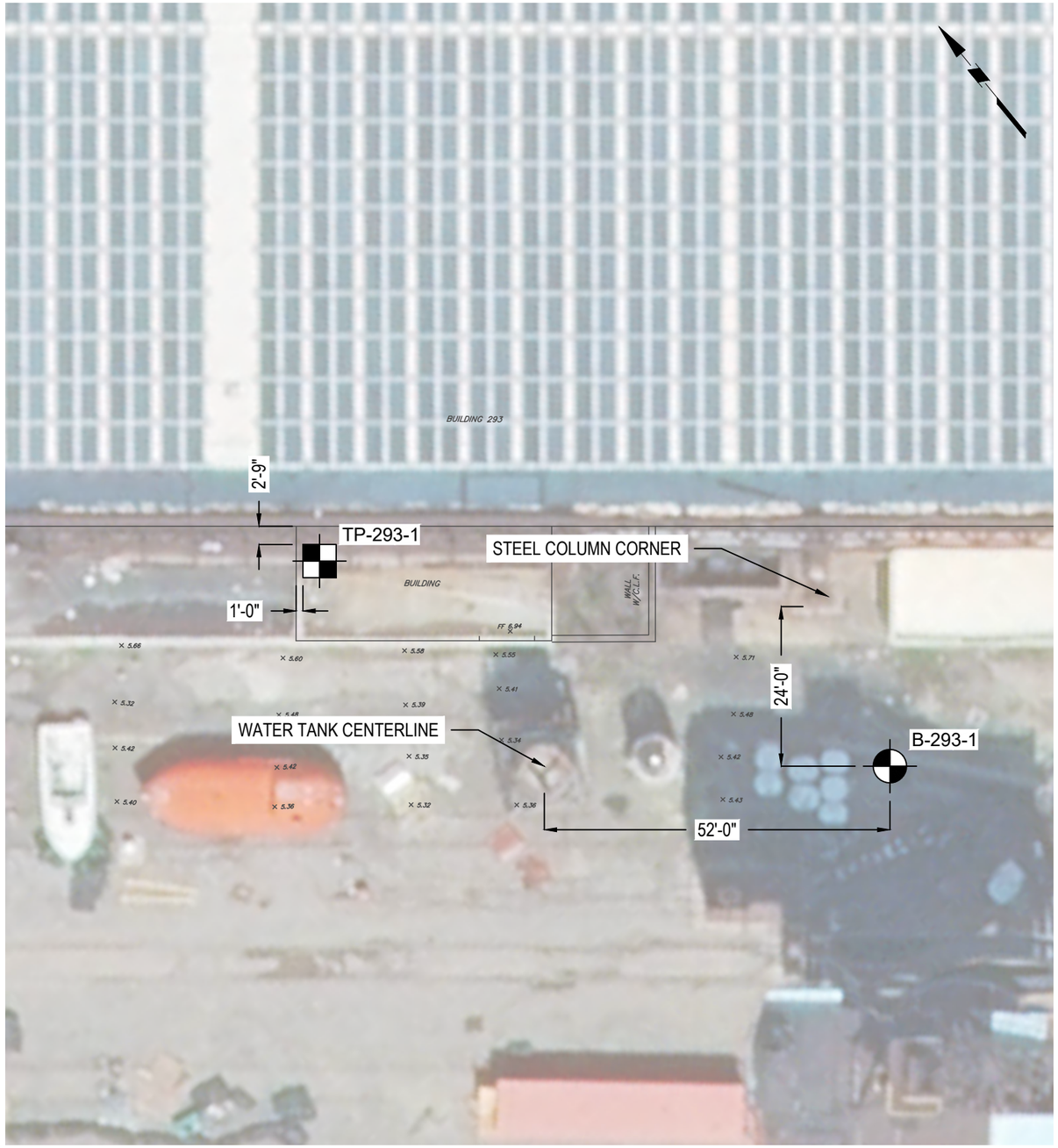
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE

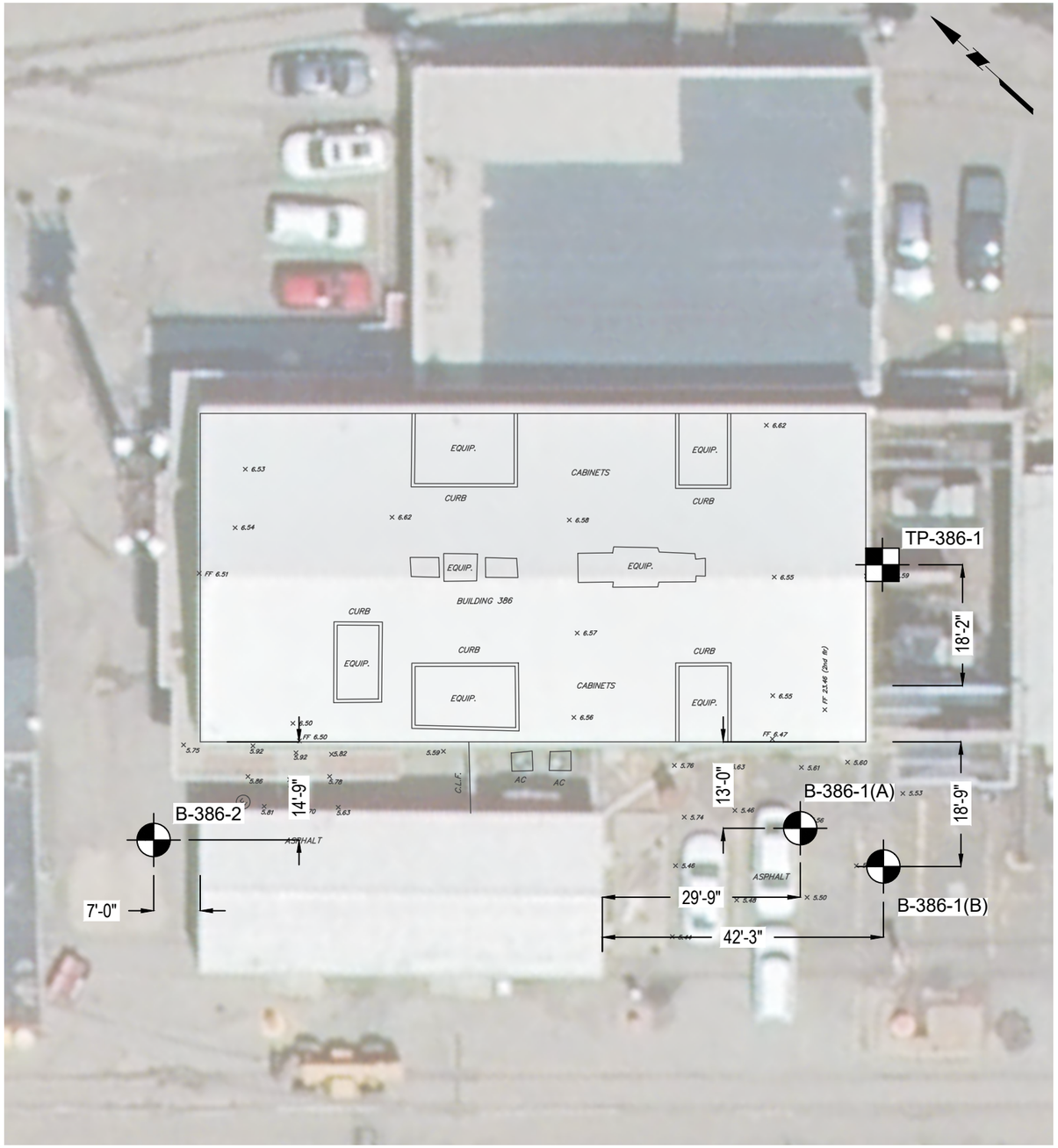
AS-DRILLED BORING AND AS-DUG TEST PIT LOCATION PLAN

PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	FIG. 2.2
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	3 OF 4



1 BORING AND TEST PIT LOCATION PLAN - BUILDING 293

Scale: 1" = 20'-0"



2 BORING AND TEST PIT LOCATION PLAN - BUILDING 386

Scale: 1" = 20'-0"

0 20' 40'

NOTES:

1. SEE SHEET FIG. 2.0 (SHEET 1 OF 4) FOR ALL GENERAL NOTES.

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BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
AS-DRILLED BORING AND AS-DUG TEST PIT LOCATION PLAN

PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	FIG. 2.3
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	4 OF 4

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

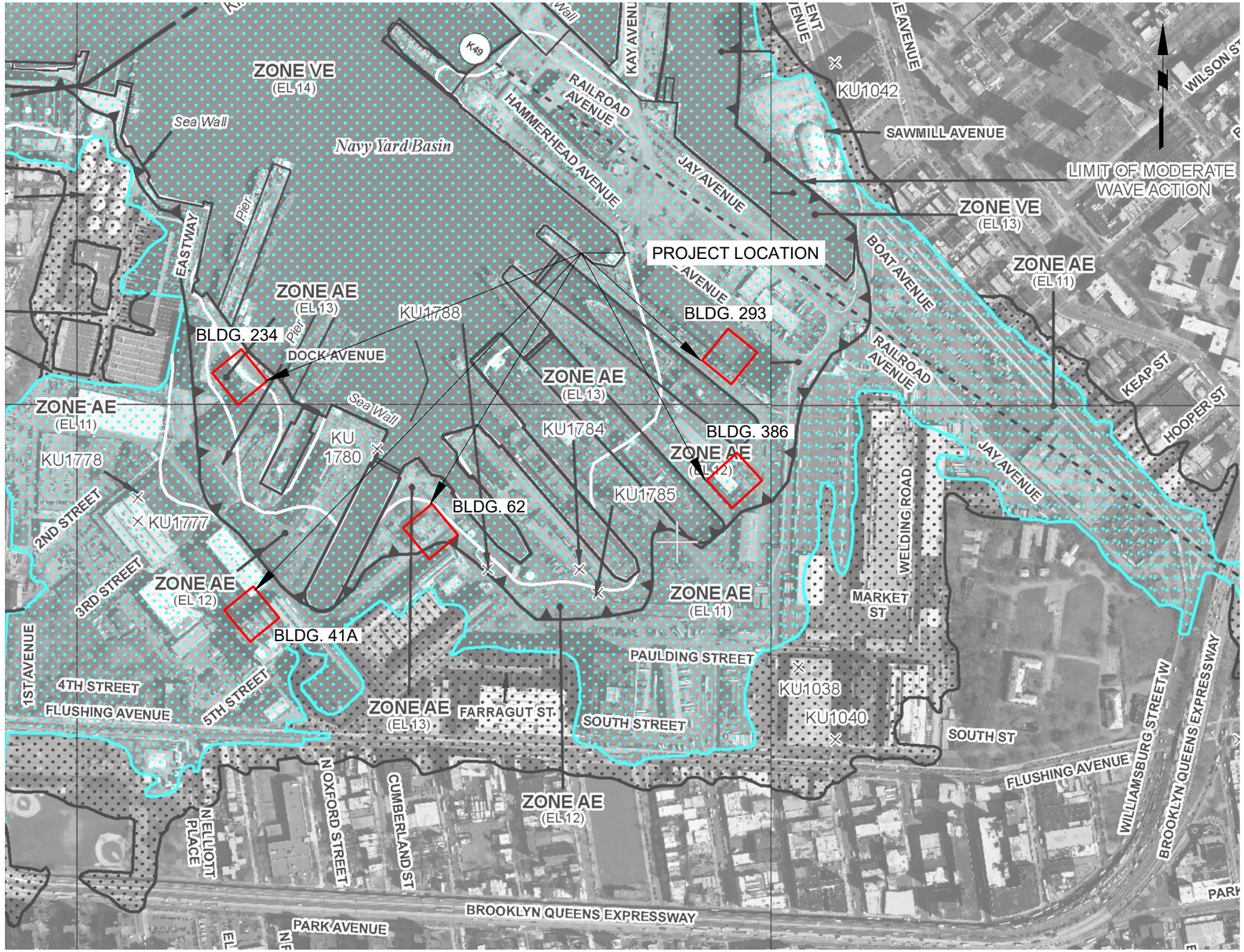
OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- Limit of Moderate Wave Action
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- Culvert, Flume, Penstock or Aqueduct
- Road or Railroad Bridge
- Footbridge
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 2476000mN — 1000-meter Universal Transverse Mercator grid values, zone 18
- 600000 FT — 5000-foot grid values: New York State Plane coordinate system, Long Island zone (FIPSZONE 3104), Lambert Conformal Conic projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile



NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0203G

FIRM

FLOOD INSURANCE RATE MAP

CITY OF,
NEW YORK
NEW YORK
BRONX, RICHMOND, NEW YORK, QUEENS, AND KINGS COUNTIES

PANEL 203 OF 457

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW YORK, CITY OF	360497	0203	G

PRELIMINARY
DECEMBER 5, 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
3604970203G

MAP REVISED

Federal Emergency Management Agency

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0204G

FIRM

FLOOD INSURANCE RATE MAP

CITY OF,
NEW YORK
NEW YORK
BRONX, RICHMOND, NEW YORK, QUEENS, AND KINGS COUNTIES

PANEL 204 OF 457

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW YORK, CITY OF	360497	0204	G

PRELIMINARY
DECEMBER 5, 2013

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
3604970204G

MAP REVISED

Federal Emergency Management Agency

1

FEMA FLOOD INSURANCE RATE MAP (FIRM)

Scale: 1" = 500'

0 — 500' — 1000'

LEGEND

PROJECT LOCATION

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PROJECT NAME

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DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE

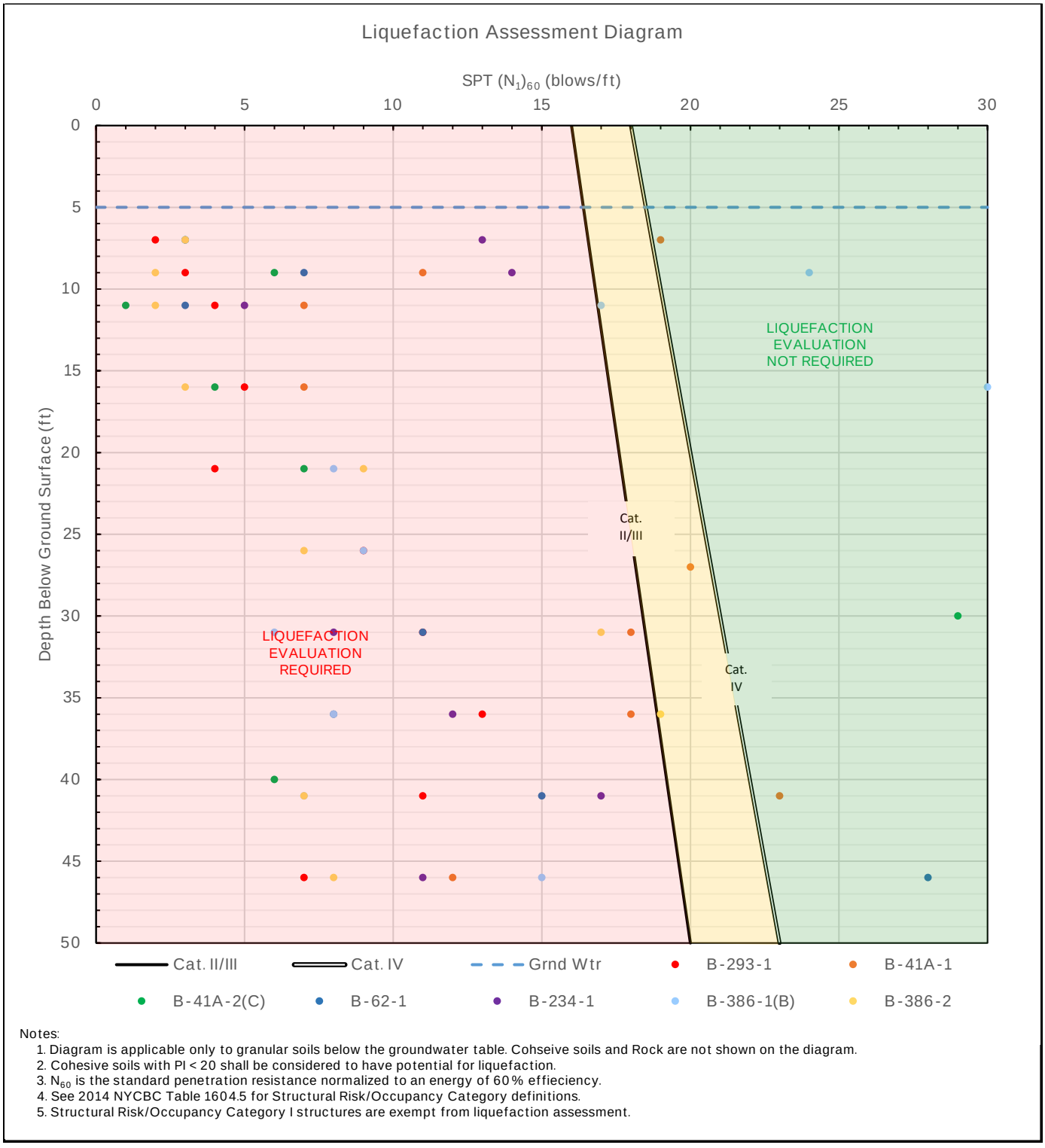
FEMA FLOOD INSURANCE RATE MAP (FIRM)

PROJECT NO.	1119060	SHEET NO.
DATE	11/26/2019	FIG. 3
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	1 OF 1

Made By:	ATG	Date:	2/6/2020	Sheet No.	1 of 1
Checked By:	JMF	Date:	2/6/2020	Project No:	1119060

FOR: SEISMIC ANALYSIS - LIQUEFACTION

SUBJECT: FIG. 4 - 2014 NYCBC LIQUEFACTION ASSESSMENT



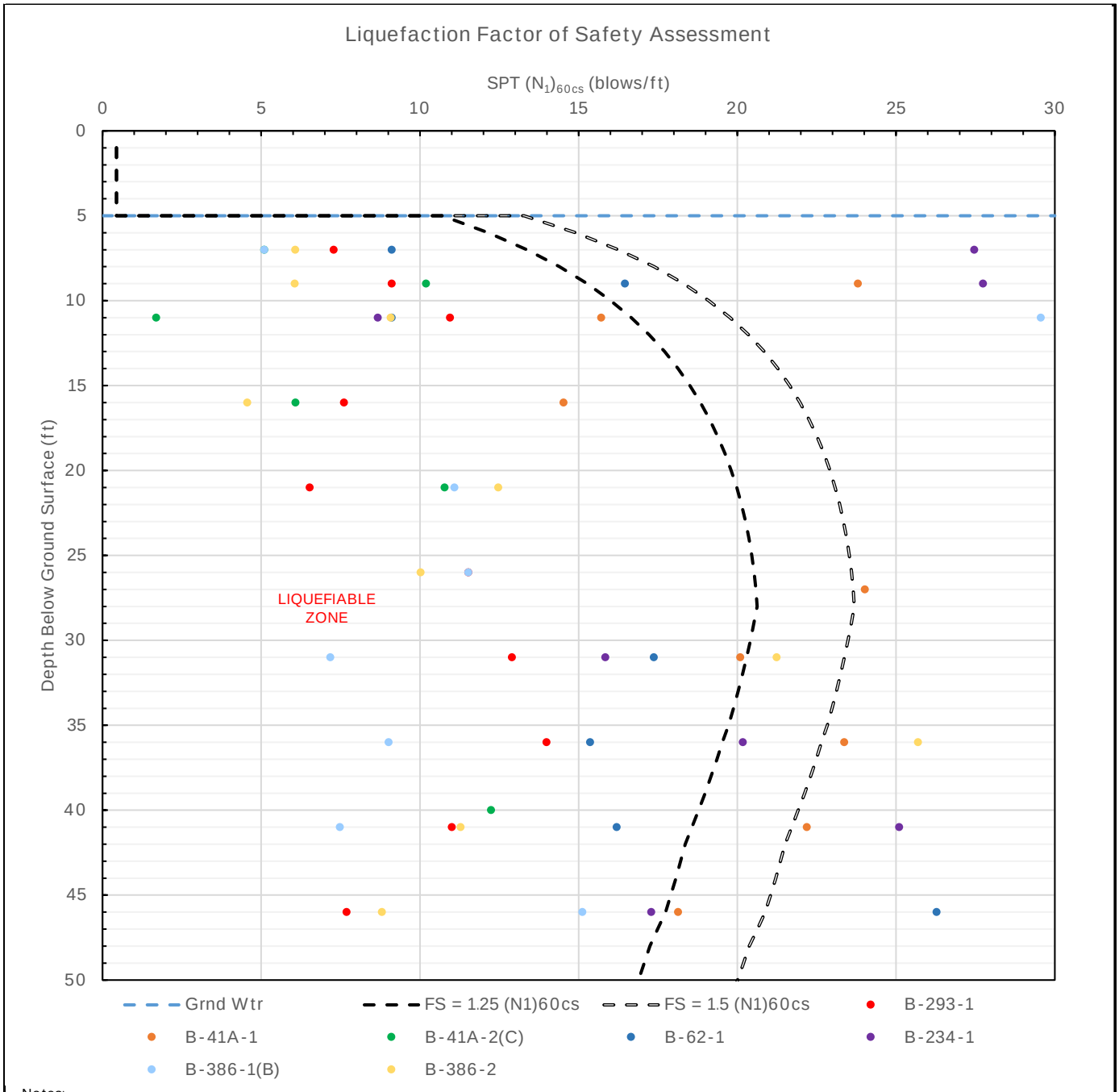
Notes:

1. Diagram is applicable only to granular soils below the groundwater table. Cohseive soils and Rock are not shown on the diagram.
2. Cohesive soils with PI < 20 shall be considered to have potential for liquefaction.
3. N_{60} is the standard penetration resistance normalized to an energy of 60% effieciency.
4. See 2014 NYCBC Table 1604.5 for Structural Risk/Occupancy Category definitions.
5. Structural Risk/Occupancy Category I structures are exempt from liquefaction assessment.

Made By:	ATG	Date:	2/6/2020	Sheet No.	1 of 1
Checked By:	JMF	Date:	2/6/2020	Project No:	1119060

FOR: SEISMIC ANALYSIS - LIQUEFACTION

SUBJECT: FIG. 5 - ASSESSMENT OF FACTOR OF SAFETY AGAINST LIQUEFACTION

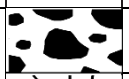
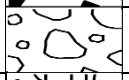
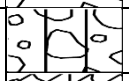
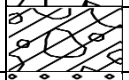
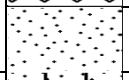
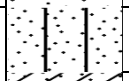
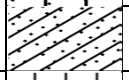
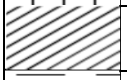
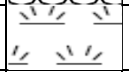


Notes:

1. Diagram is applicable only to granular soils below the groundwater table. Cohseive soils (clays, silts) and rock are not shown on the diagram.
2. Cohesive soils with PI < 20 shall be considered to have potential for liquefaction.
3. $(N_1)_{60cs}$ is the standard penetration resistance normalized to an energy of 60% effieciency and adjusted for fines content to clean sand.
4. SPT $(N_1)_{60cs}$ values greater than 30 are not shown on the diagram for clarity purposes.
5. Soils greater than 50 feet below the ground surface are not considered to have potential for liquefaction (NYCBC 2014).
6. Reference: *Liquefaction Resistance of Soils*, Youd et al, 2001.

APPENDIX A
2019 MFS Boring Logs

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISION			GRAPHIC SYMBOL	GROUP SYMBOL (ASTM D2487)	TYPICAL DESCRIPTION
COARSE-GRAINED SOIL — MORE THAN 50% BY WEIGHT RETAINED ON NO. 200 SIEVE*	GRAVEL — 50% OR MORE OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL — LESS THAN 5% FINES**		GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES
				GP	POORLY GRADED GRAVEL, GRAVEL- SAND MIXTURES
		GRAVEL WITH FINES — MORE THAN 12% FINES**		GM	GRAVEL-SAND-SILT MIXTURES
				GC	GRAVEL-SAND-CLAY MIXTURES
	SAND — MORE THAN 50% OF COURSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND — LESS THAN 5% FINES**		SW	WELL GRADED SAND, SAND-GRAVEL MIXTURES
				SP	POORLY GRADED SAND, SAND-GRAVEL MIXTURES
		SAND WITH FINES — MORE THAN 12% FINES**		SM	SAND-SILT MIXTURES
				SC	SAND-CLAY MIXTURES
FINE-GRAINED SOIL — MORE THAN 50% BY WEIGHT PASSES NO. 200 SIEVE*	SILT & CLAY — LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILT, CLAYEY SILT, LOW PLASTICITY
				CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, SILTY CLAY
				OL	ORGANIC, LOW PLASTICITY, SILT-CLAY MIXTURES, LESS THAN 30% ORGANICS
	SILT & CLAY — LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILT OF HIGH PLASTICITY,
				CH	INORGANIC CLAY OF HIGH PLASTICITY
				OH	ORGANIC, MEDIUM TO HIGH PLASTICITY, SILT-CLAY MIXTURES, LESS THAN 30% ORGANICS
HIGHLY ORGANIC SOIL — 30% OR MORE ORGANICS				PT	PEAT, MUCK, OTHER HIGHLY ORGANIC SOIL

* BASED ON MATERIAL PASSING THE 3" (75MM) SIEVE; COBBLES 3" TO 12"; BOULDERS > 12"
** MATERIALS WITH 5% TO 12% FINES ARE BORDERLINE CASES, DESIGNATED: GW-GM, SW-SC, ETC.

GRADATION

TERM	% BY DRY WEIGHT
TRACE	< 10
LITTLE	10 to 20
SOME	20 to 35
AND	35 to 50

TERM	% BY VOLUME
OCCASIONAL	< 1
FREQUENT	1 to 10
NUMEROUS	> 10

RELATIVE DENSITY (COARSE-GRAINED SOIL)

TERM	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	0 to 4
LOOSE	5 to 10
MEDIUM DENSE	11 to 30
DENSE	31 to 50
VERY DENSE	> 50

TERM	PLASTICITY
SILT	NON-PLASTIC
CLAYEY SILT	LOW PLASTICITY
SILTY CLAY	MEDIUM PLASTICITY
CLAY	HIGH PLASTICITY

CONSISTENCY (FINE-GRAINED SOIL)

TERM	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	0 to 2
SOFT	3 to 4
MEDIUM STIFF	5 to 8
STIFF	9 to 15
VERY STIFF	16 to 30
HARD	31 to 50
VERY HARD	> 50

VALUES OF PERCENT CONTENT ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE.
WHEN NO TESTING WAS PERFORMED, VALUES OF PERCENT CONTENT ARE ESTIMATED BASED ON VISUAL OBSERVATION.

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BORING NUMBER B-41A-1

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.70 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/20/19
COMPLETED 12/20/19
SIZE AND TYPE OF BIT 5-7/8", 3-7/8", & 2-15/16" Tri-Cone Roller Bit
COMPLETION DEPTH 70 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 20 **DIST.** 18
UNDIST. 2 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5.5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.42	5" Asphalt	5.28	Mobilize to boring at 7:10 AM Start boring at 7:50 AM Drill through surface course with 5-7/8" tri-cone roller bit (TCRB) Hand clear to 6' below grade
	GB S-1						Wet, grey c.-f. SAND, sm. f. Gravel, tr. Silt (Class 7) (FILL)		Grab S-1
	GB S-2						Moist, brown/black f.-c. SAND, sm. f.-c. Gravel, lt. Silt (wood fragments) (Class 7) (FILL)		Grab S-2
5	GB S-3						Moist/wet, grey f.-m. SAND, lt. Silt, tr. f. Gravel (Class 7) (FILL)		Grab S-3
	SS S-4	12	5-10-8-5 (18)				Wet, brown f.-c. SAND, sm. Silt, tr. f. Gravel (brick fragments) (Class 7) (FILL)		Take S-4
10	SS S-5	24	6-5-5-3 (10)		Class 7		Wet, brown/grey f.-c. SAND, sm. Silt, lt. f. Gravel (Class 7) (FILL)		Take S-5
	SS S-6	24	3-4-3-3 (7)				Wet, grey/brown f.-m. SAND, sm. Silt, tr. f. Gravel (Class 7) (FILL)		Take S-6 Add 15' of 4" casing to 13' below grade Mix drilling mud Drill to 15' below grade using 2-15/16" TCRB
15	SS S-7	0	5-4-3-3 (7)				No Recovery		Take S-7
						17.00		-11.30	Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 2-15/16" TCRB Driller noted strata changed to clay between 15' and 20' below grade Redrill to 20' below grade using 3-7/8" TCRB
20	ST U-1	0			Class 6		No Recovery		Take U-1
	SS S-8	24	WOH-WOH-WOH-WOH				Wet, grey ORGANIC CLAY, sm. Silt, tr. f. Sand (shell fragments) (Class 6) (OH) (P.P.=*0.094TSF)		Take S-8 Drill to 24' below grade using 3-7/8" TCRB
25	ST U-2	24					Wet, grey ORGANIC CLAY, lt. Silt, tr. f. Sand (OH)		Take U-2
						26.00		-20.30	
	SS S-9	24	8-7-12-14 (19)		Class 3		Wet, grey f.-m. SAND, sm. Organic Clay (Class 3b) (SC)		Take S-9 Drill to 30' below grade using 3-7/8" TCRB
30						29.00		-23.30	
	SS S-10	13	8-7-10-12 (17)		Class 3		Wet, brown f.-c. SAND, tr. Silt, tr. f. Gravel (Class 3b) (SP)		Take S-10 Drill to 35' below grade using 3-7/8" TCRB
						33.50		-27.80	
35					Class 3				

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MFS BORING LOG WITHOUT ROCK CORING (NYC) - 1214013_GINT.GPJ - 1/22/20 11:14 - P:\JOB_FOLDERS\3\111 NEW YORK\2019\1119060\ENGINEERING DATA\GEOTECHNICAL\GINT\LOGS\1119060_GINT LOGS.GPJ

MFS Engineers & Surveyors
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BORING NUMBER B-41A-1

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-11	14	7-9-8-10 (17)		Class 3		Wet, brown f.-m. SAND, lt. Silt (Class 3b) (SM)		Take S-11 Drill to 40' below grade using 3-7/8" TCRB
40	SS S-12	16	7-9-13-10 (22)				Wet, grey/brown f.-m. SAND and Silt, tr. Clay, tr. f. Gravel (Class 3b) (SM)		Take S-12 Drill to 45 below grade using 3-7/8" TCRB
						43.50		-37.80	
45	SS S-13	20	7-5-6-7 (11)		Class 5		Wet, brown SILT, sm. Clay, tr. f. Sand (Class 5b) (ML)		Take S-13 Drill to 50' below grade using 3-7/8" TCRB
						48.50		-42.80	
50	SS S-14	16	2-3-4-4 (7)				Wet, brown SILT, sm. Clay, lt. f. Sand (Class 6) (ML) (P.P.=0.25TSF)		Take S-14 Drill to 55' below grade using 3-7/8" TCRB
55	SS S-15	12	4-5-4-4 (9)		Class 6		Wet, brown SILT, lt. f. Sand, lt. Clay (Class 6) (ML)		Take S-15 Drill to 60' below grade using 3-7/8" TCRB
60	SS S-16	19	4-4-5-9 (9)				Wet, brown SILT, sm. f.-m. Sand, lt. Clay (Class 6) (ML)		Take S-16 Drill to 65' below grade using 3-7/8" TCRB
65	SS S-17	24	WOH-WOH-2-3				Wet, brown SILT, sm. Clay, tr. f. Sand (Class 6) (ML) (P.P.=0.5TSF)		Take S-17 Drill to 68' below grade using 3-7/8" TCRB
						67.50		-61.80	
70	SS S-18	10	12-13-14-18 (27)		Class 3	70.00	Wet, brown f.-c. SAND, lt. Silt, tr. f. Gravel (Class 3b) (SM)	-64.30	Take S-18 End of boring at 11:35 AM to 70' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch

Bottom of borehole at 70.0 feet.

* Pocket Penetrometer reading take with adapter foot attachment in the field. Values shown have been corrected to an equivalent 1/4-inch diameter piston.

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BORING NUMBER B-41A-2(A)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.67 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/20/19
COMPLETED 12/20/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit
COMPLETION DEPTH 1 feet
ROCK DEPTH ----
CASING ----
NO. SAMPLES 1 **DIST.** 1
UNDIST. 0 **CORE** 0
CASING HAMMER ---
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING ----
WEIGHT ---- **DROP** ----
AT END OF DRILLING ----
AFTER DRILLING ----
SAMPLER ----
FOREMAN Ed Flanagan
SAMPLER HAMMER ----
INSPECTOR Gilbert Del Orbe
WEIGHT ---- **DROP** ----
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0	GB S-1				Class 7	0.50 1.00	6" Asphalt Moist, grey/black f.-c. SAND. sm. c.-f. Gravel, lt. Silt (Class 7) (FILL) Bottom of borehole at 1.0 feet.	5.17 4.67	Mobilize to hole at 12:20 PM Start boring at 12:45 PM Drill through surface course with 3-7/8" drag bit Hand clear to 1' below grade Obstruction (concrete) encountered 1' below grade. Re-attempt boring at 41A-2(B) due to obstruction End of boring at 1:00 PM to 1' below grade Backfill hole with soil cuttings Patch to grade with concrete patch

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BORING NUMBER B-41A-2(B)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.67 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/23/19
COMPLETED 12/23/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit
COMPLETION DEPTH 0.25 feet
ROCK DEPTH ----
CASING ----
NO. SAMPLES 0 **DIST.** 0
UNDIST. 0 **CORE** 0
CASING HAMMER ---
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING ----
WEIGHT ---- **DROP** ----
AT END OF DRILLING ----
AFTER DRILLING ----
SAMPLER ----
FOREMAN Ed Flanagan
SAMPLER HAMMER ----
INSPECTOR Gilbert Del Orbe
WEIGHT ---- **DROP** ----
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.25	3" Asphalt	5.42	Start boring at 8:15 AM Drill through surface course with 3-7/8" drag bit Attempt to hand clear to 1' below grade Old railroad track encountered 3" below grade Re-attempt boring at 41A-2(C) due to obstruction End of boring at 8:20 AM to 3" below grade Backfill hole with soil cuttings Patch to grade with concrete patch
							Bottom of borehole at 0.3 feet.		

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BORING NUMBER B-41A-2(C)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.67 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/23/19
COMPLETED 12/23/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit, 5-7/8", 3-7/8", & 2-15/16" TCRB
COMPLETION DEPTH 60 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 15 **DIST.** 15
UNDIST. 0 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.67	8" Asphalt	5.00	Start boring at 8:45 AM
						1.33	8" Concrete	4.34	Drill through surface course with 3-7/8" drag bit and 5-7/8" tri-cone roller bit (TCRB)
	GB S-1						Moist, brown f.-c. SAND, lt. f. Gravel, tr. Silt (Class 7) (FILL)		Hand clear to 6' below grade
5	GB S-2						Moist/wet, brown f.-c. SAND, lt. f. Gravel, tr. Silt (Class 7) (FILL)		Grab S-1 Grab S-2
	SS S-3	1	1-2-1-1 (3)				Wet, brown f.-c. SAND, lt. f. Gravel, tr. Silt (Class 7) (FILL)		Take S-3
10	SS S-4	3	1-3-3-2 (6)				Wet, brown/grey f.-c. SAND, tr. f. Gravel, tr. Silt (Class 7) (FILL)		Take S-4
	SS S-5	12	1-WOH-1-1				Wet, brown f.-c. SAND, tr. f. Gravel, tr. Silt (Class 7) (FILL)		Take S-5 Add 15' of 4" casing to 13' below grade Slow advancement at approximately 12' below grade Mix drilling mud Drill to 15' below grade using 3-7/8" TCRB
15					Class 7				
	SS S-6	9	3-2-2-2 (4)				Wet, black f.-c. SAND, lt. Silt, lt. f. Gravel (wood fragments) (Class 7) (FILL)		Take S-6 Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 3-7/8" TCRB
20									
	SS S-7	6	5-4-3-5 (7)				Wet, black f.-c. SAND and f.-c. Gravel, lt. Silt (Class 7) (FILL)		Take S-7 Add 5' of 4" casing to 23' below grade (25' total) Drill to 25' below grade using 2-15/16" TCRB
25									
	SS S-8	7	10-23-33-18 (56)				Wet, black f.-m. SAND, lt. Silt, lt. f.-c. Gravel (wood fragments) (Class 7) (FILL)		Take S-8 Add 5' of 4" casing to 28' below grade (30' total) Slow advancement of casing
						28.50		-22.83	Drill to 30' below grade using 2-15/16" TCRB
30									Wood fragments observed in soil cuttings
	SS S-9	15	16-13-15-9 (28)		Class 3		Wet, brown f.-m. SAND, sm. Silt (Class 3b) (SM)		Take S-9 Mix more drilling mud Drill to 35' below grade using 3-7/8" TCRB
						33.50		-27.83	
35					Class 5				

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BORING NUMBER B-41A-2(C)

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-10	18	14-14-23-18 (37)		Class 5		Wet, brown SILT and f.-m. Sand, tr. Clay (Class 5a) (ML)		Take S-10 Drill to 40' below grade using 3-7/8" TCRB
						38.50		-32.83	
40	SS S-11	8	3-50/5"		Class 4	40.92	Wet, brown CLAY, sm. Silt, tr. f. Sand (wood fragments) (Class 4c) (CL) (P.P.=1TSF)	-35.25	Take S-11 Refusal at 40'-11" below grade Drill to 45' below grade using 3-7/8" TCRB
							Assumed Boulder		Assumed boulder from approximately 40'-11" to 43' below grade
						43.00		-37.33	
45	SS S-12	12	17-16-15-20 (31)		Class 3		Wet, brown f.-c. SAND, lt. Silt, lt. c.-f. Gravel (Class 3a) (SM)		Attempt S-12. Hole collapsed while lowering split spoon Add 15' of 4" casing to 43' below grade (45' total) Re-drill to 45' below grade using 3-7/8" TCRB
						48.50		-42.83	
50	SS S-13	14	10-9-11-16 (20)				Wet, brown f.-m. SAND, tr. Silt, tr. f. Gravel (Class 3b) (SP-SM)		Take S-12 Drill to 50' below grade using 3-7/8" TCRB Take S-13 Drill to 55' below grade using 3-7/8" TCRB
55	SS S-14	3	8-9-10-12 (19)		Class 3		Wet, brown f.-c. SAND, lt. f.-c. Gravel, tr. Silt (Class 3b) (SP-SM)		Take S-14 Drill to 58' below grade using 3-7/8" TCRB
60	SS S-15	16	18-13-16-18 (29)				Wet, brown f.-c. SAND, tr. Silt, tr. f. Gravel (Class 3b) (SP-SM)		Take S-15 End of boring at 12:05 PM to 60' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch
						60.00		-54.33	

Bottom of borehole at 60.0 feet.

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BORING NUMBER B-62-1

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 8.57 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/19/19
COMPLETED 12/19/19
SIZE AND TYPE OF BIT 5-7/8" and 3-7/8" Tri-Cone Roller Bit
COMPLETION DEPTH 60 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 17 **DIST.** 16
UNDIST. 1 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 6.5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 7
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						1.00	12" Concrete	7.57	Mobilize to boring at 7:45 AM Start boring at 8:05 AM Drill through surface course with 5-7/8" tri-cone roller bit (TCRB) Hand clear to 6' below grade
	GB S-1						Moist, brown/black f.-c. SAND, sm. f.-c. Gravel, lt. Silt (Class 7) (FILL)		Grab S-1
	GB S-2						Moist, brown f.-c. SAND, sm. f.-c. Gravel, lt. Silt (brick fragments) (Class 7) (FILL)		Grab S-2
5	GB S-3						Moist, brown f.-c. SAND, sm. f.-c. Gravel, lt. Silt (Class 7) (FILL)		Grab S-3
	SS S-4	6	2-2-1-2 (3)				Wet, brown/black f.-c. SAND, sm. Silt, lt. Clay, tr. f. Gravel (Class 7) (FILL)		Take S-4
10	SS S-5	10	8-3-4-4 (7)		Class 7		Wet, black/brown f.-c. SAND, sm. Silt, lt. f.-c. Gravel, tr. Clay (Class 7) (FILL)		Take S-5
	SS S-6	1	1-1-2-3 (3)				Wet, brown f. SAND, sm. Silt, lt. c.-f. Gravel (Class 7) (FILL)		Take S-6 Add 15' of 4" casing to 13' below grade Mix drilling mud Drill to 15' below grade using 2-15/16" TCRB
15									
	SS S-7	0	WOH-WOH-1-1			16.00	No Recovery	-7.43	Take S-7 Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 2-15/16" TCRB
20									
	SS S-8	16	WOH-WOH-WOH-WOH				Wet, grey CLAY, lt. Silt, tr. f. Sand, tr. Organics (shell fragments) (Class 6) (CL) (P.P.=*0.063TSF)		Take S-8 Drill to 22' below grade using 3-7/8" TCRB
	ST U-1	24			Class 6		Wet, grey CLAY, sm. Silt, tr. f. Sand, tr. Organics (shell fragments) (CL)		Take U-1
25	SS S-9	24	1-1-2-3 (3)				Wet, grey CLAY, sm. Silt, tr. f. Sand, tr. Organics (shell fragments) (Class 6) (CL) (P.P.=*0.156TSF)		Take S-9 Drill to 30' below grade using 3-7/8" TCRB
30									
	SS S-10	12	2-4-6-9 (10)			30.50	S-10A - Top 3": Wet, grey CLAY, sm. Silt, tr. f. Sand, tr. Organics (shell fragments) (Class 6) (CL)	-21.93	Take S-10 Drill to 35' below grade using 3-7/8" TCRB
					Class 3	33.50	S-10B - Bottom 9": Wet, grey f.-m. SAND, lt. Clay, tr. Organics (Class 3b) (SC)	-24.93	
35					Class 4				

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BORING NUMBER B-62-1

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-11	15	3-4-4-4 (8)		Class 4		Wet, grey CLAY, sm. f. Sand, lt. Silt (Class 4c) (CL)		Take S-11 Drill to 40' below grade using 3-7/8" TCRB
						38.50		-29.93	
40	SS S-12	12	5-5-9-10 (14)		Class 3		Wet, brown f.-c. SAND, lt. Silt (Class 3b) (SM)		Take S-12 Drill to 45' below grade using 3-7/8" TCRB
45	SS S-13	18	7-12-15-14 (27)				Wet, tan/light brown f. SAND and Silt, tr. Clay, tr. f. Gravel (Class 3b) (SM)		Take S-13 Drill to 50' below grade using 3-7/8" TCRB
						48.50		-39.93	
50	SS S-14	24	5-6-4-4 (10)		Class 5		Wet, tan/light brown SILT, sm. Clay, tr. f. Sand (Class 5b) (ML) (P.P.=0.5TSF)		Take S-14 Drill to 55' below grade using 3-7/8" TCRB
55	SS S-15	18	3-6-5-5 (11)				Wet, tan/light brown SILT, sm. Clay, tr. f. Sand (Class 5b) (ML) (P.P.=0.5TSF)		Take S-15 Drill to 58' below grade using 3-7/8" TCRB
						57.50		-48.93	
60	SS S-16	12	13-14-18-14 (32)		Class 3	60.00	Wet, tan/light brown f.-m. SAND, sm. Silt, tr. Clay (Class 3a) (SM)	-51.43	Take S-16 End of boring at 10:40 AM to 60' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch

Bottom of borehole at 60.0 feet.

* Pocket Penetrometer reading take with adapter foot attachment in the field. Values shown have been corrected to an equivalent 1/4-inch diameter piston.

MFS BORING LOG WITHOUT ROCK CORING (NYC) - 1214013_GINT.GPJ - 1/22/20 11:14 - P:\JOB_FOLDERS\3)\11 NEW YORK\2019\1119060\ENGINEERING DATA\GEOTECHNICAL\GINT\LOGS\1119060_GINT LOGS.GPJ

MFS Engineers & Surveyors
2780 Hamilton Boulevard
South Plainfield, New Jersey 07080
Telephone: Telephone: (908) 922-4622
Fax: Fax: (866) 517-7413

BORING NUMBER B-234-1(A)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 6.50 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/23/19
COMPLETED 12/23/19
SIZE AND TYPE OF BIT 5-7/8" Tri-Cone Roller Bit
COMPLETION DEPTH 2 feet
ROCK DEPTH ----
CASING ---
NO. SAMPLES 1 **DIST.** 1
UNDIST. 0 **CORE** 0
CASING HAMMER ---
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING ----
WEIGHT ---- **DROP** ----
AT END OF DRILLING ----
AFTER DRILLING ----
SAMPLER ----
FOREMAN Ed Flanagan
SAMPLER HAMMER ----
INSPECTOR Gilbert Del Orbe
WEIGHT ---- **DROP** ----
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0	GB S-1				Class 7	0.42 2.00	5" Concrete Moist, brown f.-m. SAND, lt. Silt, lt. f.-c. Gravel (Class 7) (FILL) Bottom of borehole at 2.0 feet.	6.08 4.50	Start boring at 12:50 PM Drill through surface course with 5-7/8" tri-cone roller bit Hand clear to 2' below grade Grab S-1 Utility pipe encountered at 2' below grade Re-attempt boring at 234-1(B) due to utility conflict End of boring at 1:10 PM to 2' below grade Backfill hole with soil cuttings Patch to grade with concrete patch

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BORING NUMBER B-234-1(B)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 6.50 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/23/19
COMPLETED 12/26/19
SIZE AND TYPE OF BIT 5-7/8" Tri-Cone Roller Bit
COMPLETION DEPTH 3.5 feet
ROCK DEPTH ----
CASING ---
NO. SAMPLES 0 **DIST.** 0
UNDIST. 0 **CORE** 0
CASING HAMMER ---
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING ----
WEIGHT ---- **DROP** ----
AT END OF DRILLING ----
AFTER DRILLING ----
SAMPLER ----
FOREMAN Ed Flanagan
SAMPLER HAMMER ----
INSPECTOR Gilbert Del Orbe
WEIGHT ---- **DROP** ----
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.42	5" Concrete	6.08	12/23/19 Start boring at 1:16 PM Drill through surface course with 5-7/8" tri-cone roller bit Hand clear to 2' below grade End of boring operations for the day 12/26/19 Resume boring operations at 8:00 AM Continue hand clearing Utility pipe encountered at 3.5' below grade Re-attempt boring at 234-1(C) due to utility conflict End of boring at 8:17 PM to 3.5' below grade Backfill hole with soil cuttings Patch to grade with concrete patch
					Class 7		See Log for Boring B-234-1(C)		
						3.50		3.00	
							Bottom of borehole at 3.5 feet.		

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BORING NUMBER B-234-1(C)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 6.50 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/26/19
COMPLETED 12/26/19
SIZE AND TYPE OF BIT 5-7/8", 3-7/8", & 2-15/16" Tri-Cone Roller Bit
COMPLETION DEPTH 62 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 15 **DIST.** 14
UNDIST. 1 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5.75
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 6
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon and 3-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.42	5" Concrete	6.08	Start boring at 8:20 AM Drill through surface course with 5-7/8" tri-cone roller bit Hand clear to 6' below grade
	GB S-1						Moist, brown f.-c. SAND, lt. Silt, lt. f.-c. Gravel (Class 7) (FILL)		Grab S-1
5	GB S-2						Moist/wet, brown/grey f.-c. SAND, lt. Silt, lt. f. Gravel (petroleum odor) (Class 7) (FILL)		Grab S-2
	SS S-3	12	5-6-6-5 (12)				Wet, grey/brown f.-c. SAND, sm. Silt, tr. f. Gravel (wood fragments) (petroleum odor) (Class 7) (FILL)		Take S-3
10	SS S-4	14	10-10-3-3 (13)		Class 7		Wet, grey f.-m. SAND, sm. Silt, tr. f Gravel, tr. Organics (petroleum odor) (Class 7) (FILL)		Take S-4
	SS S-5	5	3-3-2-2 (5)				Wet, grey/brown f.-c. SAND, lt. f.-c. Gravel, lt. Silt (wood fragments) (petroleum odor) (Class 7) (FILL)		Take S-5 Add 15' of 4" casing to 13' below grade Drill to 15' below grade using 2-15/16" tri-cone roller bit (TCRB)
15									Unable to obtain sample at 15' below grade due to casing being pushed down while clearing out casing
						18.50		-12.00	Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 2-15/16" TCRB
20	SS S-6	0	1-2-1-2 (3)				No Recovery		Take S-6 Add 5' of 4" casing to 23' below grade (25' total) Drill to 25' below grade using 2-15/16" TCRB Drilling through clay/silt at 23' below grade
25	SS S-7	20	WOH-WOH-1-1		Class 6		Wet, grey ORGANIC SILT, sm. Clay, tr. f. Sand (Class 6) (OH) (P.P.=0.25TSF)		Take S-7 Drill to 27' below grade using 3-7/8" TCRB
	ST U-1	24					Wet, grey ORGANIC SILT, sm. Clay, tr. f. Sand (Class 6) (OH)		Take U-1
						29.00		-22.50	
30	SS S-8	13	2-4-4-6 (8)				Wet, grey SILT and f. Sand, sm. Clay (Class 6) (ML) (P.P.=0.25TSF)		Take S-8 Drill to 35' below grade using 3-7/8" TCRB
					Class 6	33.00		-26.50	
35					Class 3				

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BORING NUMBER B-234-1(C)

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-9	10	5-5-6-6 (11)		Class 3		Wet, grey/brown f.-c. SAND, sm. Silt, lt. Clay, tr. f. Gravel (clay lumps) (Class 3b) (SM)		Take S-9 Drill to 40' below grade using 3-7/8" TCRB
						38.50		-32.00	
40	SS S-10	13	6-9-7-8 (16)		Class 5		Wet, brown SILT, sm. Clay, tr. f. Sand, tr. f. Gravel (Class 5b) (ML) (P.P.=1.5TSF)		Take S-10 Drill to 45' below grade using 3-7/8" TCRB
45	SS S-11	14	5-6-4-4 (10)				Wet, brown SILT, sm. Clay, lt. f. Sand (Class 5b) (ML)		Take S-11 Drill to 50' below grade using 3-7/8" TCRB
						48.50		-42.00	
50	SS S-12	20	4-5-3-4 (8)		Class 4		Wet, brown CLAY and Silt, lt. f. Sand (Class 4c) (CL) (P.P.=0.5TSF)		Take S-12 Drill to 55' below grade using 3-7/8" TCRB
						53.50		-47.00	
55	SS S-13	13	4-5-5-8 (10)		Class 3		Wet, brown f.-m. SAND, sm. Silt, tr. Clay (Class 3b) (SM)		Take S-13 Drill to 60' below grade using 3-7/8" TCRB
60	SS S-14	15	5-9-11-10 (20)				Wet, brown f.-m. SAND, sm. Silt, tr. Clay (Class 3b) (SM)		Take S-14
						62.00		-55.50	Finish boring at 10:29 AM to 62' below grade Backfill hole with hole plug Patch to grade with concrete patch Drum soil cuttings and drilling mud

Bottom of borehole at 62.0 feet.

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MFS Engineers & Surveyors
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BORING NUMBER B-293-1

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.42 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/13/19
COMPLETED 12/13/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit, 2-15/16" Tri-Cone Roller Bit
COMPLETION DEPTH 70 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 17 **DIST.** 17
UNDIST. 0 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 6
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5.75
AFTER DRILLING ----
SAMPLER 2-inch and 3-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.83	10" Asphalt	4.59	Mobilize to boring at 7:25 AM Start boring at 8:28 AM Drill through surface course with 3-7/8" drag bit Hand clear to 6' below grade
	GB S-1						Moist, brown f.-c. SAND and c.-f. Gravel, lt. Silt, tr. Cobbles (Class 7) (FILL) Moist, brown f.-c. SAND, sm. Silt, lt. f.-c. Gravel (Class 7) (FILL)		Grab S-1
5	GB S-2						Moist, brown f.-c. SAND, sm. Silt, lt. f.-c. Gravel (Class 7) (FILL)		Grab S-2
	SS S-3	12	1-1-1-2 (2)				Wet, brown f.-c. SAND, sm. Silt, lt. f. Gravel (Class 7) (FILL)		Take S-3
10	SS S-4	24	2-1-1-1 (2)				Wet, brown f.-c. SAND, sm. Silt, lt. f. Gravel (Class 7) (FILL)		Take S-4
	SS S-5	24	1-2-2-2 (4)				Wet, brown/grey f.-c. SAND, sm. Silt, lt. f. Gravel (Class 7) (FILL)		Take S-5 Add 15' of 4" casing to 13' below grade Mix drilling mud Drill to 15' below grade using 2-15/16" tri-cone roller bit (TCRB)
15									
	SS S-6	1	1-2-3-3 (5)		Class 7		Wet, brown c.-f. GRAVEL, lt. f.-m. Sand (Class 7) (FILL)		Take S-6 Coarse gravel in split spoon shoe Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 2-15/16" TCRB
20									
	SS S-7	7	1-2-2-1 (4)				Wet, brown/grey/black f.-c. SAND and f.-c. Gravel, lt. Silt (Class 7) (FILL)		Take S-7 Add 5' of 4" casing to 23' below grade (25' total) Drill to 25' below grade using 2-15/16" TCRB Slow, hard drilling from 22' to 25' below grade
25									
	SS S-8	10	6-4-5-4 (9)				Wet, brown f.-c. SAND, lt. f.-c. Gravel, tr. Silt (Class 7) (FILL)		Take S-8 Add 5' of 4" casing to 28' below grade (30' total) Drill to 30' below grade using 2-15/16" TCRB Slow drilling due to gravel getting caught between rods and casing while drilling
30									
	SS S-9	11	5-3-7-7 (10)				Wet, light brown/grey f.-c. SAND, lt. f.-c. Gravel, tr. Silt (shell and brick fragments) (Class 7) (FILL)		Take S-9 Add 5' of 4" casing to 33' below grade (35' total) Drill to 35' below grade using 2-15/16" TCRB Slow drilling due to gravel getting
35									

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BORING NUMBER B-293-1

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-10	2	7-4-8-6 (12)				Wet, black/brown f.-c. SAND, sm. c.-f. Gravel, tr. Silt (Class 7) (FILL)		caught between rods and casing while drilling Take S-10 Poor recovery (2" c. gravel). Retake S-10 with 3" O.D. split spoon Soil description taken from 3" O.D. split spoon sample Add 5' of 4" casing to 38' below grade (40' total) Drill to 40' below grade using 2-15/16" TCRB Slow drilling due to gravel getting caught between rods and casing while drilling Take S-11 Add 5' of 4" casing to 43' below grade (45' total) Drill to 45' below grade using 2-15/16" TCRB Slow drilling due to gravel getting caught between rods and casing while drilling Take S-12 Add 5' of 4" casing to 48' below grade (50' total) Drill to 50' below grade using 2-15/16" TCRB Take S-13 Drill to 55' below grade using 2-15/16" TCRB Take S-14 Drill to 58' below grade using 2-15/16" TCRB Take S-15 Drill to 65' below grade using 2-15/16" TCRB
40	SS S-11	3	11-5-5-6 (10)		Class 7		Wet, brown f.-c. SAND, lt. f.-c. Gravel, tr. Silt (brick fragments) (Class 7) (FILL)		
45	SS S-12	13	6-4-3-4 (7)				Wet, brown/black f.-m. SAND, sm. c.-f. Gravel, lt. Silt, tr. Clay (brick and wood fragments) (Class 7) (FILL)		
						48.50		-43.08	
50	SS S-13	15	3-3-4-4 (7)		Class 6		Wet, brown/grey/black f.-m. SAND, sm. Silt, tr. Clay (Class 6) (SM)		
55	SS S-14	24	1-1-5-11 (6)			55.83	S-14A: Top 10" - Wet, brown f. SAND and Silt (Class 6) (SM)	-50.41	
					Class 6	56.67		-51.25	
						57.50	S-14B: Middle 10" - Wet, black SILT, lt. Clay, tr. f. Sand (Class 6) (ML) (P.P.=0.5TSF)	-52.08	
60	SS S-15	17	3-4-9-14 (13)		Class 6		S-14C: Bottom 4" - Wet, brown f. SAND and Silt, lt. Clay (Class 6) (SM)		
					Class 5		Wet, black/brown SILT, sm. f. Sand, lt. Clay (organic odor) (Class 6) (ML) (P.P.=2TSF)		
						62.50		-57.08	
65	SS S-16	24	WOH-1-1-3 (2)		Class 6		Wet, brown CLAY, lt. Silt, tr. f. Sand (f. sand at bottom of sample) (Class 6) (CL) (P.P.=0.5TSF)		
						67.50		-62.08	
70	SS S-17	15	8-9-10-8 (19)		Class 3	70.00	Wet, brown f.-c. SAND, tr. Silt (mica fragments) (Class 3b) (SP-SM)	-64.58	Take S-17 Finish boring to 70' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch

Bottom of borehole at 70.0 feet.

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BORING NUMBER B-386-1(A)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.56 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/16/19
COMPLETED 12/18/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit, 3-7/8" Tri-Cone Roller Bit
COMPLETION DEPTH 8.67 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 4 **DIST.** 4
UNDIST. 0 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5.5
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						0.50	6" Asphalt	5.06	12/16/19 Mobilize to boring at 12:45 PM Start boring at 12:50 PM Drill through surface course with 3-7/8" drag bit Hand clear to 6' below grade Grab S-1 Grab S-2 End of boring operations for the day at 1:25 PM 12/18/19 Resume boring operation at 8:10 AM Take S-3 Refusal at 6'-4" below grade Mix drilling mud Drill to 8' below grade using 3-7/8" tri-cone roller bit Take S-4 Refusal at 8'-8" below grade (spoon bouncing) Reattempt boring at B-386-1(B) due to copper wire recovered from split spoon Finish boring at 8:40 AM to 8'-8" below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch
	GB S-1						Moist, grey f.-c. SAND, sm. c.-f. Gravel, tr. Silt, tr. Cobbles (Class 7) (FILL) Moist, brown f.-c. SAND, sm. f.-c. Gravel, lt. Silt (security glass fragments) (Class 7) (FILL)		
5	GB S-2				Class 7		Moist/wet, brown f.-c. SAND, lt. f.-c. Gravel, lt. Silt, tr. Organics (brick fragments) (Class 7) (FILL)		
	SS S-3	3	50/4"				Wet, brown f.-c. SAND, lt. f.-c. Gravel, lt. Silt (Class 7) (FILL)		
	SS S-4	2	20-50/2"			8.67	Copper wire and rubber fragments (Class 7) (FILL)	-3.11	
							Bottom of borehole at 8.7 feet.		

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BORING NUMBER B-386-1(B)

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.53 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/18/19
COMPLETED 12/18/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit, 3-7/8" & 2-15/16" TCRB
COMPLETION DEPTH 70 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 15 **DIST.** 15
UNDIST. 0 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5.5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5.75
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0									Mobilize to boring at 12:45 PM Start boring at 12:50 PM Drill through surface course with 3-7/8" drag bit Hand clear to 6' below grade
5							See Log for Boring B-386-1(A)		
						6.00 ▼		-0.47	
	SS S-1	10	1-2-1-1 (3)				Wet, brown f.-c. SAND, sm. Silt, lt. f.-c. Gravel (Class 7) (FILL)		Take S-1
10	SS S-2	8	4-5-18-10 (23)				Wet, brown f.-c. SAND, sm. Silt, lt. f.-c. Gravel (Class 7) (FILL)		Take S-2
	SS S-3	13	8-7-9-12 (16)				Wet, grey/brown f.-c. SAND, sm. f.-c. Gravel, lt. Silt (brick fragments) (Class 7) (FILL)		Take S-3 Add 15' of 4" casing to 13' below grade Drill to 15' below grade using 2-15/16" tri-cone roller bit (TCRB) Slow drilling due to gravel getting caught between rods and casing while drilling
15									
	SS S-4	0	17-18-11-12 (29)				No Recovery		Take S-4 Add 5' of 4" casing to 18' below grade (20' total) Drill to 20' below grade using 2-15/16" TCRB
20									
	SS S-5	11	11-6-2-3 (8)		Class 7		Wet, brown/grey f.-c. SAND, sm. f.-c. Gravel, tr. Silt (brick fragments) (Class 7) (FILL)		Take S-5 Add 5' of 4" casing to 23' below grade (25' total) Drill to 25' below grade using 2-15/16" TCRB Slow drilling due to gravel getting caught between rods and casing while drilling
25									
	SS S-6	8	11-5-4-5 (9)				Wet, brown/grey f.-c. SAND, sm. f.-c. Gravel, tr. Silt (brick fragments) (Class 7) (FILL)		Take S-6 Add 5' of 4" casing to 28' below grade (30' total) Drill to 30' below grade using 2-15/16" TCRB Slow drilling due to gravel getting caught between rods and casing while drilling
30									
	SS S-7	0	3-3-3-5 (6)				No Recovery		Take S-7 Add 5' of 4" casing to 33' below grade (35' total) Drill to 35' below grade using 2-15/16" TCRB Slow drilling due to gravel getting
35									

(Continued Next Page)

MFS BORING LOG WITHOUT ROCK CORING (NYC) - 1214013_GINT.GPJ - 1/22/20 11:14 - P:\JOB_FOLDERS\3\11 NEW YORK\2019\1119060\ENGINEERING DATA\GEOTECHNICAL\GINT\LOGS\1119060_GINT LOGS.GPJ

MFS Engineers & Surveyors
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BORING NUMBER B-386-1(B)

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35	SS S-8	7	4-4-4-5 (8)				Wet, brown f.-c. SAND, sm. f.-c. Gravel, tr. Silt (Class 7) (FILL)		caught between rods and casing while drilling Take S-8 Add 5' of 4" casing to 38' below grade (40' total) Drill to 40' below grade using 2-15/16" TCRB
40	SS S-9	2	4-3-4-3 (7)		Class 7		Wet, brown/grey/white c.-f. GRAVEL, tr. f.-c. Sand (Class 7) (FILL)		Take S-9 Add 5' of 4" casing to 43' below grade (45' total) Drill to 45' below grade using 2-15/16" TCRB
45	SS S-10	0	7-5-9-9 (14)			46.00	No Recovery	-40.47	Take S-10 Add 5' of 4" casing to 48' below grade (50' total) Drill to 50' below grade using 2-15/16" TCRB Hard, slow drilling from 49' to 50' below grade
50	SS S-11	9	3-3-10-7 (13)		Class 3		Wet, grey/brown f.-c. SAND, sm. c.-f. Gravel, tr. Silt (Class 3b) (SP-SM)		Take S-11 Add 5' of 4" casing to 53' below grade (55' total) Drill to 55' below grade using 3-7/8" TCRB
55	SS S-12	2	2-3-3-5 (6)		Class 6	53.50	Wet, black SILT and Clay, tr. f. Sand (Class 6) (ML)	-47.97	Take S-12 Drill to 60' below grade using 3-7/8" TCRB
60	SS S-13	24	10-8-10-9 (18)		Class 5	58.50	Wet, tan SILT and Clay, lt. f. Sand (Class 5b) (ML) (P.P.=0.5TSF)	-52.97	Take S-13 Drill to 65' below grade using 3-7/8" TCRB
65	SS S-14	18	5-3-6-6 (9)		Class 6	63.50	Wet, grey f. SAND, lt. Silt, lt. Clay (Class 6) (SM)	-57.97	Take S-14 Drill to 68' below grade using 3-7/8" TCRB
70	SS S-15	16	8-9-11-9 (20)		Class 3	67.50	Wet, brown f.-m. SAND, tr. Silt (Class 3b) (SP)	-61.97	Take S-15 Finish boring at 12:35 PM to 70' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch
						70.00	Bottom of borehole at 70.0 feet.	-64.47	

MFS BORING LOG WITHOUT ROCK CORING (NYC) - 1214013_GINT.GPJ - 1/22/20 11:14 - P:\JOB_FOLDERS\3)\11 NEW YORK\2019\1119060\ENGINEERING DATA\GEOTECHNICAL\GINT\LOGS\1119060_GINT LOGS.GPJ

MFS Engineers & Surveyors
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BORING NUMBER B-386-2

CLIENT H2M architects + engineers
PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work
MFS PROJECT NUMBER 1119060
PROJECT LOCATION Brooklyn, New York

DRILLING AGENCY Craig Geotechnical Drilling Inc.
SURFACE ELEVATION 5.81 feet+/-
DATUM NAVD88
DRILLING EQUIPMENT Truck-Mounted CME-75
DATE STARTED 12/16/19
COMPLETED 12/16/19
SIZE AND TYPE OF BIT 3-7/8" Drag Bit, 3-7/8" & 2-15/16" TCRB
COMPLETION DEPTH 60 feet
ROCK DEPTH ----
CASING 4-inch I.D. Steel Casing
NO. SAMPLES 15 **DIST.** 15
UNDIST. 0 **CORE** 0
CASING HAMMER Auto
GROUND WATER LEVELS (ft. BG):
AT TIME OF DRILLING 5
WEIGHT 140 pounds **DROP** 30 inches
AT END OF DRILLING 5.6
AFTER DRILLING ----
SAMPLER 2-inch O.D. Split Spoon
FOREMAN Ed Flanagan
SAMPLER HAMMER Auto
INSPECTOR Gilbert Del Orbe
WEIGHT 140 pounds **DROP** 30 inches
CHECKED BY Michael Mudalel, PE

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
0						1.00	1' Asphalt	4.81	Mobilize to boring at 8:00 AM Start boring at 8:10 AM Drill through surface course with 3-7/8" drag bit Hand clear to 6' below grade
	GB S-1						Moist, grey c.-f. SAND and c.-f. Gravel, lt. Silt (Class 7) (FILL) Moist, brown f.-c. SAND, lt. c.-f. Gravel, lt. Silt (Class 7) (FILL)		Grab S-1
5	GB S-1						Moist/wet, brown f.-c. SAND, lt. c.-f. Gravel, lt. Silt (Class 7) (FILL)		Grab S-2
	SS S-3	13	1-2-1-1 (3)				Wet, brown f.-c. SAND, sm. c.-f. Gravel, lt. Silt (Class 7) (FILL)		Take S-3
10	SS S-4	8	1-1-1-1 (2)				Wet, brown/black f.-c. SAND, lt. f.-c. Gravel, lt. Silt (Class 7) (FILL)		Take S-4
	SS S-5	8	1-1-1-1 (2)				Wet, brown/grey f.-c. SAND, lt. f.-c. Gravel, tr. Silt (Class 7) (FILL)		Take S-5 Mix drilling mud Add 15' of 4" casing to 13' below grade Drill to 15' below grade using 2-15/16" tri-cone roller bit (TCRB)
15									Slow drilling due to gravel getting caught between rods and casing while drilling
	SS S-6	0	2-1-2-2 (3)				No Recovery		Take S-6 Add 5' of 4" casing to 18' below grade (20' total)
20					Class 7				Drill to 20' below grade using 2-15/16" TCRB
	SS S-7	1	7-3-6-8 (9)				Wet, grey c.-f. GRAVEL (Class 7) (FILL)		Slow drilling due to gravel getting caught between rods and casing while drilling Take S-7 Add 5' of 4" casing to 23' below grade (25' total)
25									Drill to 25' below grade using 2-15/16" TCRB
	SS S-8	7	8-4-3-3 (7)				Wet, grey/brown f.-c. SAND, lt. f. Gravel, lt. Silt (Class 7) (FILL)		Slow drilling due to gravel getting caught between rods and casing while drilling Take S-8 Add 5' of 4" casing to 28' below grade (30' total)
30									Drill to 30' below grade using 2-15/16" TCRB
	SS S-9	1	3-6-10-8 (16)				Wet, grey/brown c.-f. GRAVEL, lt. f.-c. Sand, lt. Silt (Class 7) (FILL)		Slow drilling due to gravel getting caught between rods and casing while drilling Take S-9 Add 5' of 4" casing to 33' below grade (35' total)
35									

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Fax: Fax: (866) 517-7413

BORING NUMBER B-386-2

CLIENT H2M architects + engineers

PROJECT NAME BNYDC - Boilers, Substations, and Electrical Work

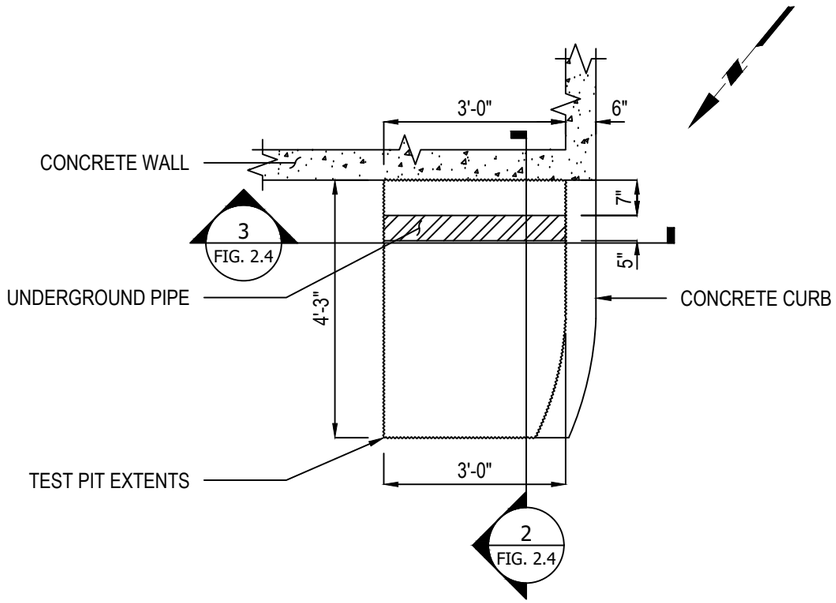
MFS PROJECT NUMBER 1119060

PROJECT LOCATION Brooklyn, New York

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY (in) (RQD%)	BLOW COUNTS / 6 INCHES (N VALUE)	GRAPHIC LOG	NYC BUILDING CODE	DEPTH BELOW SURFACE (ft)	MATERIAL DESCRIPTION	ELEVATION	REMARKS
35									
	SS S-10	10	5-6-12-12 (18)		Class 7		Wet, brown/grey f.-c. SAND, sm. Silt, sm. f.-c. Gravel (brick fragments) (Class 7) (FILL)		Drill to 35' below grade using 2-15/16" TCRB Take S-10 Add 5' of 4" casing to 38' below grade (40' total) Drill to 40' below grade using 2-15/16" TCRB
40									
	SS S-11	11	3-3-4-5 (7)				Wet, brown/black f.-c. SAND, sm. Silt, tr. f. Gravel (brick and wood fragments) (Class 7) (FILL)		Take S-11 Add 5' of 4" casing to 43' below grade (45' total) Drill to 45' below grade using 2-15/16" TCRB
						43.50		-37.69	
45									
	SS S-12	3	8-5-3-18 (8)		Class 6		Wet, brown/grey c.-f. GRAVEL, lt. Clay, tr. f. Sand (Class 6) (GC)		Take S-12 Add 5' of 4" casing to 48' below grade (50' total) Drill to 50' below grade using 2-15/16" TCRB Mix drilling mud Hard/slow drilling 48'-50' below grade (assumed boulder)
						48.00		-42.19	
							Assumed Boulder		
50						50.00		-44.19	
	SS S-13	0	50/4"		Class 2		No Recovery		Drillers losing drilling mud. Mixing additional mud Take S-13 Refusal 50'-4" below grade Drill to 55' below grade using 3-7/8" TCRB Driller losing drilling mud Mixing additional mud Hard slow drilling 50'-55'
55									
	SS S-14	10	8-10-30-32 (40)				Wet, grey c.-f. GRAVEL and c.-f. Sand (Class 2a) (GP)		Take S-14 Drill to 58' below grade using 3-7/8" TCRB Take S-15
						57.50		-51.69	
					Class 3	58.33		-52.52	
	SS S-15	16	28-31-33-29 (64)		Class 5		S-15A: Top 4" - Wet, grey c.-f. SAND, sm. c.-f. Gravel, lt. Silt (Class 3a) (SM)		
60						60.00		-54.19	Finish boring at 11:58 AM to 60' below grade Backfill hole with soil cuttings and hole plug Patch to grade with concrete patch
							S-15B: Bottom 12" - Wet, brown/olive SILT and f. Sand (Class 5a) (ML)		
							Bottom of borehole at 60.0 feet.		

MFS BORING LOG WITHOUT ROCK CORING (NYC) - 1214013_GINT.GPJ - 1/22/20 11:14 - P:\JOB_FOLDERS\3)\11 NEW YORK\2019\1119060\ENGINEERING DATA\GEOTECHNICAL\GINT\LOGS\1119060_GINT LOGS.GPJ

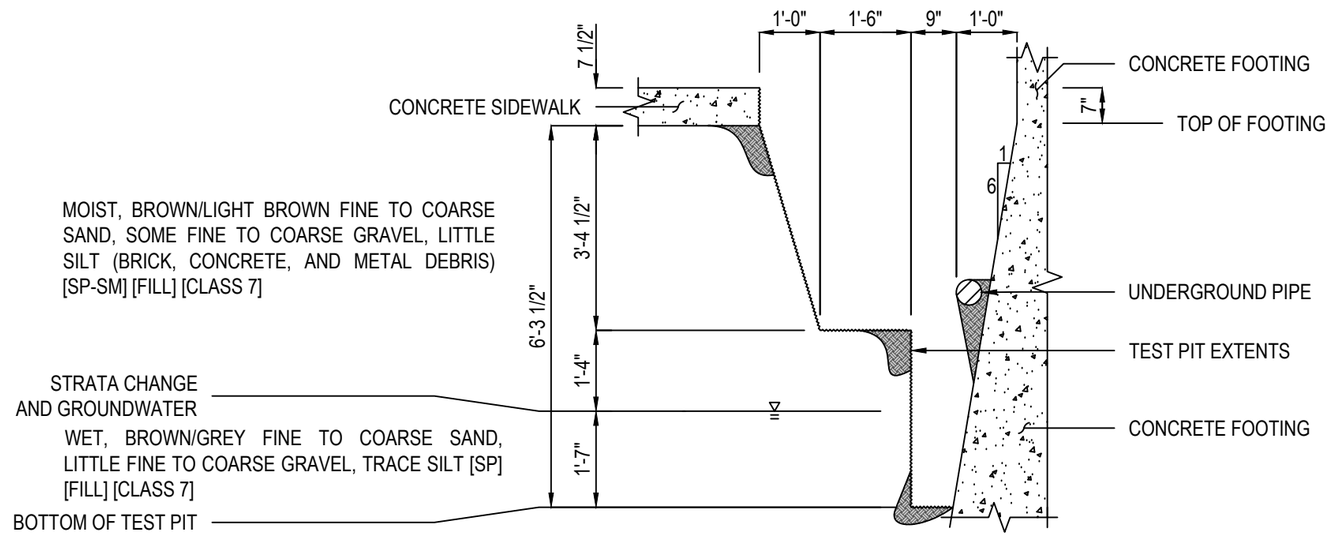
APPENDIX B
2019 MFS TEST PIT PLANS AND SECTIONS



1 TP-41A-1 PLAN

Scale: 1" = 2'-6"

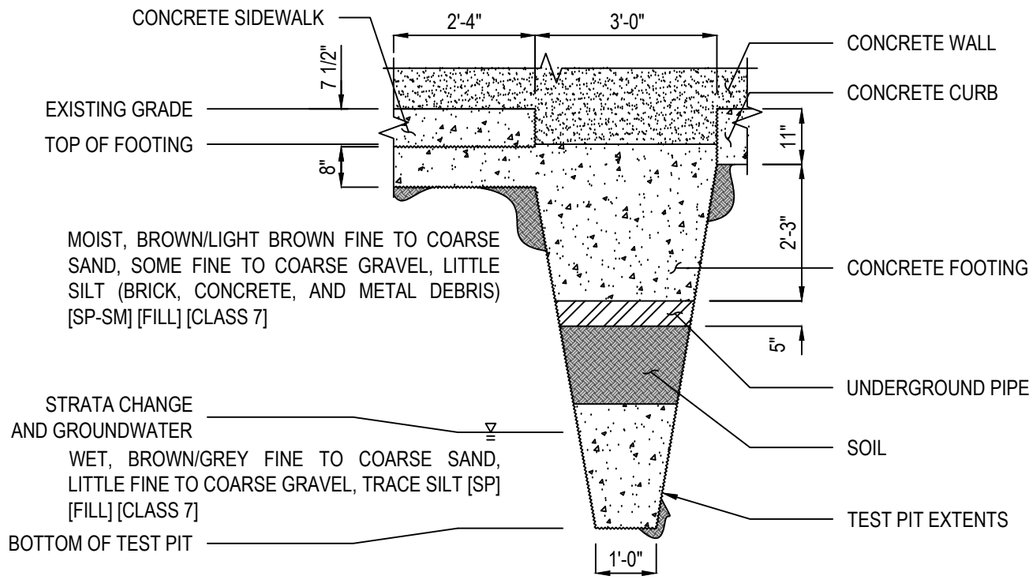
0 2.5' 5'



2 TP-41A-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'



3 TP-41A-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'

NOTES:

1. SEE FIGURE 2.0 FOR ALL GENERAL NOTES.
2. THE TEST PIT INVESTIGATION WAS UNABLE TO IDENTIFY THE BOTTOM EXTENT OF THE CONCRETE FOOTING DUE TO ENCOUNTERING THE GROUNDWATER TABLE.

MFS ENGINEERS & SURVEYORS

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F: 866.517.7413
N.Y. CERTIFICATE OF AUTHORIZATION: 0007564

PROJECT NAME

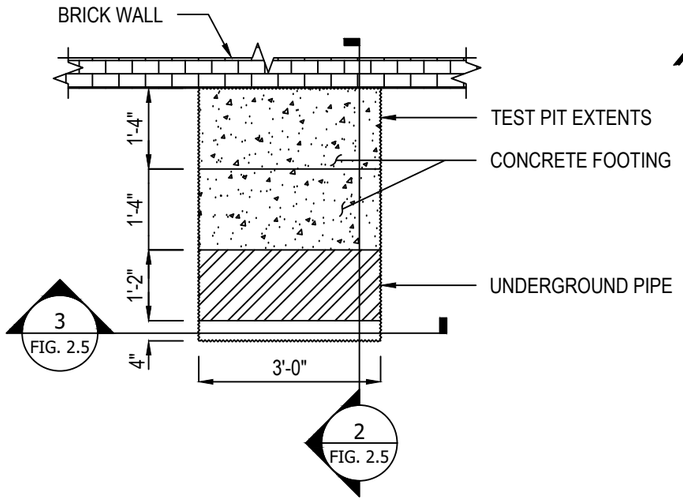
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE

TEST PIT PLAN AND SECTIONS

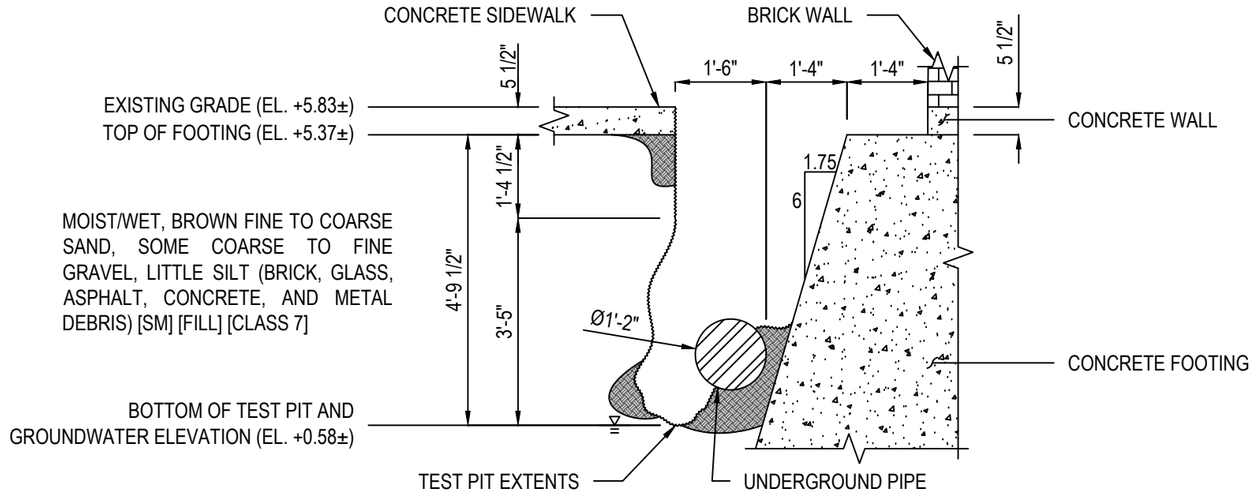
PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	APPENDIX B.1
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	1 OF 5



1 TP-41A-2 PLAN

Scale: 1" = 2'-6"

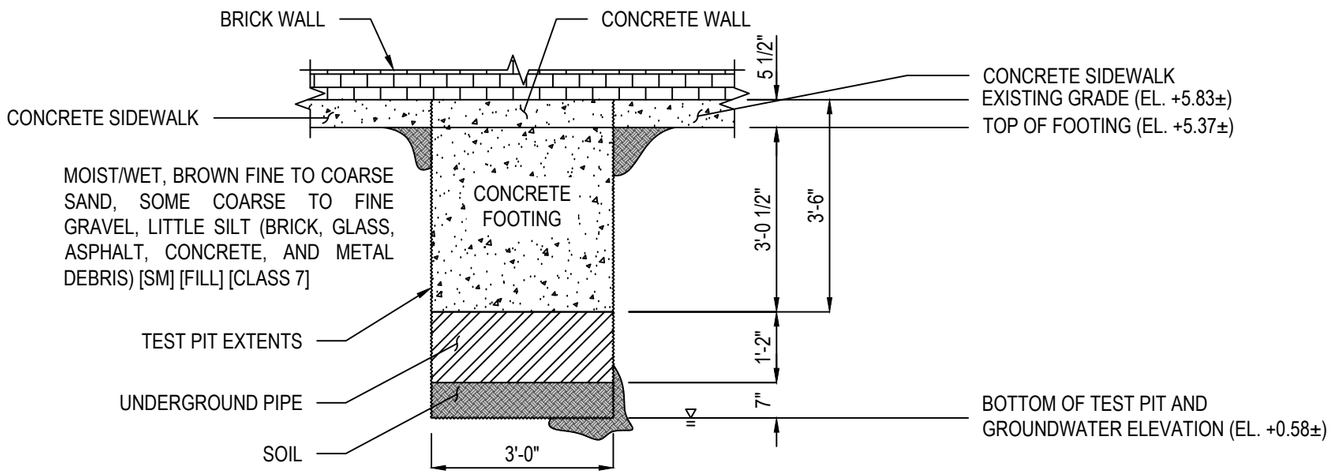
0 2.5' 5'



2 TP-41A-2 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'



3 TP-41A-2 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'

NOTES:

1. SEE FIGURE 2.0 FOR ALL GENERAL NOTES.
2. THE TEST PIT INVESTIGATION WAS UNABLE TO IDENTIFY THE BOTTOM EXTENT OF THE CONCRETE FOOTING DUE TO ENCOUNTERING THE GROUNDWATER TABLE AND UTILITY CONFLICTS.

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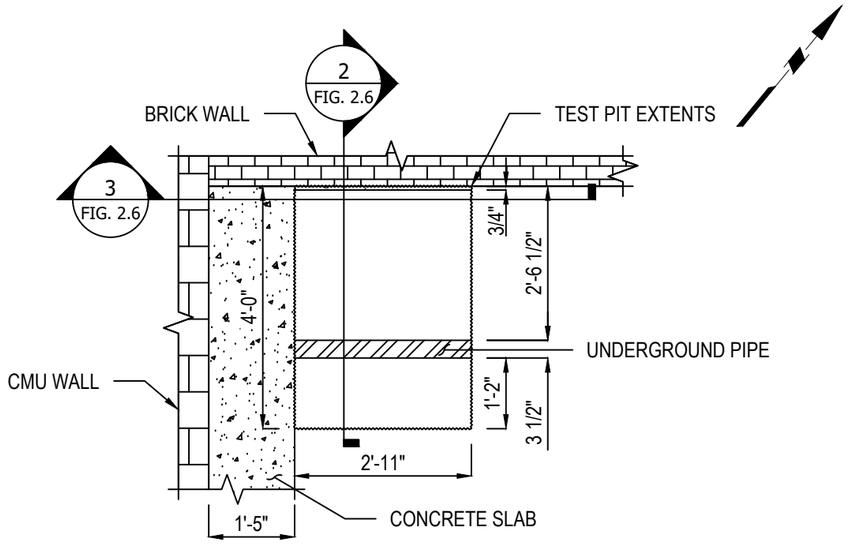
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
TEST PIT PLAN AND SECTIONS

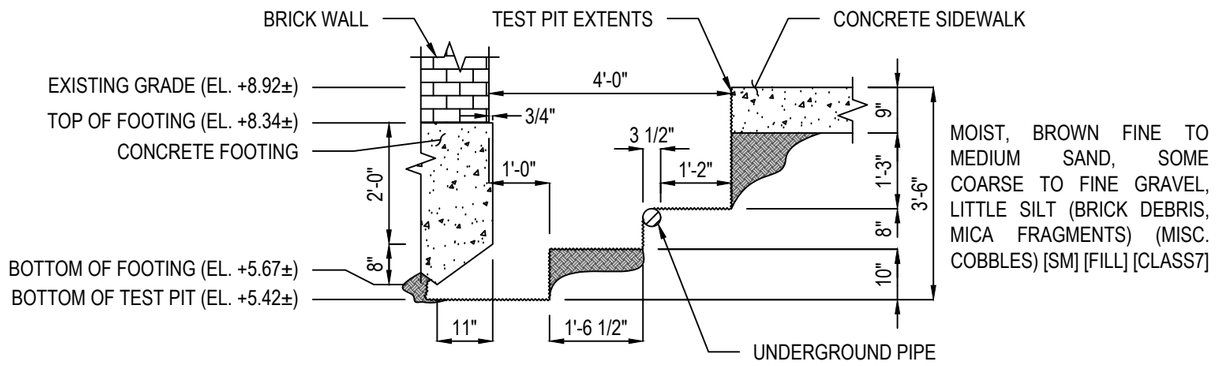
PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	APPENDIX B.2
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	2 OF 5



1 TP-62-1 PLAN

Scale: 1" = 2'-6"

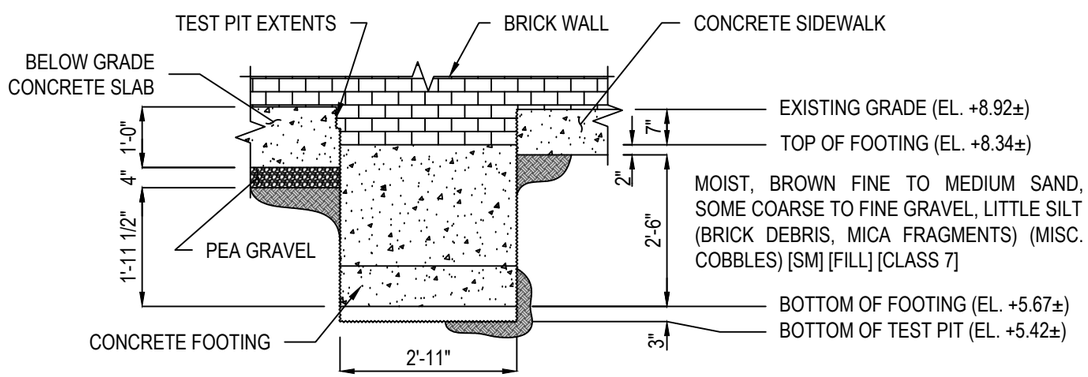
0 2.5' 5'



2 TP-62-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'



3 TP-62-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'

NOTES:

1. SEE FIGURE 2.0 FOR ALL GENERAL NOTES.

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PROJECT NAME

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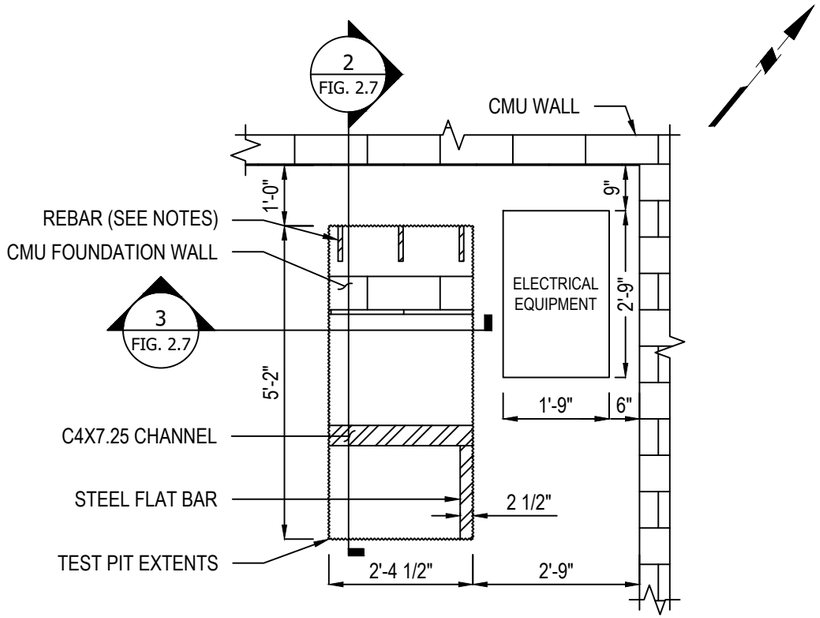
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK

KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE

TEST PIT PLAN AND SECTIONS

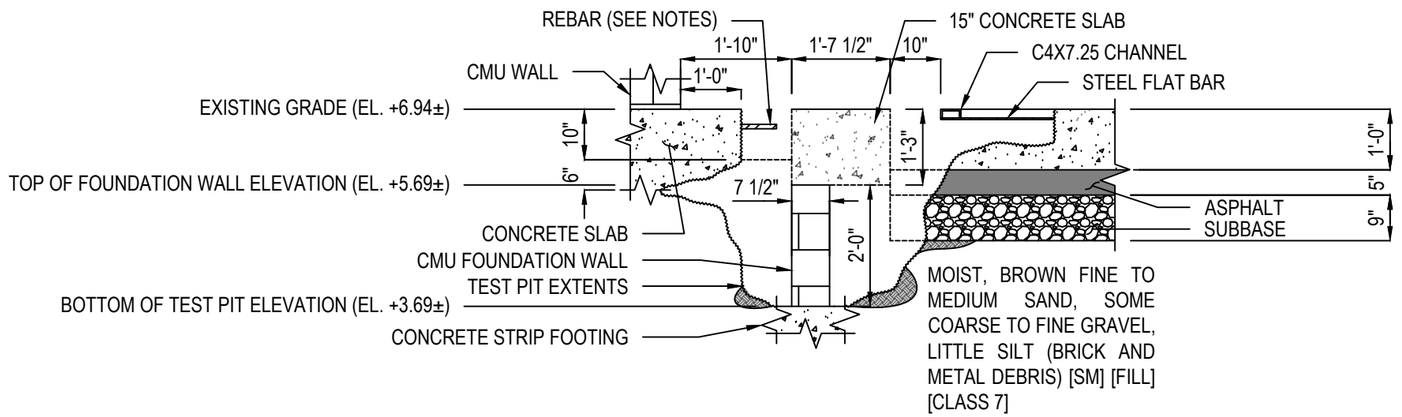
PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	APPENDIX B.3
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	3 OF 5



1 TP-293-1 PLAN

Scale: 1" = 2'-6"

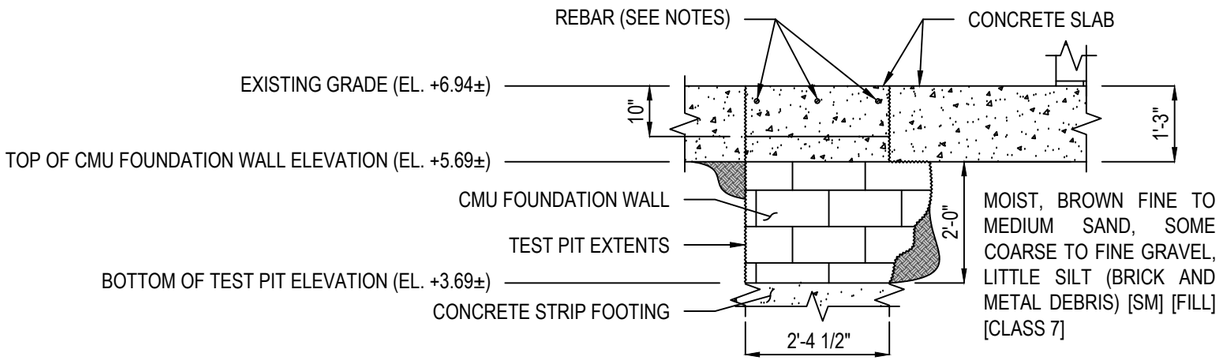
0 2.5' 5'



2 TP-293-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'



3 TP-293-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'

NOTES:

1. SEE FIGURE 2.0 FOR ALL GENERAL NOTES.
2. THE 9" SUBBASE LAYER ENCOUNTERED DIRECTLY BELOW THE ASPHALT LAYER CONSISTED OF DRY, GREY COARSE GRAVEL AND SOME FINE SAND.
3. NOTE THAT NO FOUNDATION WAS ENCOUNTERED BENEATH THE NORHTHWEST CMU WALL AND ONLY A CONCRETE SLAB WAS OBSERVED.
4. THE CONCRETE SLAB VARIED FROM 10" THICK AT THE NORTHWEST END OF THE TEST PIT, 15" THICK AT THE CENTER OF THE TEST PIT, AND 12" AT THE SOUTHEAST END OF THE TEST PIT.
5. THE FOLLOWING CONCRETE REINFORCEMENT WAS OBSERVED WITHIN THE CONCRETE SLABS:
   - 5.1. THE 10" SLAB HAD WELDED WIRE REINFORCEMENT AND #7 REBAR.
   - 5.2. THE 15" SLAB HAD WELDED WIRE REINFORCEMENT AND #4 REBAR.
   - 5.3. THE 12" SLAB HAD WELDED WIRE REINFORCEMENT AND #4 REBAR.
     - 5.1.1. WELDED WIRE REINFORCEMENT WAS 6"X6" CENTER ON CENTER (COC) 6" BELOW THE TOP OF THE SLAB.
     - 5.1.2. #4 REBAR WAS AT 10"X10" COC 10" BELOW THE TOP OF THE SLAB.
     - 5.1.3. #7 REBAR WAS AT 12" COC 3" BELOW THE TOP OF THE SLAB

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PROJECT NAME
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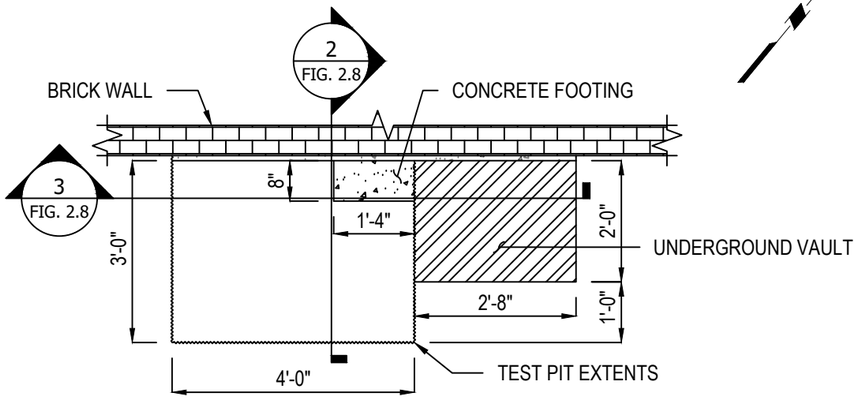
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
TEST PIT PLAN AND SECTIONS

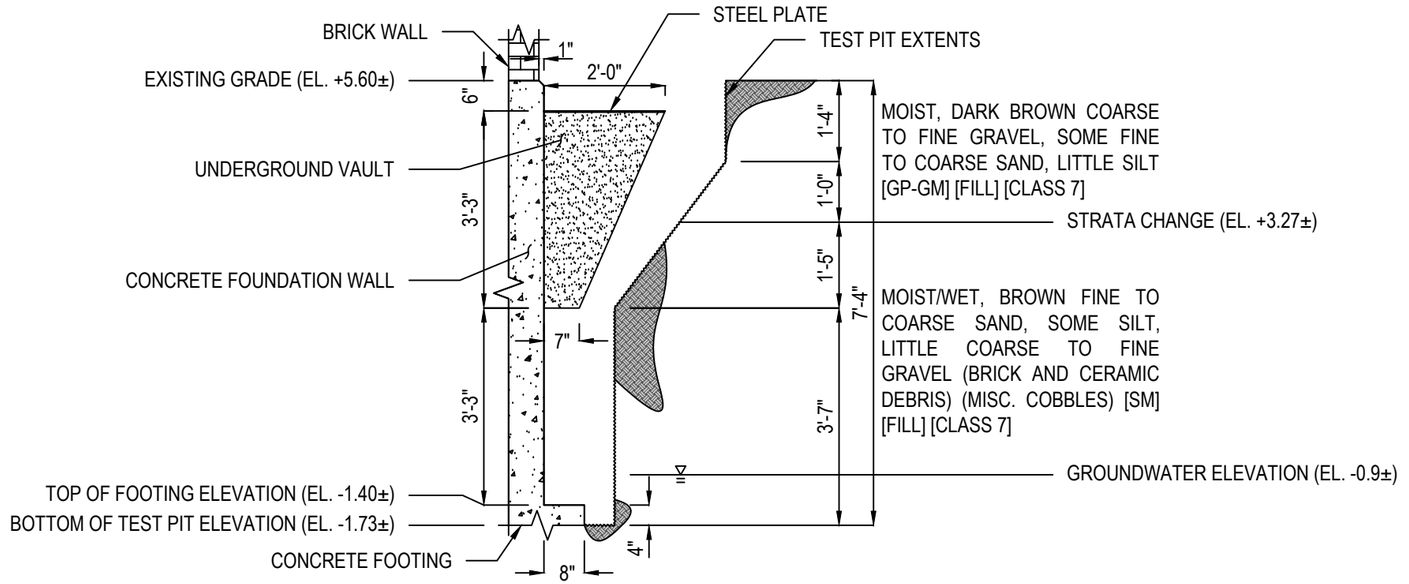
PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	APPENDIX B.4
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	4 OF 5



1 TP-386-1 PLAN

Scale: 1" = 2'-6"

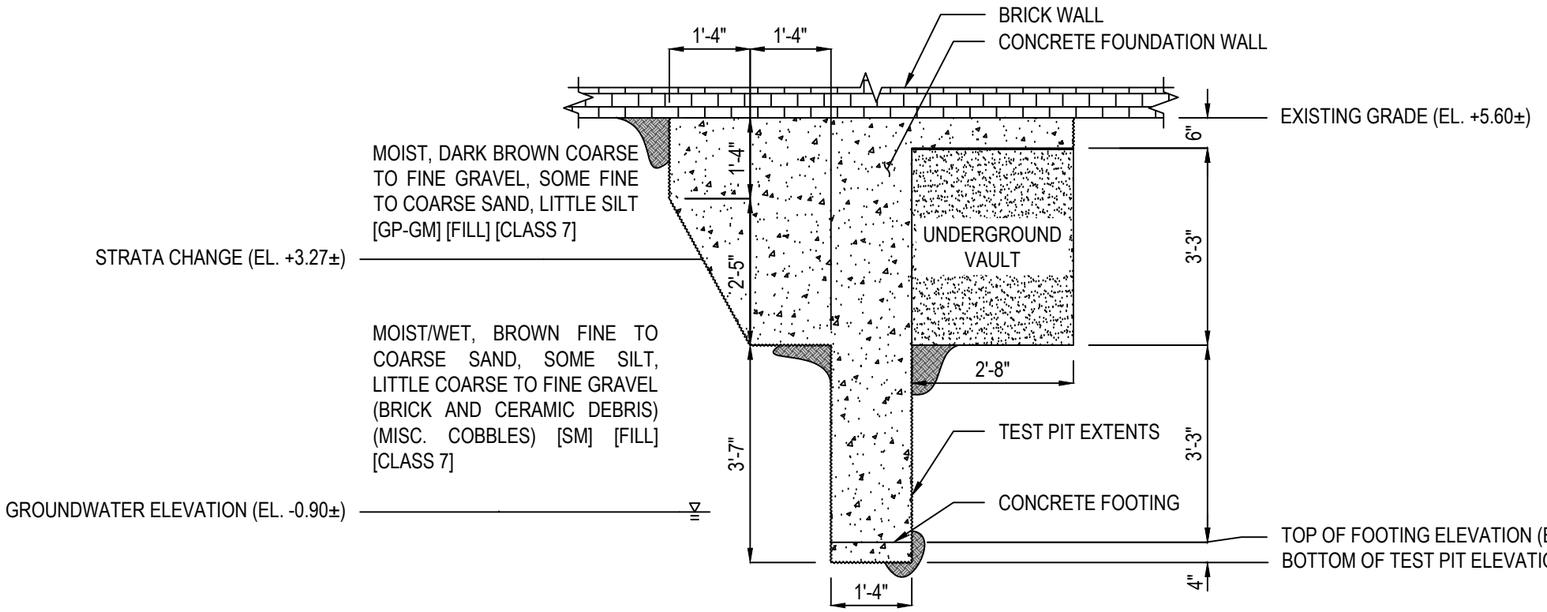
0 2.5' 5'



2 TP-386-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'



3 TP-386-1 SECTION

Scale: 1" = 2'-6"

0 2.5' 5'

NOTES:

1. SEE FIGURE 2.0 FOR ALL GENERAL NOTES.
2. THE TEST PIT INVESTIGATION WAS UNABLE TO IDENTIFY THE BOTTOM EXTENT OF THE CONCRETE FOOTING DUE TO ENCOUNTERING THE GROUNDWATER TABLE.

MFS ENGINEERS & SURVEYORS
MFS CONSULTING ENGINEERS & SURVEYOR, DPC
320 FIFTH AVE., FLOOR 11-SUITE #1102, NEW YORK, NY 10001
T: 212.943.6576 www.MFSengineers.com
F: 866.517.7413
N.Y. CERTIFICATE OF AUTHORIZATION: 0007564

PROJECT NAME
BROOKLYN NAVY YARD DEVELOPMENT CORPORATION
DESIGN SERVICES FOR BOILERS, SUBSTATIONS, AND ISOLATED ELECTRICAL WORK
KINGS COUNTY
BROOKLYN NEW YORK

DRAWING TITLE
TEST PIT PLAN AND SECTIONS

PROJECT NO.	1119060	SHEET NO.
DATE	12/17/2019	APPENDIX B.5
SCALE	AS_NOTED	
DRAWN BY	ATG	
CHECKED BY	MLM	5 OF 5

APPENDIX B
2019 MFS TEST PIT PHOTOGRAPHS

Photo 1: Test Pit TP-41A-1 upon completion (facing southeast)

Photo 2: Test Pit TP-41A-1 upon completion (southwest)

Photo 3: Test Pit TP-41A-1 after backfilling and concrete patch (facing east)

Photo 4: Test Pit TP-41A-2 prior to excavation (facing west)

Photo 5: Test Pit TP-41A-2 upon completion (facing northwest)

Photo 6: Test Pit TP-41A-2 upon completion (facing southwest)

Photo 7: Test Pit TP-41A-2 upon completion (facing northeast)

Photo 8: Test Pit TP-62-1 prior to excavation (facing west)

Photo 9: Test Pit TP-62-1 upon encountering bottom of footing (facing west)

Photo 10: Test Pit TP-62-1 upon encountering bottom of footing (facing southwest)

Photo 11: Test Pit TP-62-1 after backfilling and concrete patch (facing west)

Photo 12: Test Pit TP-293-1 prior to excavation (facing north)

Photo 13: Test Pit TP-293-1 upon completion (facing north)

Photo 14: Test Pit TP-293-1 upon completion (facing northwest)

Photo 15: Test Pit TP-293-1 waterproofing along northwest wall (facing northwest)

Photo 16: Test Pit TP-293-1 after backfill and concrete patch (facing northwest)

Photo 17: Test Pit TP-386-1 prior to excavation (facing north)

Photo 18: Test Pit TP-386-1 upon completion (facing southwest)

Photo 19: Test Pit TP-386-1 upon completion (facing north)

Photo 20: Test Pit TP-386-1 upon completion (facing northeast)

Photo 21: Test Pit TP-386-1 after backfill (facing southwest)

APPENDIX D
GEOTECHNICAL LABORATORY RESULTS

RSA GEOLAB, LLC

1017 Greeley Avenue North
Union, New Jersey 07083
908-964-0786 (P)
www.RSAgeolab.com

Letter of Transmittal

Date: 1-13-20 Job No.: 909 Lab Log: 19-563

Attention: Jacob Fradkin
MFS Consulting Engineers and Surveyor, DPC
2780 Hamilton Boulevard
South Plainfield, NJ 07080

CC:

Re: Brooklyn Navy Yard DC Boilers
Project#1119060

Sample(s) ID: **B-41A-1 S-4 thru B-234-1C S-10**

Dear Mr. Fradkin,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D2216 Moisture Content (25 tests)
- ASTM D4318 Atterberg Limits (5 tests)
- ASTM D422 Washed Sieve Analysis (13 tests)
- ASTM D422 Sieve & Hydrometer Analysis (7 tests)
- ASTM D2974 Organic Content (3 tests)

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed: _____

Dr. Raza S. Ahmed
President RSA Geolab, LLC

RSA's Geolab's Geotechnical Laboratory testing was performed and results reported in accordance with ASTM standards and accepted industry standards. No other representations or warranties either express or implied are given. RSA Geolab, LLC neither accepts responsibility for nor makes claim to the final use and purpose of the material tested.
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RSA Geolab	MOISTURE CONTENTS TEST METHOD ASTM D-2216

CLIENT:	MFS Consulting Engineers and Surveyor, DPC	**DATE:**	13-Jan-20
PROJECT:	Brooklyn Navy Yard DC Boilers Project#1119060	**PROJECT #**	909

HOLE #/ SAMPLE #	B-41A-1 S-4	B-41A-1 S-8	B-41A-1 S-11	B-41A-1 S-13	B-41A-1 S-15
DEPTH	6-8'	22-24'	35-37'	45-47'	55-57'
WET WGT. + tare (gms.)	435.5	174.4	427.6	396.6	403.5
DRY WGT. + tare (gms.)	373.8	115.2	363.4	312.3	316.4
WGT. WATER (gms.)	61.7	59.2	64.2	84.3	87.1
TARE (gms.)	7.2	7.1	8.4	7.1	7.2
DRY WGT. (gms.)	366.6	108.1	355.0	305.2	309.2
MOISTURE CONTENT	16.8%	54.8%	18.1%	27.6%	28.2%

HOLE #/ SAMPLE #	B-41A-1 S-17	B-41A-2C S-5	B-41A-2C S-7	B-41A-2C S-10	B-41A-2C S-11
DEPTH	65-67'	10-12'	20-22'	35-37'	40-42'
WET WGT. + tare (gms.)	378.9	450.9	275.4	481.0	214.1
DRY WGT. + tare (gms.)	280.4	385.1	241.9	397.1	160.4
WGT. WATER (gms.)	98.5	65.8	33.5	83.9	53.7
TARE (gms.)	6.9	6.9	8.6	8.7	7.1
DRY WGT. (gms.)	273.5	378.2	233.3	388.4	153.3
MOISTURE CONTENT	36.0%	17.4%	14.4%	21.6%	35.0%

Performed by: EE Entered by: KH Checked by: KP

RSA Geolab	MOISTURE CONTENTS TEST METHOD ASTM D-2216

CLIENT:	MFS Consulting Engineers and Surveyor, DPC	**DATE:**	13-Jan-20
PROJECT:	Brooklyn Navy Yard DC Boilers Project#1119060	**PROJECT #**	909

HOLE #/ SAMPLE #	B-41A-2C S-13	B-41A-2C S-15	B-62-1 S-3	B-62-1 S-5	B-62-1 S-8
DEPTH	50-52'	58-60'	4-6'	8-10'	20-22'
WET WGT. + tare (gms.)	418.9	393.0	314.9	403.9	152.7
DRY WGT. + tare (gms.)	351.1	339.6	286.0	340.6	107.0
WGT. WATER (gms.)	67.8	53.4	28.9	63.3	45.7
TARE (gms.)	7.0	7.1	7.1	7.0	7.1
DRY WGT. (gms.)	344.1	332.5	278.9	333.6	99.9
MOISTURE CONTENT	19.7%	16.1%	10.4%	19.0%	45.7%

HOLE #/ SAMPLE #	B-62-1 S-10B	B-62-1 S-11	B-62-1 S-14	B-62-1 S-15	B-62-1 S-16
DEPTH	30-32'	35-37'	50-52'	55-57'	58-60'
WET WGT. + tare (gms.)	366.5	183.9	376.4	396.3	384.9
DRY WGT. + tare (gms.)	296.5	150.3	283.0	296.9	320.6
WGT. WATER (gms.)	70.0	33.6	93.4	99.4	64.3
TARE (gms.)	7.1	7.1	6.9	7.0	7.0
DRY WGT. (gms.)	289.4	143.2	276.1	289.9	313.6
MOISTURE CONTENT	24.2%	23.5%	33.8%	34.3%	20.5%

Performed by: EE Entered by: KH Checked by: KP

RSA Geolab	MOISTURE CONTENTS TEST METHOD ASTM D-2216

CLIENT:	MFS Consulting Engineers and Surveyor, DPC	**DATE:**	13-Jan-20
PROJECT:	Brooklyn Navy Yard DC Boilers Project#1119060	**PROJECT #**	909

HOLE #/ SAMPLE #	B-234-1C S-3	B-234-1C S-5	B-234-1C S-7	B-234-1C S-9	B-234-1C S-10
DEPTH	6-8'	10-12'	25-27'	35-37'	40-42'
WET WGT. + tare (gms.)	400.1	247.1	110.6	453.8	362.9
DRY WGT. + tare (gms.)	334.5	189.6	46.0	378.0	290.0
WGT. WATER (gms.)	65.6	57.5	64.6	75.8	72.9
TARE (gms.)	7.1	8.3	7.0	8.3	8.3
DRY WGT. (gms.)	327.4	181.3	39.0	369.7	281.7
MOISTURE CONTENT	20.0%	31.7%	165.6%	20.5%	25.9%

HOLE #/ SAMPLE #					
DEPTH					
WET WGT. + tare (gms.)					
DRY WGT. + tare (gms.)					
WGT. WATER (gms.)	0.0	0.0	0.0	0.0	0.0
TARE (gms.)					
DRY WGT. (gms.)	0.0	0.0	0.0	0.0	0.0
MOISTURE CONTENT					

Performed by: EE Entered by: KH Checked by: KP

LIQUID AND PLASTIC LIMIT TEST DATA

1/13/2020

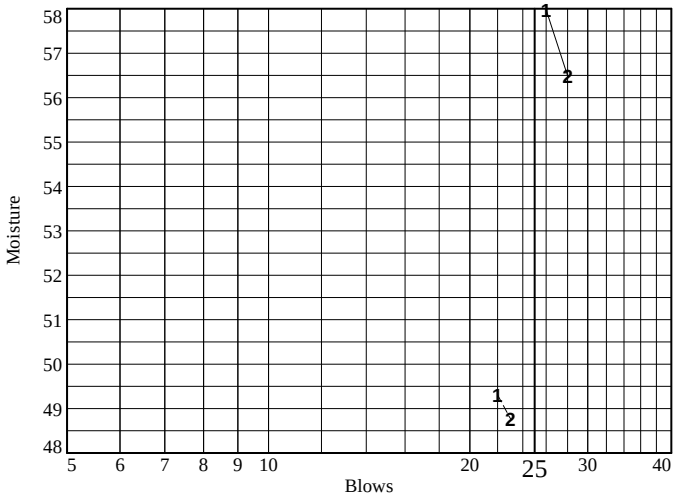
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-41A-1 S-8 22-24'
Material Description: Gray Clay & Silt, trace cmf Sand, organics (visual)
Tested by: SD **Checked by:** KP
Testing Remarks: 1-13-20

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	8.35	8.15				
Dry+Tare	5.77	5.67				
Tare	1.32	1.28				
# Blows	26	28				
Moisture	58.0	56.5				

Organics Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	8.83	8.61				
Dry+Tare	6.34	6.23				
Tare	1.29	1.35				
# Blows	22	23				
Moisture	49.3	48.8				



Liquid Limit= 59
Liquid Limit (organics)= 48
Plastic Limit= 29
Plasticity Index= 30

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	7.56	7.32			
Dry+Tare	6.15	5.97			
Tare	1.27	1.29			
Moisture	28.9	28.8			

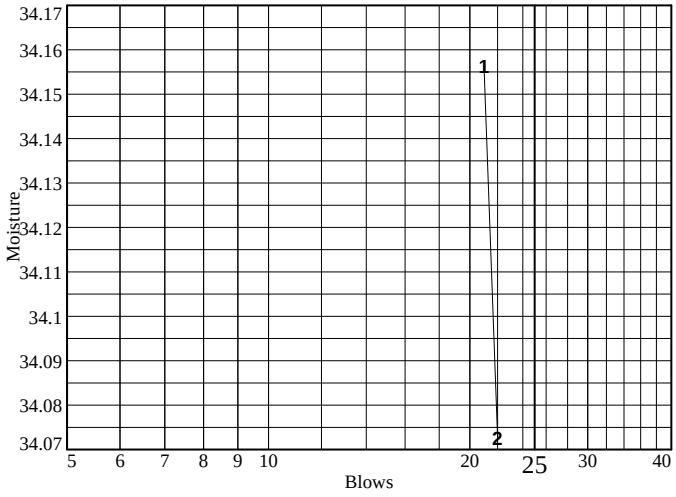
LIQUID AND PLASTIC LIMIT TEST DATA

1/13/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-41A-2C S-11 40-42'
Material Description: Light Yellowish Brown Clay & Silt, trace cmf Sand (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	7.78	7.91				
Dry+Tare	6.12	6.22				
Tare	1.26	1.26				
# Blows	21	22				
Moisture	34.2	34.1				



Liquid Limit= 34
Plastic Limit= 22
Plasticity Index= 12

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.69	7.08			
Dry+Tare	7.36	6.05			
Tare	1.26	1.26			
Moisture	21.8	21.5			

LIQUID AND PLASTIC LIMIT TEST DATA

1/13/2020

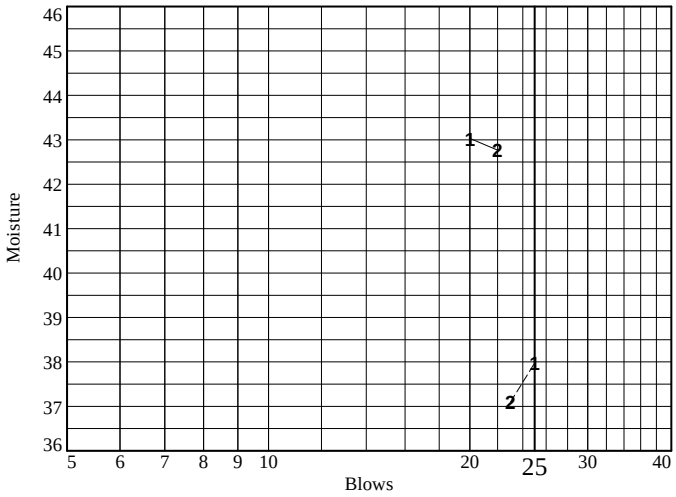
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-62-1 S-8 20-22'
Material Description: Gray Clay & Silt, trace cmf Sand, organics (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	8.68	8.25				
Dry+Tare	6.55	6.18				
Tare	1.60	1.34				
# Blows	20	22				
Moisture	43.0	42.8				

Organics Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	7.86	7.27				
Dry+Tare	6.06	5.66				
Tare	1.32	1.32				
# Blows	25	23				
Moisture	38.0	37.1				



Liquid Limit= 42
Liquid Limit (organics)= 38
Plastic Limit= 23
Plasticity Index= 19

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	7.45	7.33			
Dry+Tare	6.30	6.20			
Tare	1.34	1.35			
Moisture	23.2	23.3			

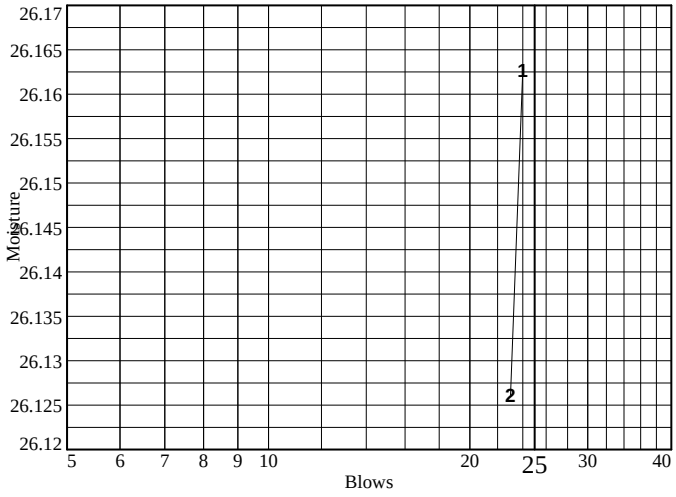
LIQUID AND PLASTIC LIMIT TEST DATA

1/13/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-62-1 S-11 35-37'
Material Description: Gray Clay & Silt, trace cmf Sand (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	7.79	8.34				
Dry+Tare	6.44	6.89				
Tare	1.28	1.34				
# Blows	24	23				
Moisture	26.2	26.1				



Liquid Limit= 26
Plastic Limit= 18
Plasticity Index= 8

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	9.98	9.14			
Dry+Tare	8.65	7.93			
Tare	1.31	1.31			
Moisture	18.1	18.3			

LIQUID AND PLASTIC LIMIT TEST DATA

1/13/2020

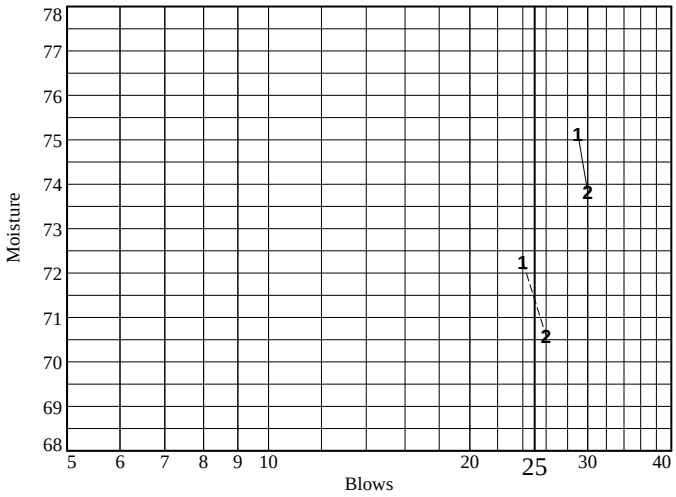
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-234-1C S-7 25-27'
Material Description: Very Dark Brown Clay & Silt, trace cmf Sand, organics (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	7.71	7.19				
Dry+Tare	4.96	4.68				
Tare	1.30	1.28				
# Blows	29	30				
Moisture	75.1	73.8				

Organics Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	7.53	7.64				
Dry+Tare	4.90	5.00				
Tare	1.26	1.26				
# Blows	24	26				
Moisture	72.3	70.6				

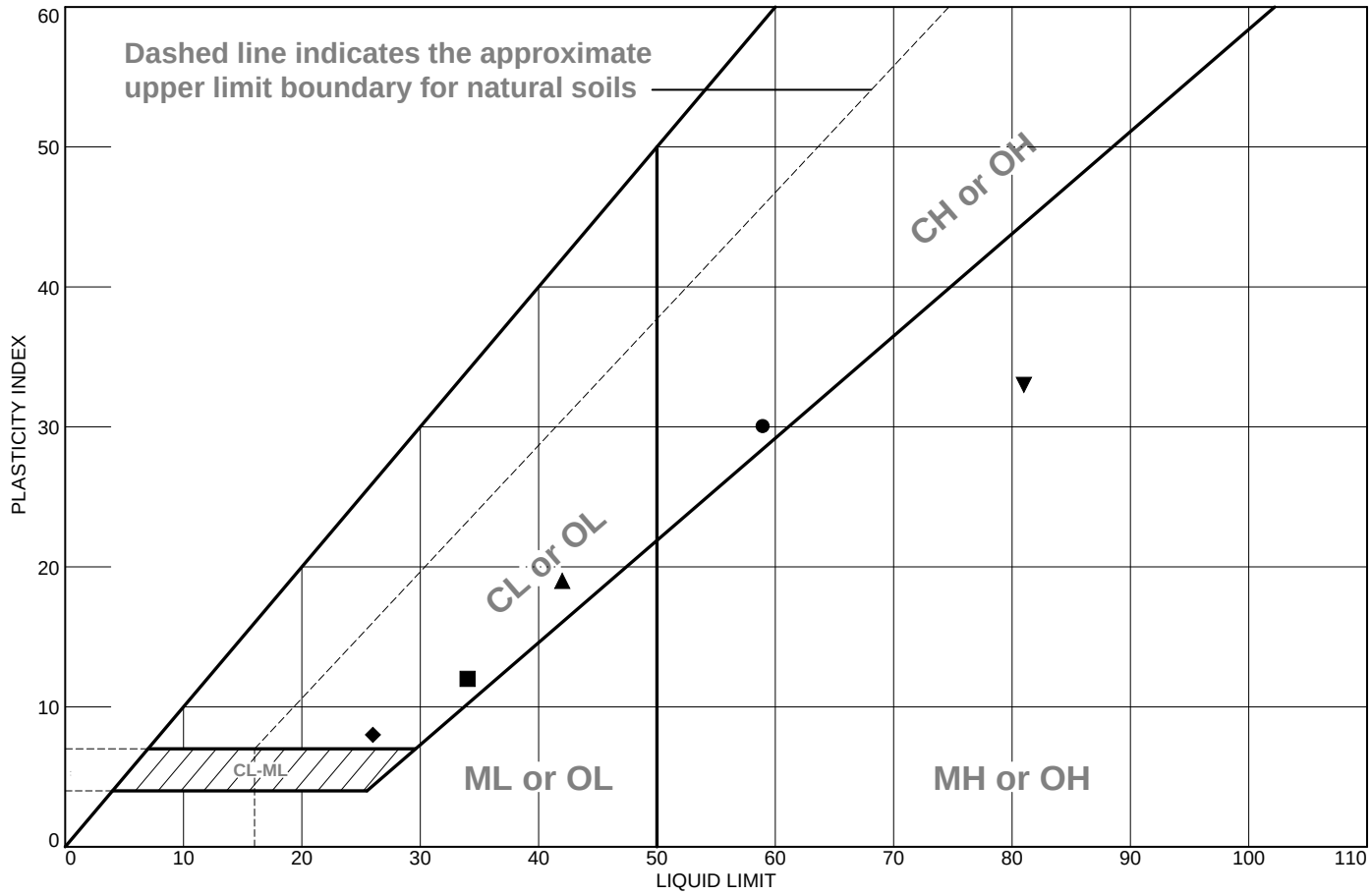


Liquid Limit= 81
Liquid Limit (organics)= 71
Plastic Limit= 48
Plasticity Index= 33

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.03	9.32			
Dry+Tare	5.85	6.70			
Tare	1.28	1.27			
Moisture	47.7	48.3			

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Gray Clay & Silt, trace cmf Sand, organics (visual)	59	29	30			
■	Light Yellowish Brown Clay & Silt, trace cmf Sand (visual)	34	22	12			
▲	Gray Clay & Silt, trace cmf Sand, organics (visual)	42	23	19			
◆	Gray Clay & Silt, trace cmf Sand (visual)	26	18	8			
▼	Very Dark Brown Clay & Silt, trace cmf Sand, organics (visual)	81	48	33			

Project No. 909 **Client:** MFS Consulting Engineers and Surveyor, DPC

Project: Brooklyn Navy Yard DC Boilers

Project No. 1119060

●**Sample Number:** B-41A-1 S-8 22-24'

■**Sample Number:** B-41A-2C S-11 40-42'

▲**Sample Number:** B-62-1 S-8 20-22'

◆**Sample Number:** B-62-1 S-11 35-37'

▼**Sample Number:** B-234-1C S-7 25-27'

RSA Geolab

Union, New Jersey

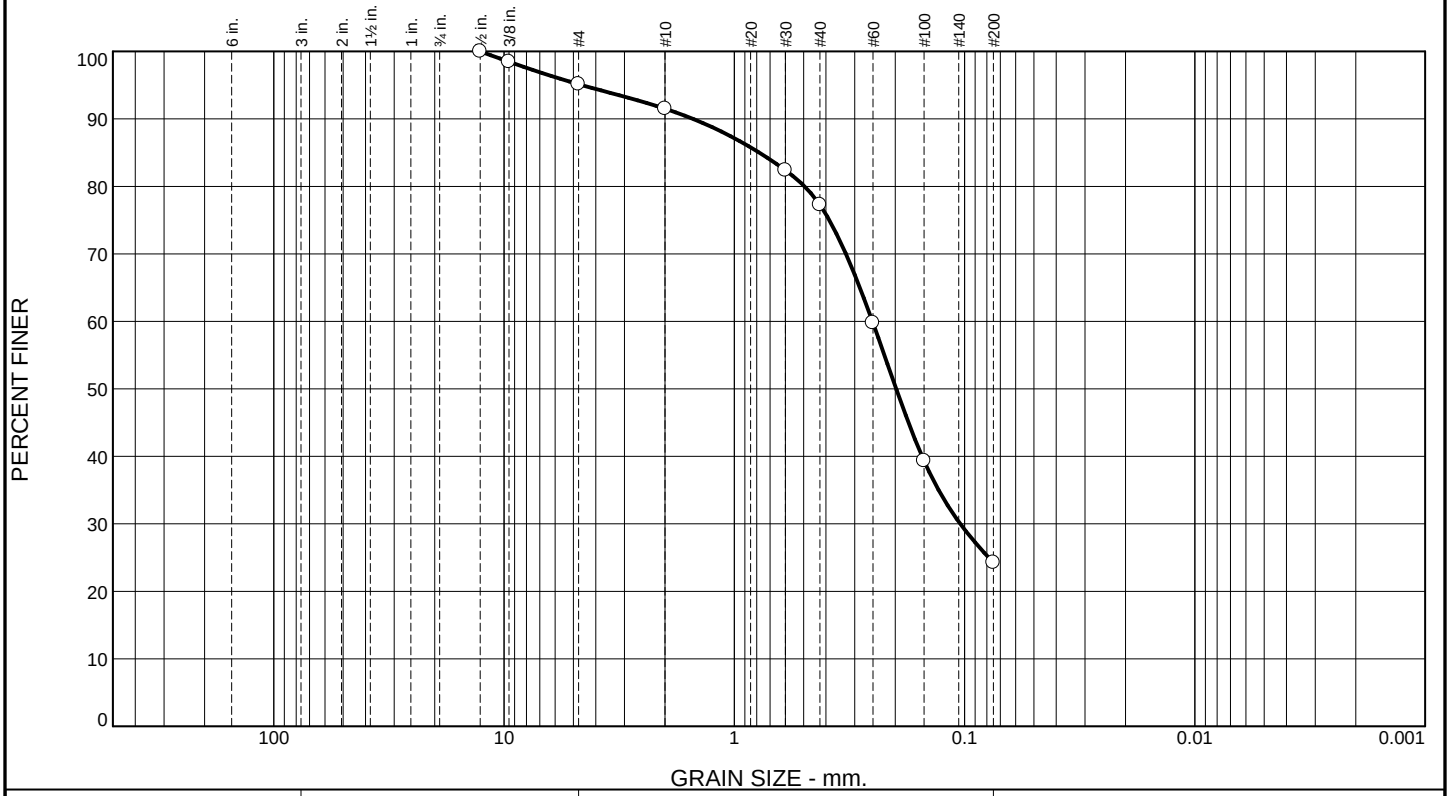
Remarks:

●1-13-20

Figure

Tested By: SD **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	3.6	14.2	53.1	24.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	98.5		
#4	95.1		
#10	91.5		
#30	82.4		
#40	77.3		
#60	59.8		
#100	39.3		
#200	24.2		

* (no specification provided)

Material Description

Dark Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.5124 D_{85}= 0.7788 D_{60}= 0.2514
D_{50}= 0.1981 D_{30}= 0.1044 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-1 S-4 6-8'

Date: 1-13-20

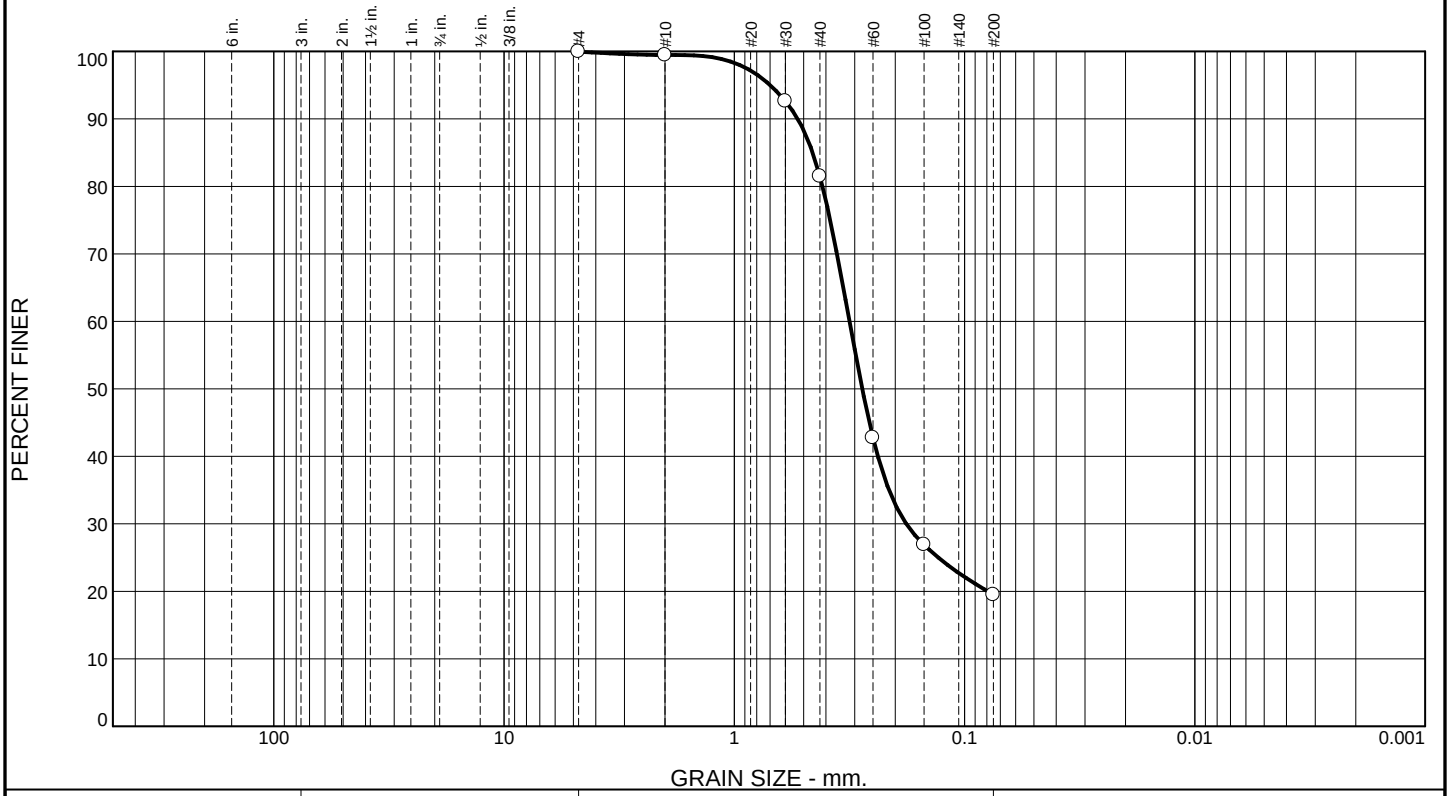
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			0.5	18.0	62.0	19.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#30	92.6		
#40	81.5		
#60	42.8		
#100	26.9		
#200	19.5		

* (no specification provided)

Material Description

Light Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5305 D_{85}= 0.4566 D_{60}= 0.3161
D_{50}= 0.2782 D_{30}= 0.1793 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-1 S-11 35-37'

Date: 1-13-20

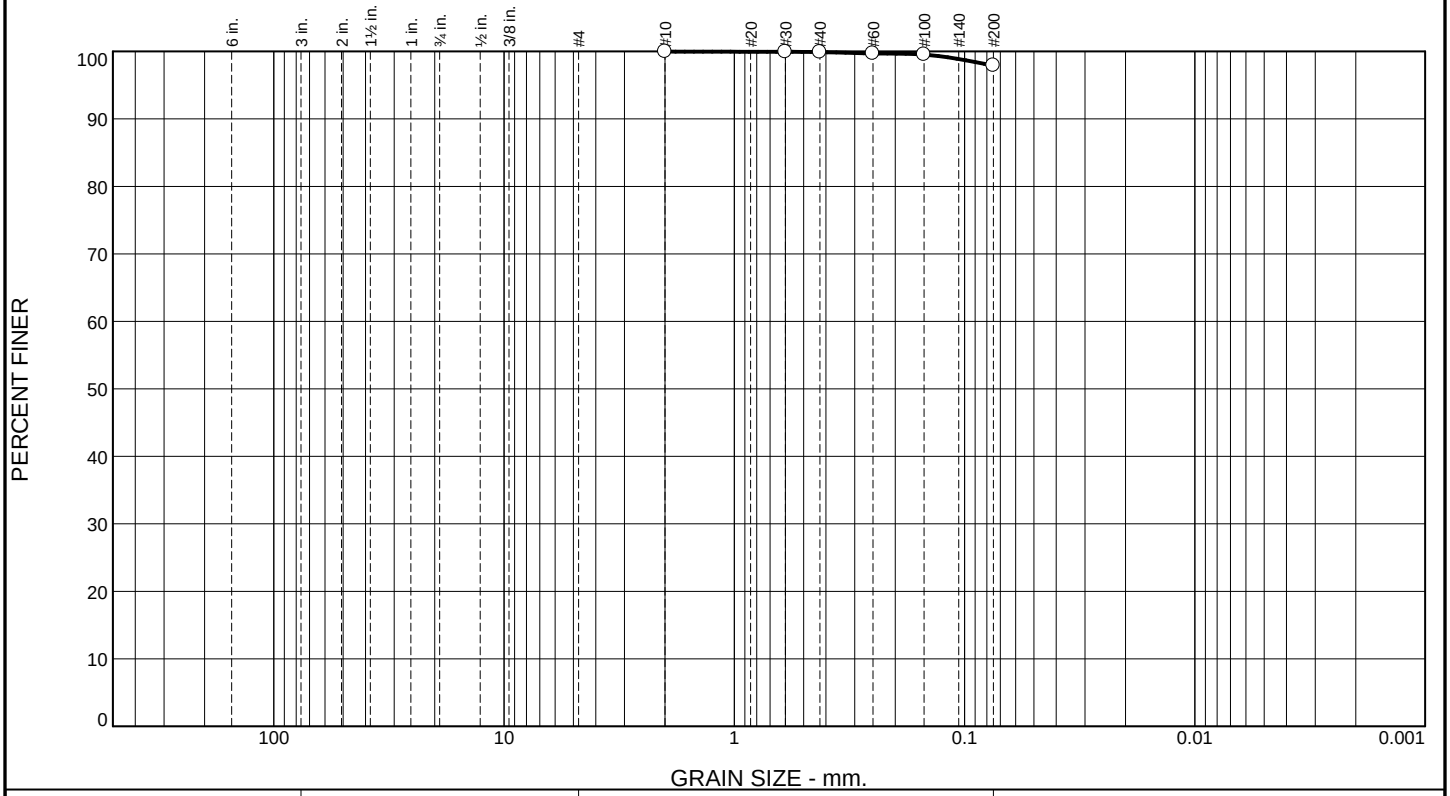
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.1	2.0	97.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#40	99.9		
#60	99.7		
#100	99.5		
#200	97.9		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-1 S-13 45-47'

Date: 1-13-20

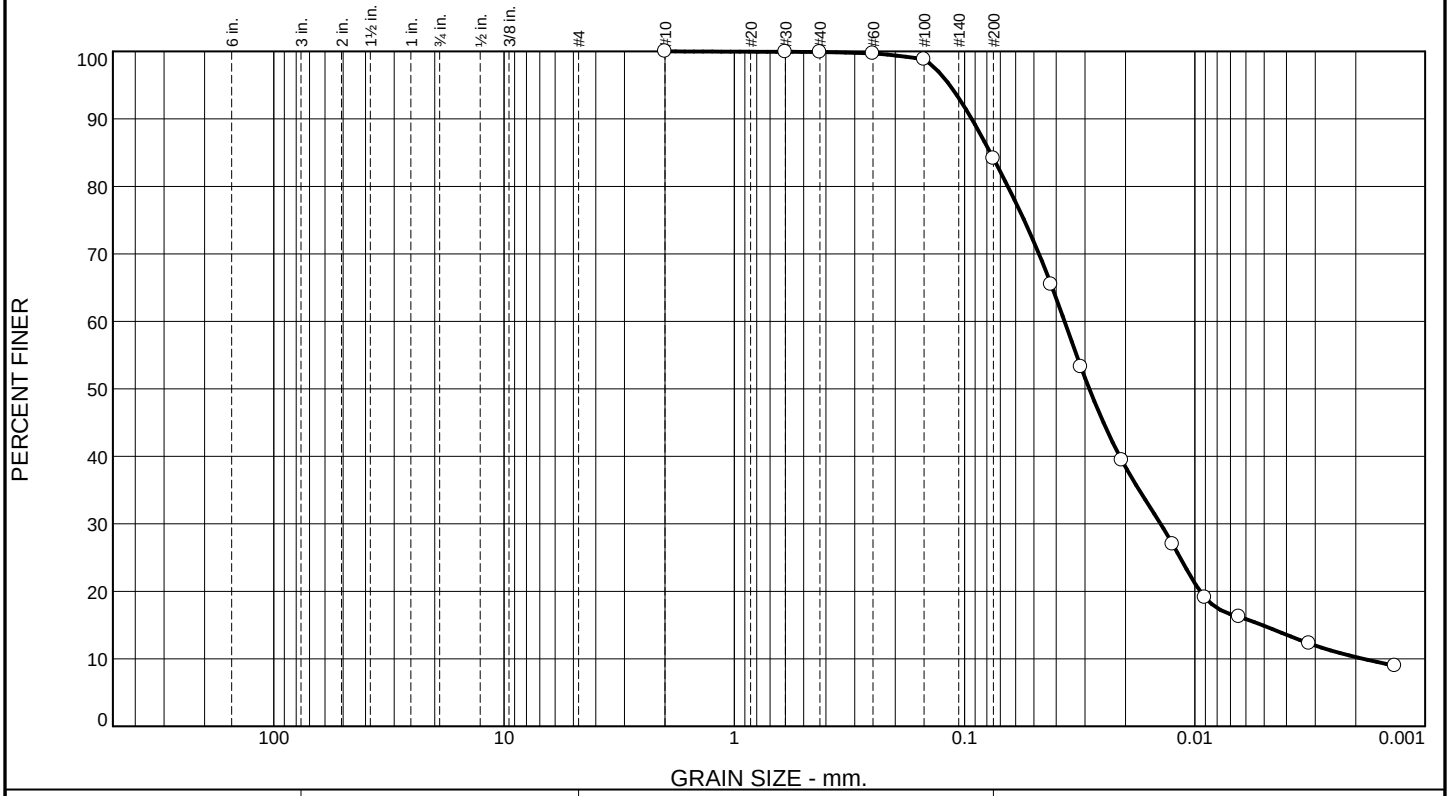
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	15.8	69.2	14.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#40	99.9		
#60	99.7		
#100	98.8		
#200	84.1		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0932 D_{85}= 0.0773 D_{60}= 0.0368
D_{50}= 0.0287 D_{30}= 0.0141 D_{15}= 0.0051
D_{10}= 0.0019 C_u= 19.83 C_c= 2.91

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-41A-1 S-15 55-57'

Date: 1-13-20

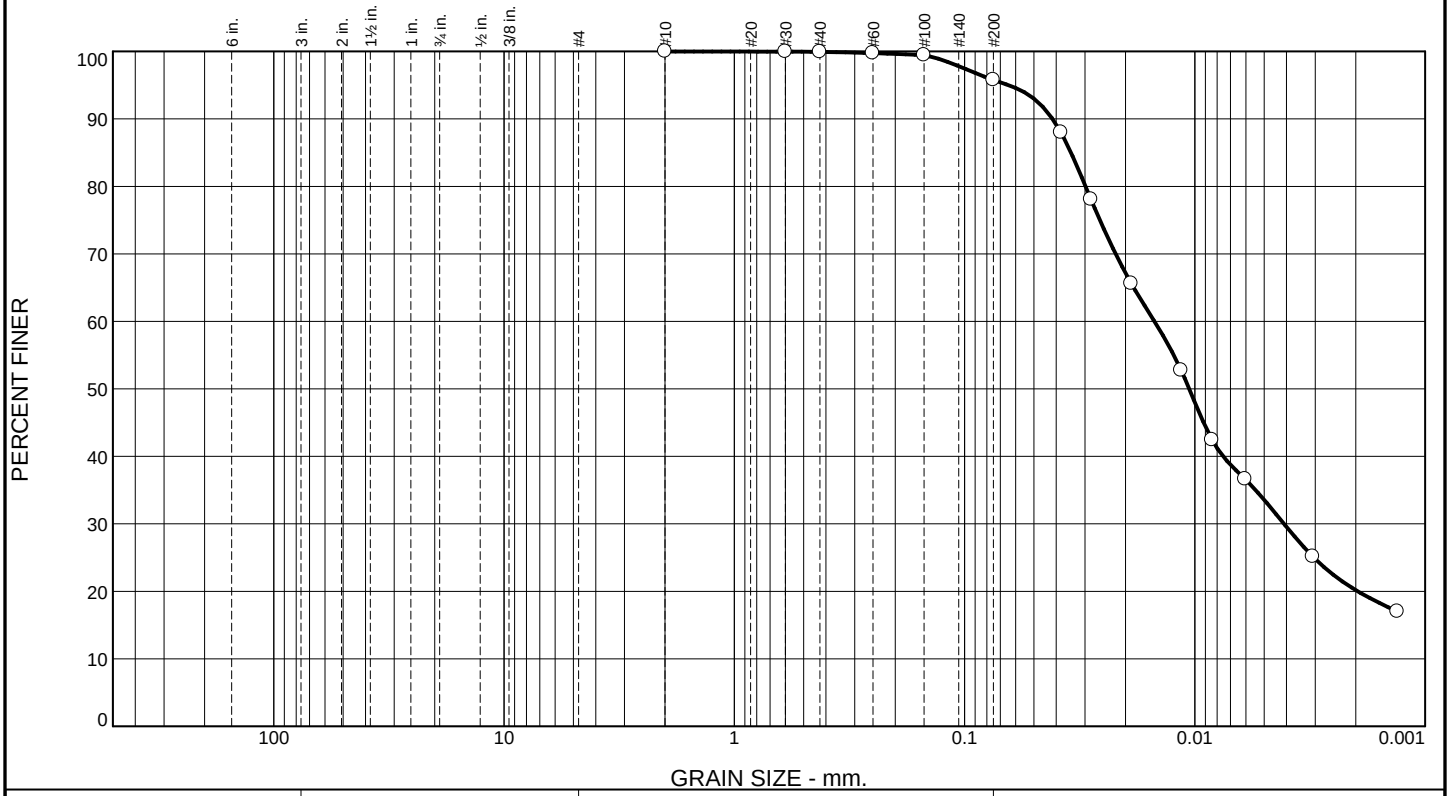
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.1	4.1	62.2	33.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	100.0		
#40	99.9		
#60	99.7		
#100	99.4		
#200	95.8		

* (no specification provided)

Material Description

Light Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0415 D_{85}= 0.0345 D_{60}= 0.0150
D_{50}= 0.0106 D_{30}= 0.0041 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-41A-1 S-17 65-67'

Date: 1-13-20

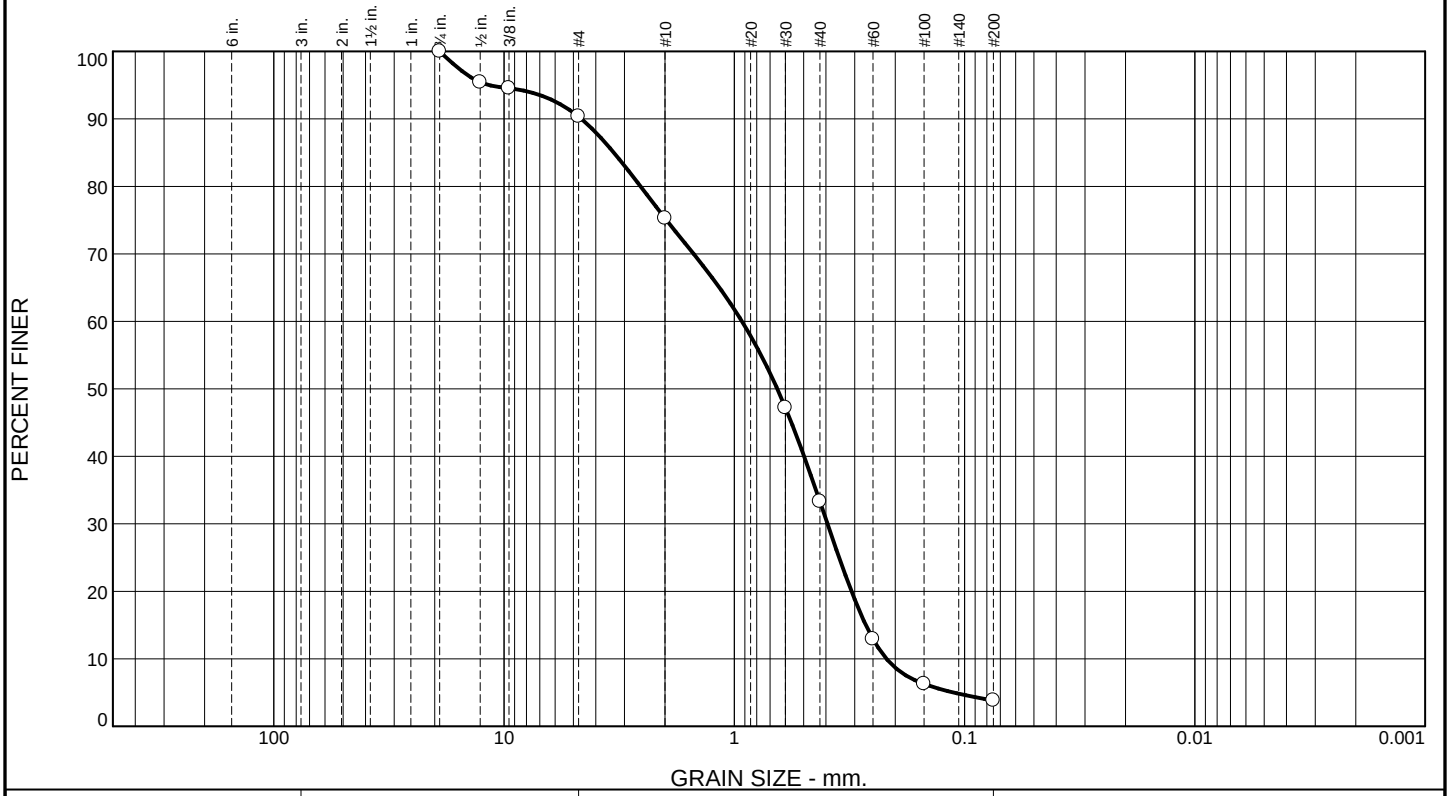
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.7	15.0	42.0	29.5	3.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.4		
.375	94.6		
#4	90.3		
#10	75.3		
#30	47.2		
#40	33.3		
#60	12.9		
#100	6.3		
#200	3.8		

* (no specification provided)

Material Description

Very Dark Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.6166 D_{85}= 3.3372 D_{60}= 0.9266
D_{50}= 0.6508 D_{30}= 0.3939 D_{15}= 0.2687
D_{10}= 0.2183 C_u= 4.24 C_c= 0.77

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B-41A-2C S-5 10-12'

Date: 1-13-20

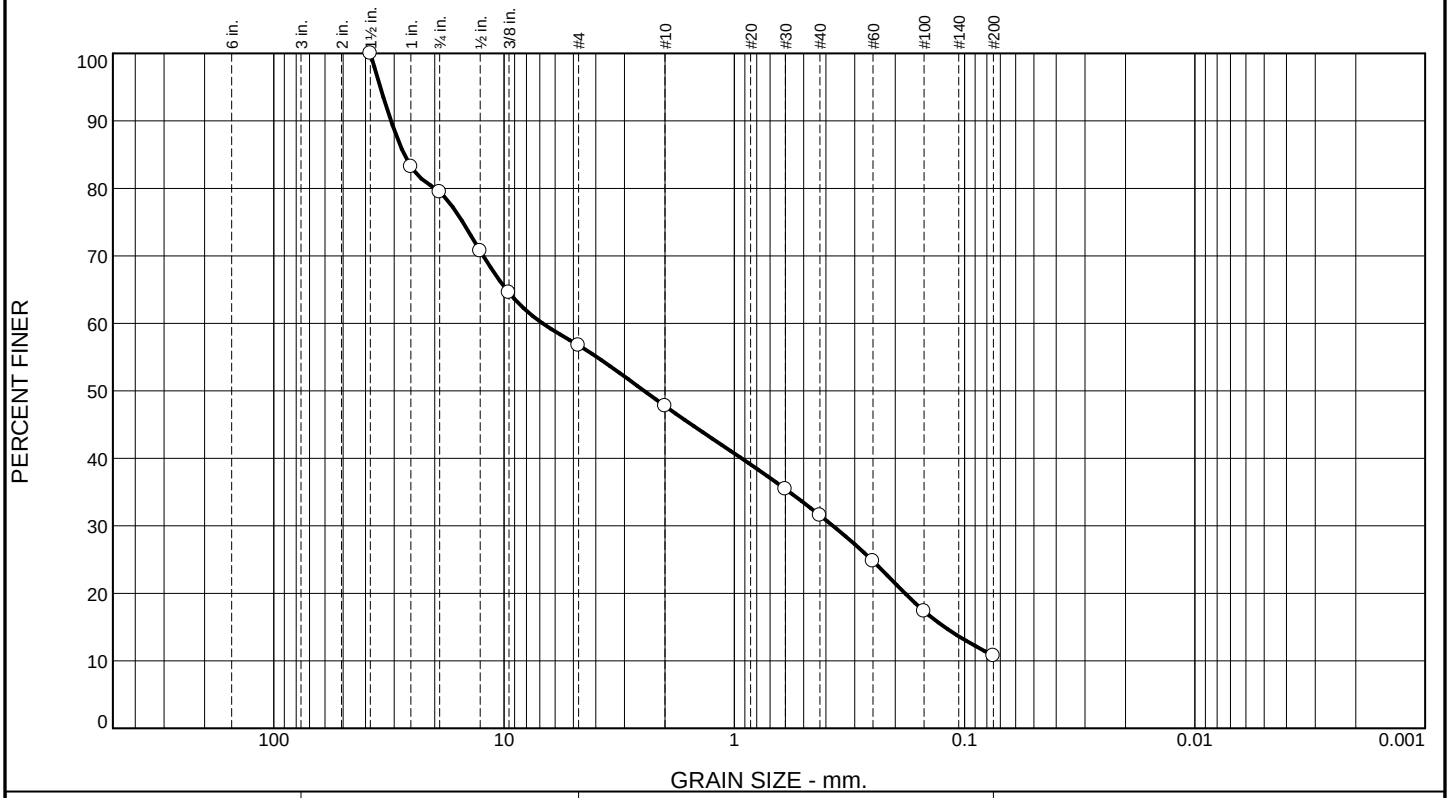
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.5	22.7	9.1	16.2	20.7	10.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	83.2		
.75	79.5		
.5	70.7		
.375	64.6		
#4	56.8		
#10	47.7		
#30	35.4		
#40	31.5		
#60	24.8		
#100	17.4		
#200	10.8		

* (no specification provided)

Material Description

Black

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 30.9783 D_{85}= 27.1440 D_{60}= 6.7999
D_{50}= 2.4644 D_{30}= 0.3730 D_{15}= 0.1221
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-2C S-7 20-22'

Date: 1-13-20

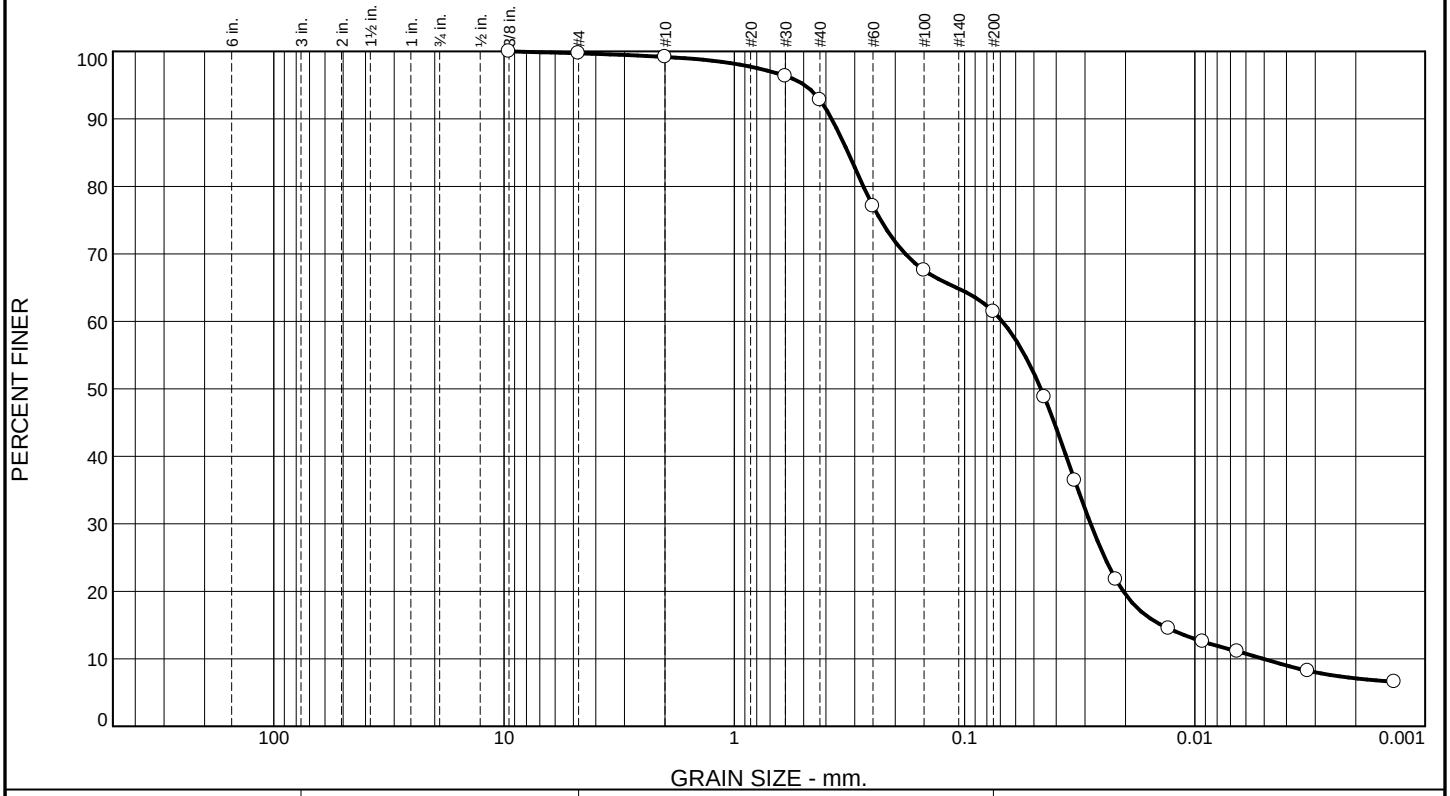
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.5	6.4	31.4	51.4	10.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.7		
#10	99.2		
#30	96.3		
#40	92.8		
#60	77.1		
#100	67.6		
#200	61.4		

* (no specification provided)

Material Description

Light Olive Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3778 D_{85}= 0.3207 D_{60}= 0.0685
D_{50}= 0.0466 D_{30}= 0.0283 D_{15}= 0.0139
D_{10}= 0.0050 C_u= 13.58 C_c= 2.32

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-41A-2C S-10 35-37'

Date: 1-13-20

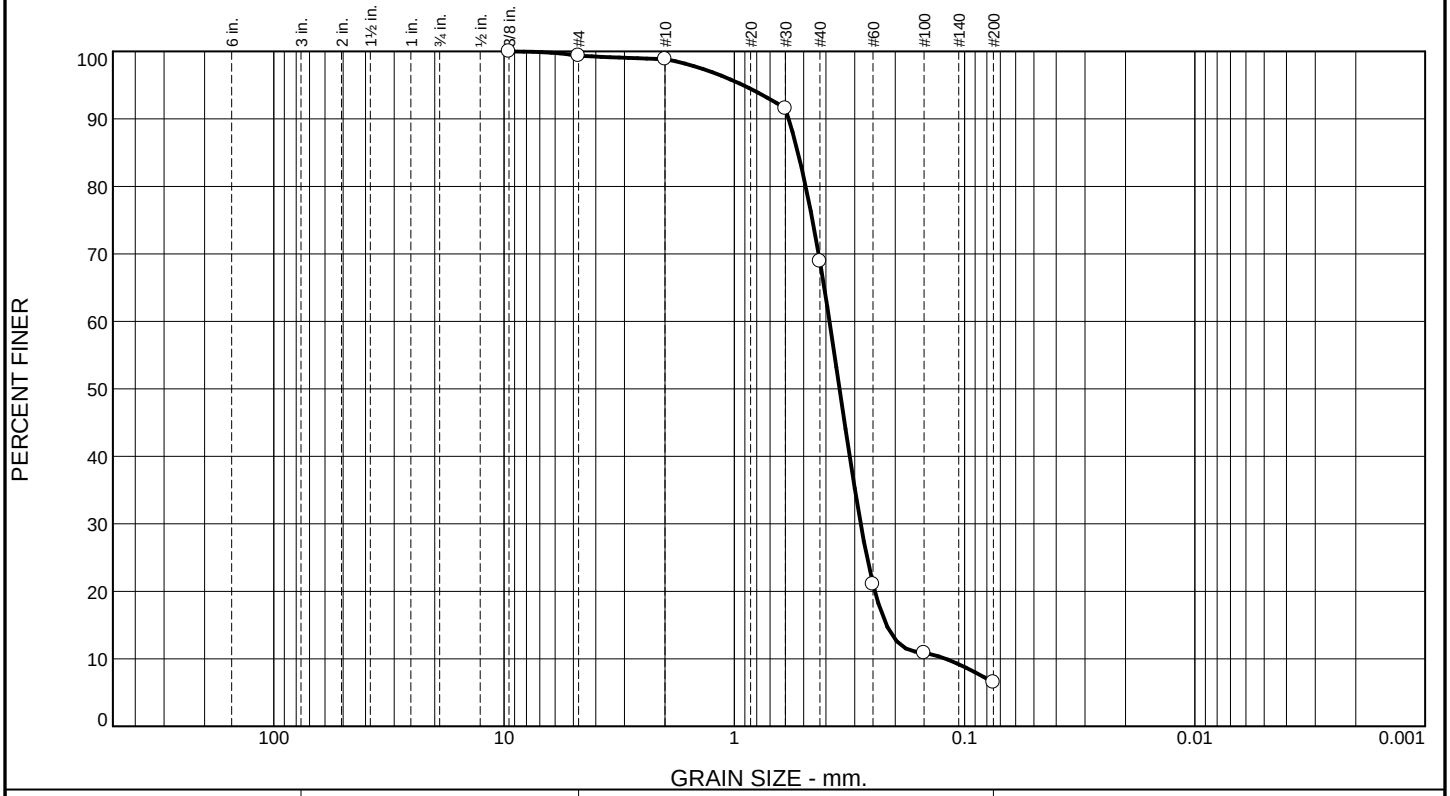
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.5	30.0	62.4	6.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.4		
#10	98.9		
#30	91.5		
#40	68.9		
#60	21.1		
#100	10.9		
#200	6.5		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5806 D_{85}= 0.5294 D_{60}= 0.3862
D_{50}= 0.3492 D_{30}= 0.2827 D_{15}= 0.2183
D_{10}= 0.1208 C_u= 3.20 C_c= 1.71

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-2C S-13 50-52'

Date: 1-13-20

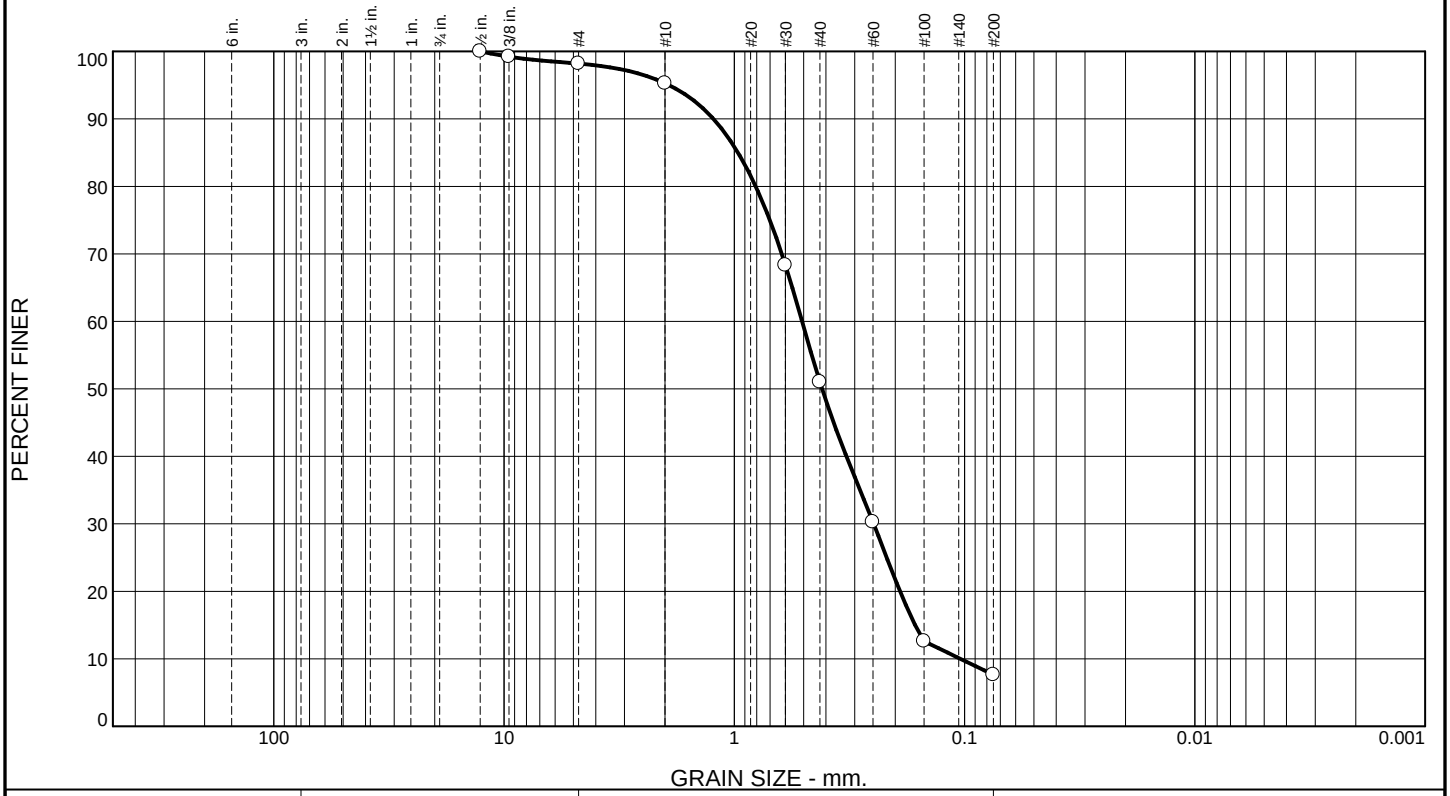
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.8	2.9	44.3	43.4	7.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.2		
#4	98.2		
#10	95.3		
#30	68.3		
#40	51.0		
#60	30.3		
#100	12.6		
#200	7.6		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.2321 D_{85}= 0.9642 D_{60}= 0.5081
D_{50}= 0.4159 D_{30}= 0.2483 D_{15}= 0.1640
D_{10}= 0.1043 C_u= 4.87 C_c= 1.16

Classification

USCS= AASHTO=

Remarks

Sample Number: B-41A-2C S-15 58-60'

Date: 1-13-20

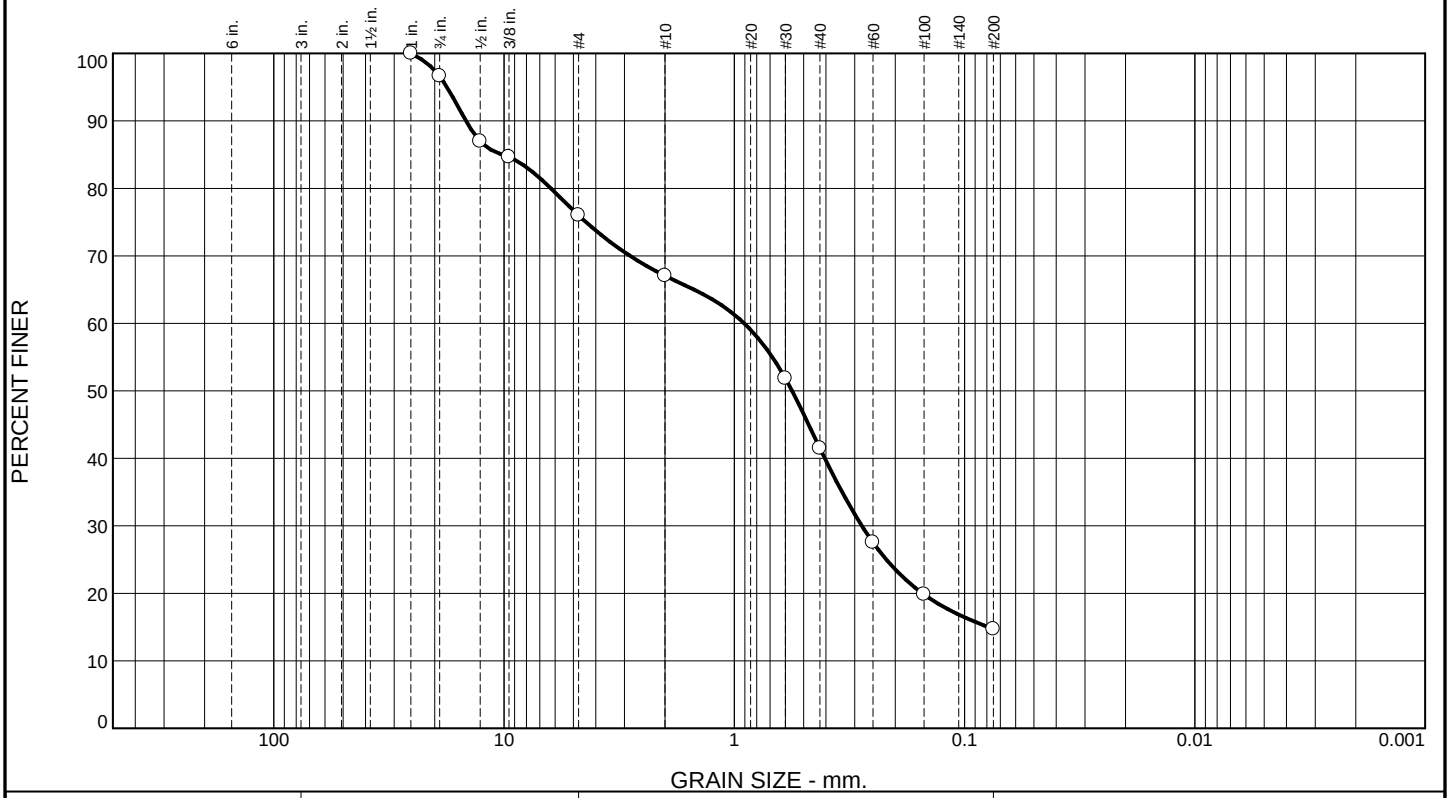
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	20.6	9.0	25.5	26.8	14.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.6		
.5	86.9		
.375	84.7		
#4	76.0		
#10	67.0		
#30	51.8		
#40	41.5		
#60	27.5		
#100	19.8		
#200	14.7		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 14.6343 D_{85}= 10.1383 D_{60}= 0.9057
D_{50}= 0.5612 D_{30}= 0.2796 D_{15}= 0.0790
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-62-1 S-3 4-6'

Date: 1-13-20

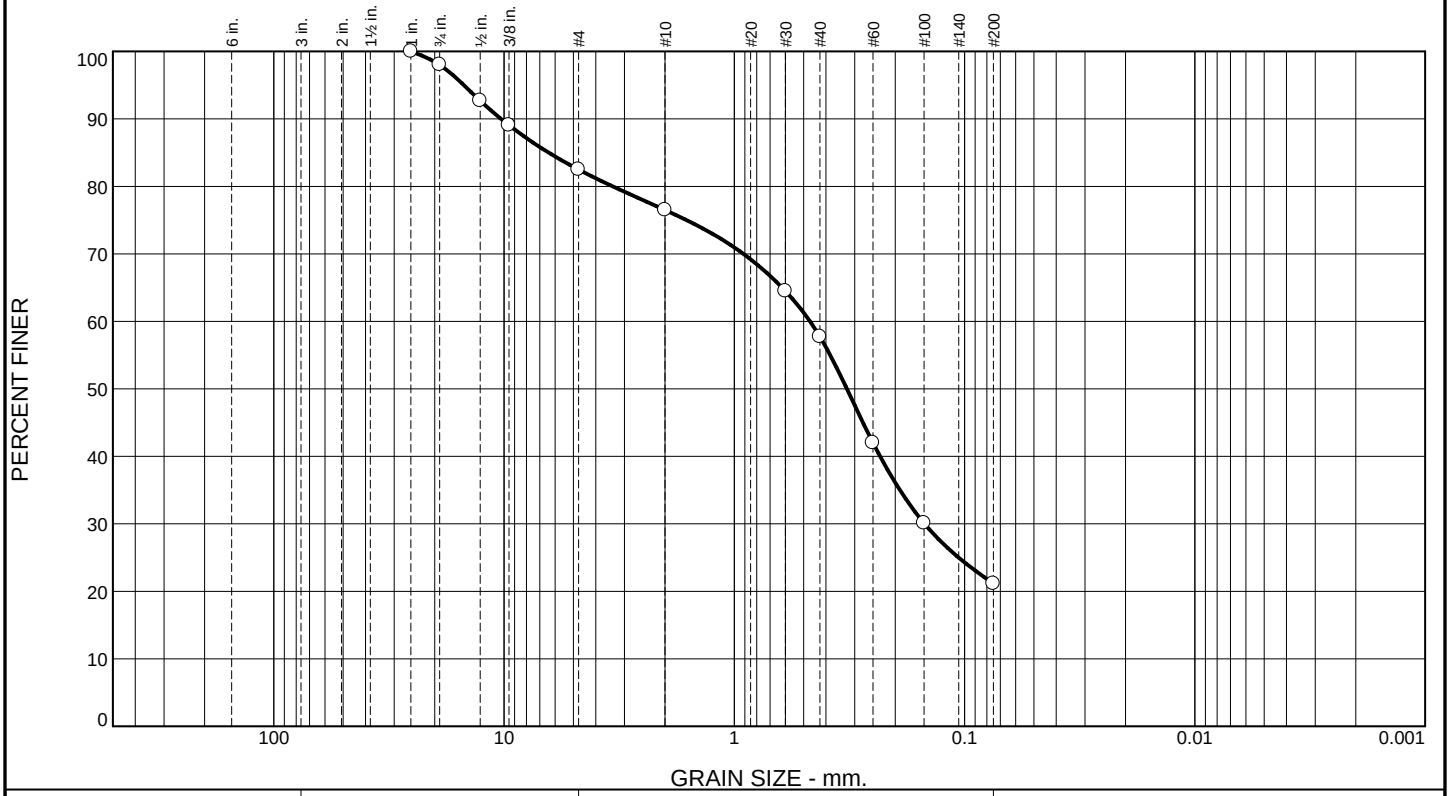
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.0	15.5	6.0	18.8	36.6	21.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.0		
.5	92.7		
.375	89.1		
#4	82.5		
#10	76.5		
#30	64.5		
#40	57.7		
#60	42.0		
#100	30.1		
#200	21.1		

* (no specification provided)

Material Description

Dark Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.3186 D_{85}= 6.4009 D_{60}= 0.4690
D_{50}= 0.3245 D_{30}= 0.1492 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-62-1 S-5 8-10'

Date: 1-13-20

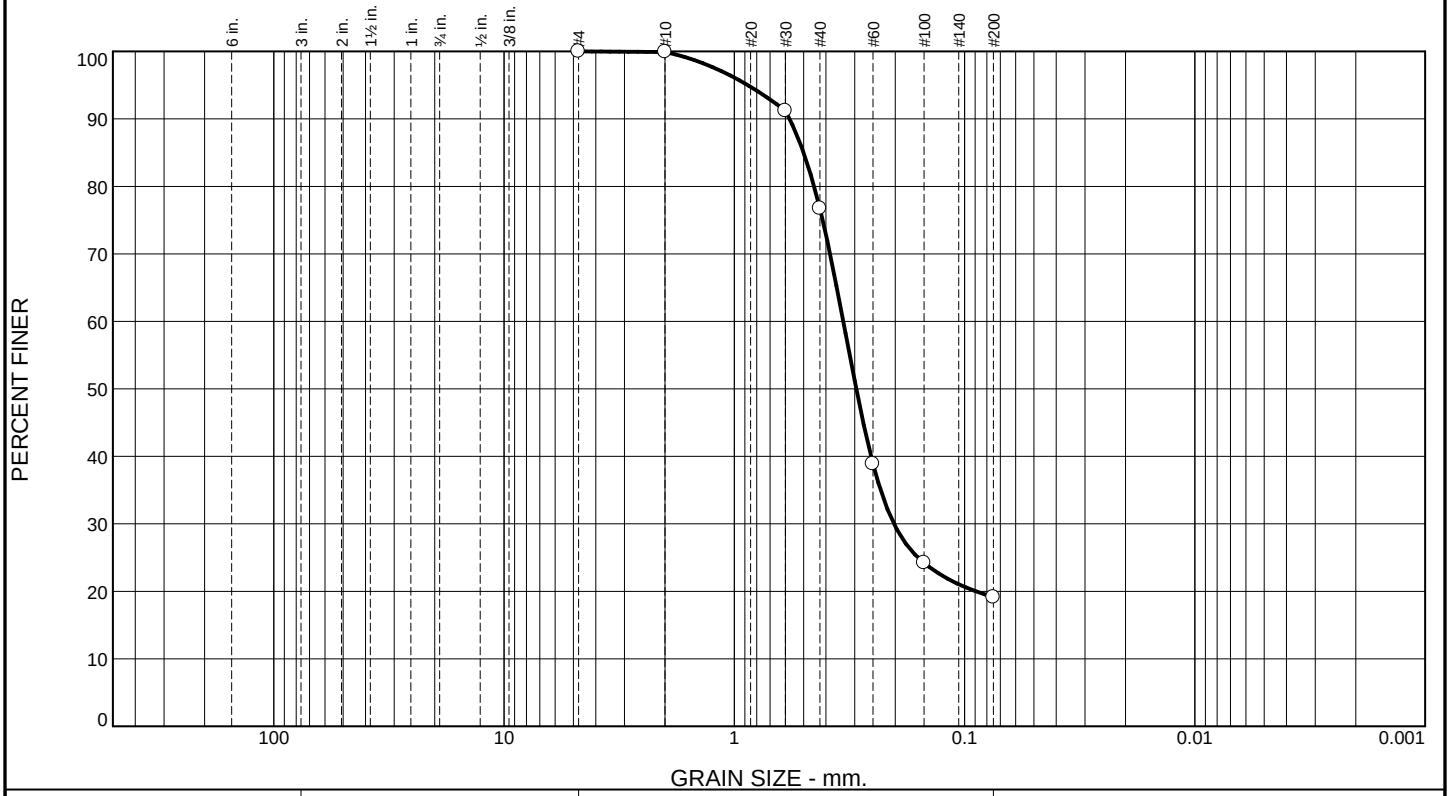
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	23.2	57.6	19.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#30	91.2		
#40	76.7		
#60	38.9		
#100	24.2		
#200	19.1		

* (no specification provided)

Material Description

Dark Gray

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5756 D_{85}= 0.5003 D_{60}= 0.3365
D_{50}= 0.2954 D_{30}= 0.2026 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-62-1 S-10B 30-32'

Date: 1-13-20

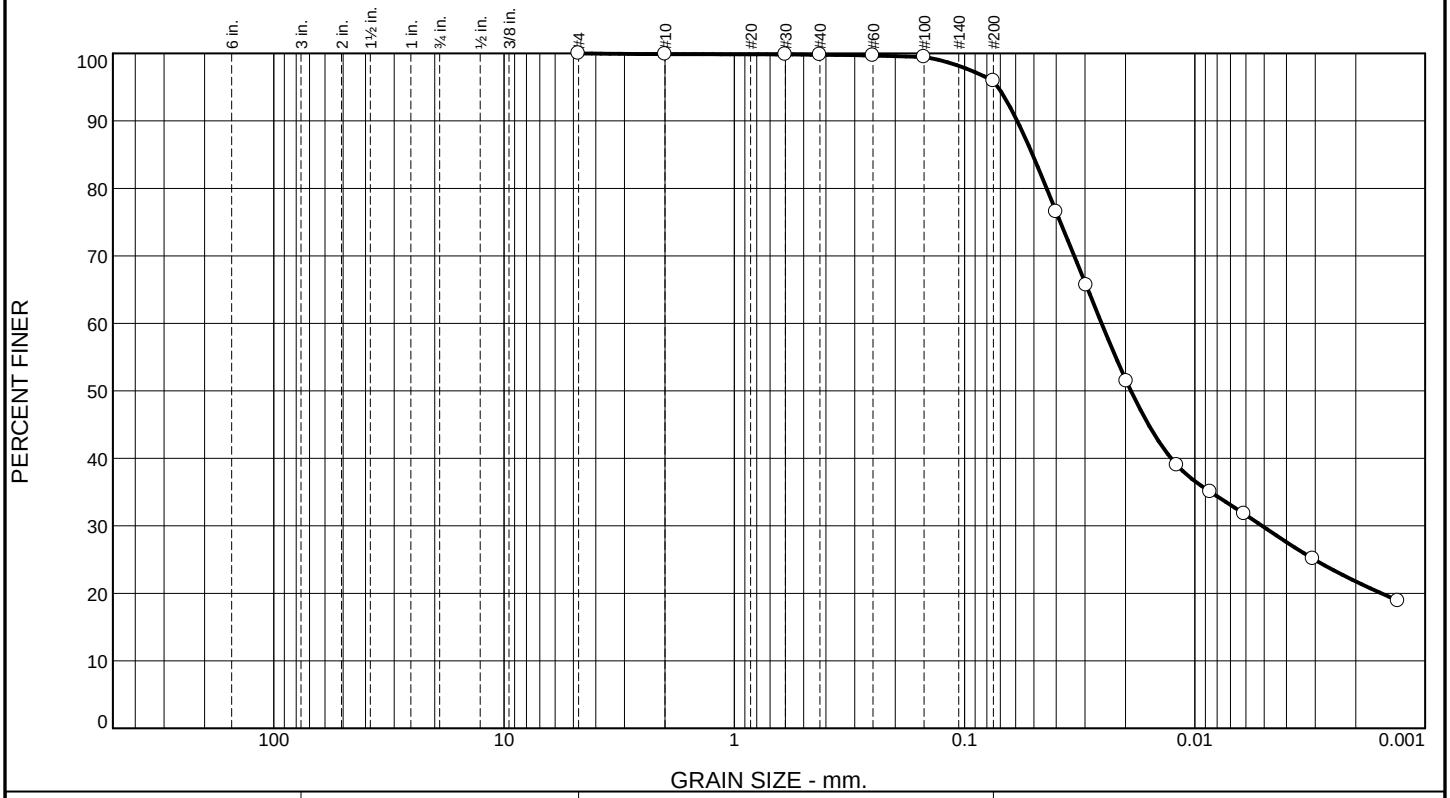
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.1	3.9	66.1	29.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#30	99.9		
#40	99.8		
#60	99.7		
#100	99.5		
#200	95.9		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0591 D_{85}= 0.0507 D_{60}= 0.0254
D_{50}= 0.0189 D_{30}= 0.0051 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-62-1 S-14 50-52'

Date: 1-13-20

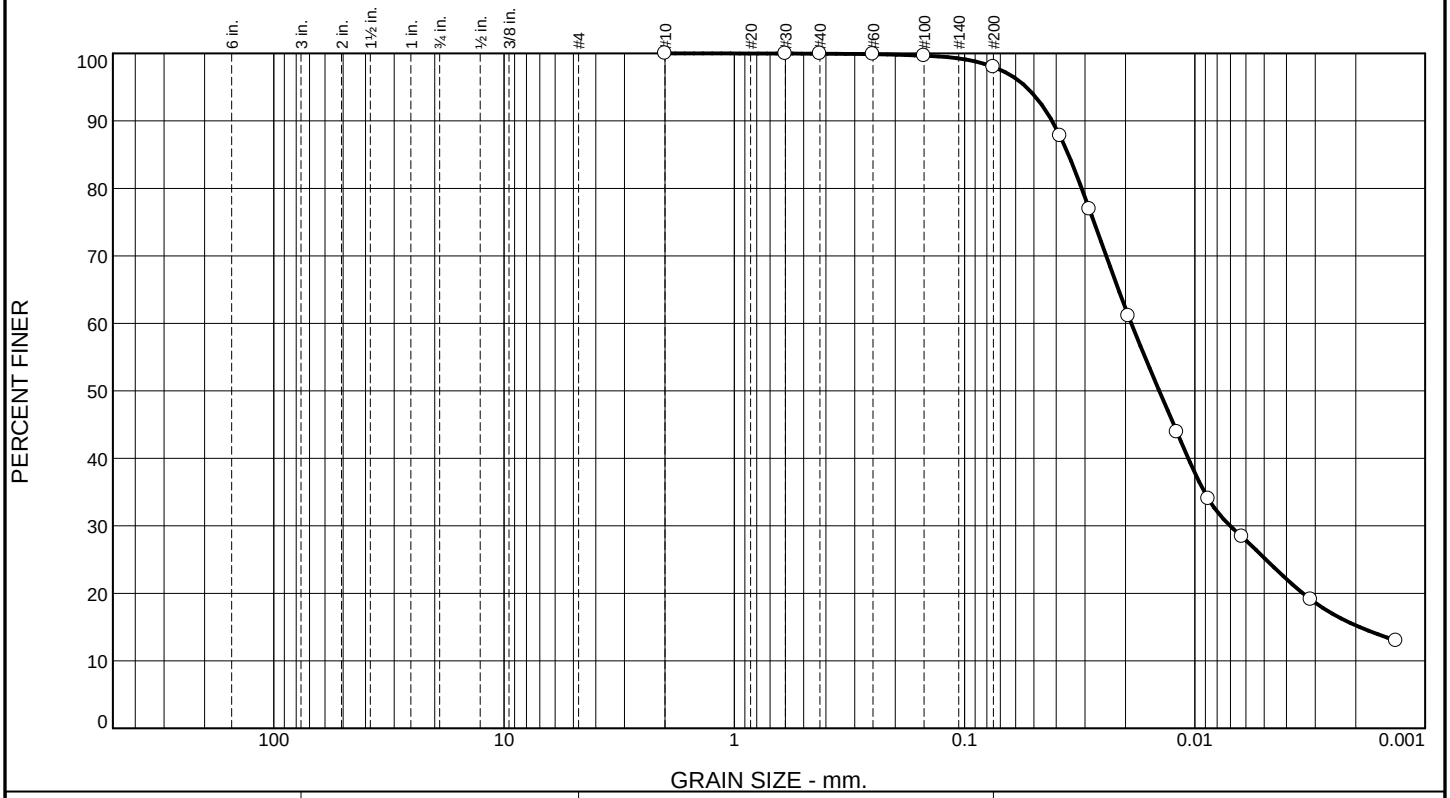
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	2.0	72.7	25.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	100.0		
#40	100.0		
#60	99.9		
#100	99.7		
#200	98.0		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0417 D_{85}= 0.0354 D_{60}= 0.0189
D_{50}= 0.0143 D_{30}= 0.0070 D_{15}= 0.0019
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-62-1 S-15 55-57'

Date: 1-13-20

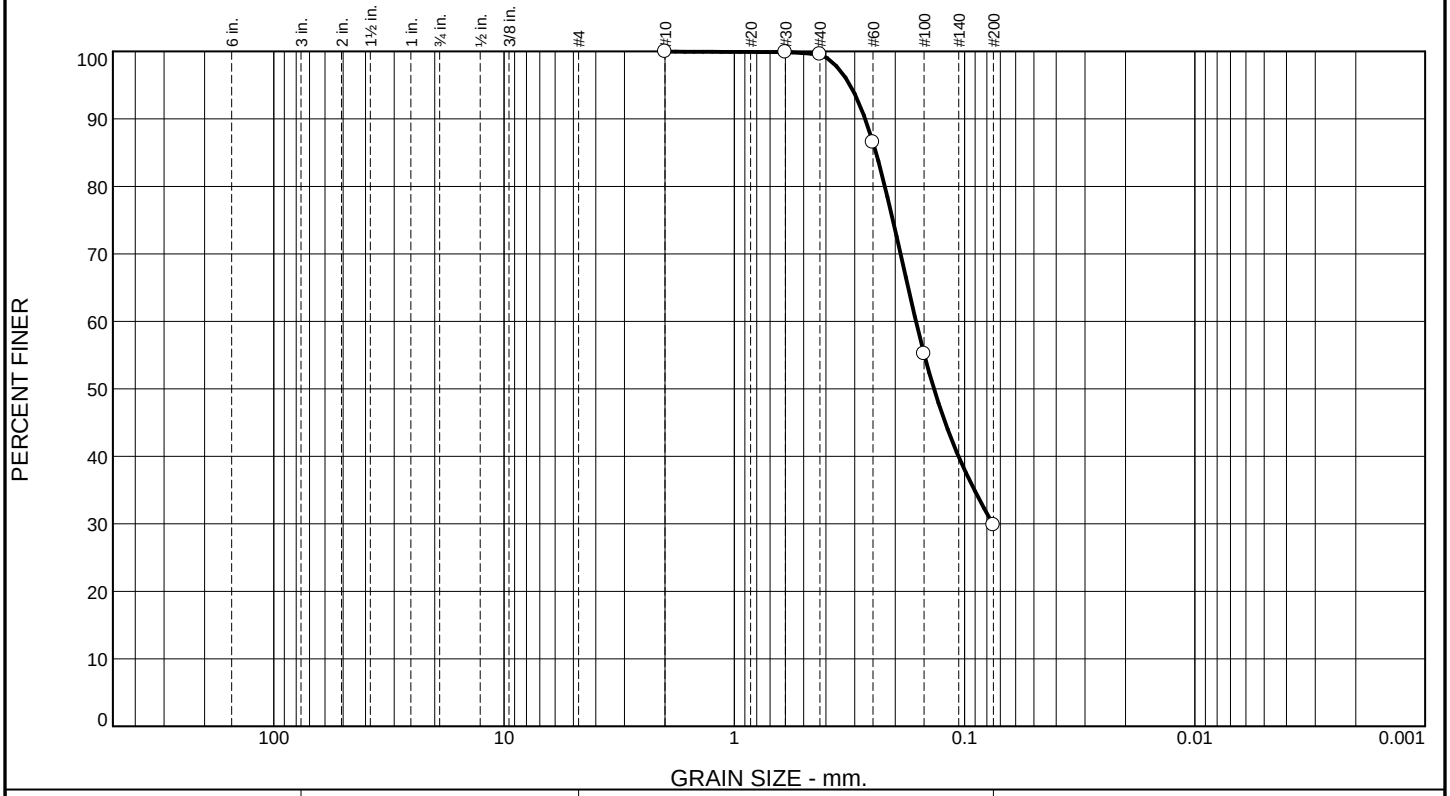
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				0.4	69.8	29.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.9		
#40	99.6		
#60	86.5		
#100	55.2		
#200	29.8		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2701 D_{85}= 0.2426 D_{60}= 0.1626
D_{50}= 0.1358 D_{30}= 0.0755 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-62-1 S-16 58-60'

Date: 1-13-20

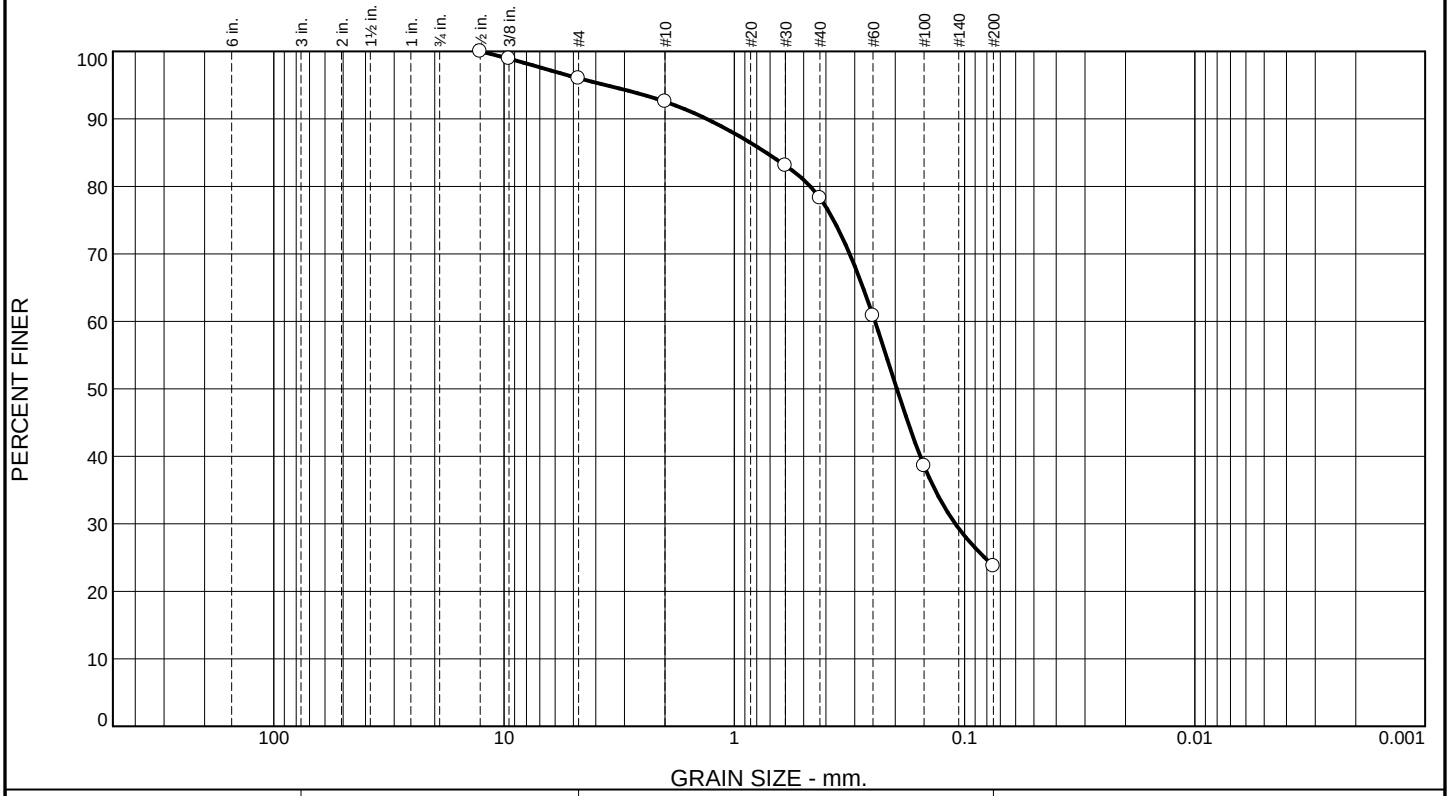
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.0	3.4	14.3	54.5	23.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	98.9		
#4	96.0		
#10	92.6		
#30	83.1		
#40	78.3		
#60	60.9		
#100	38.6		
#200	23.8		

* (no specification provided)

Material Description

Light Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.3188 D_{85}= 0.7273 D_{60}= 0.2451
D_{50}= 0.1969 D_{30}= 0.1097 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-234-1C S-3 6-8'

Date: 1-13-20

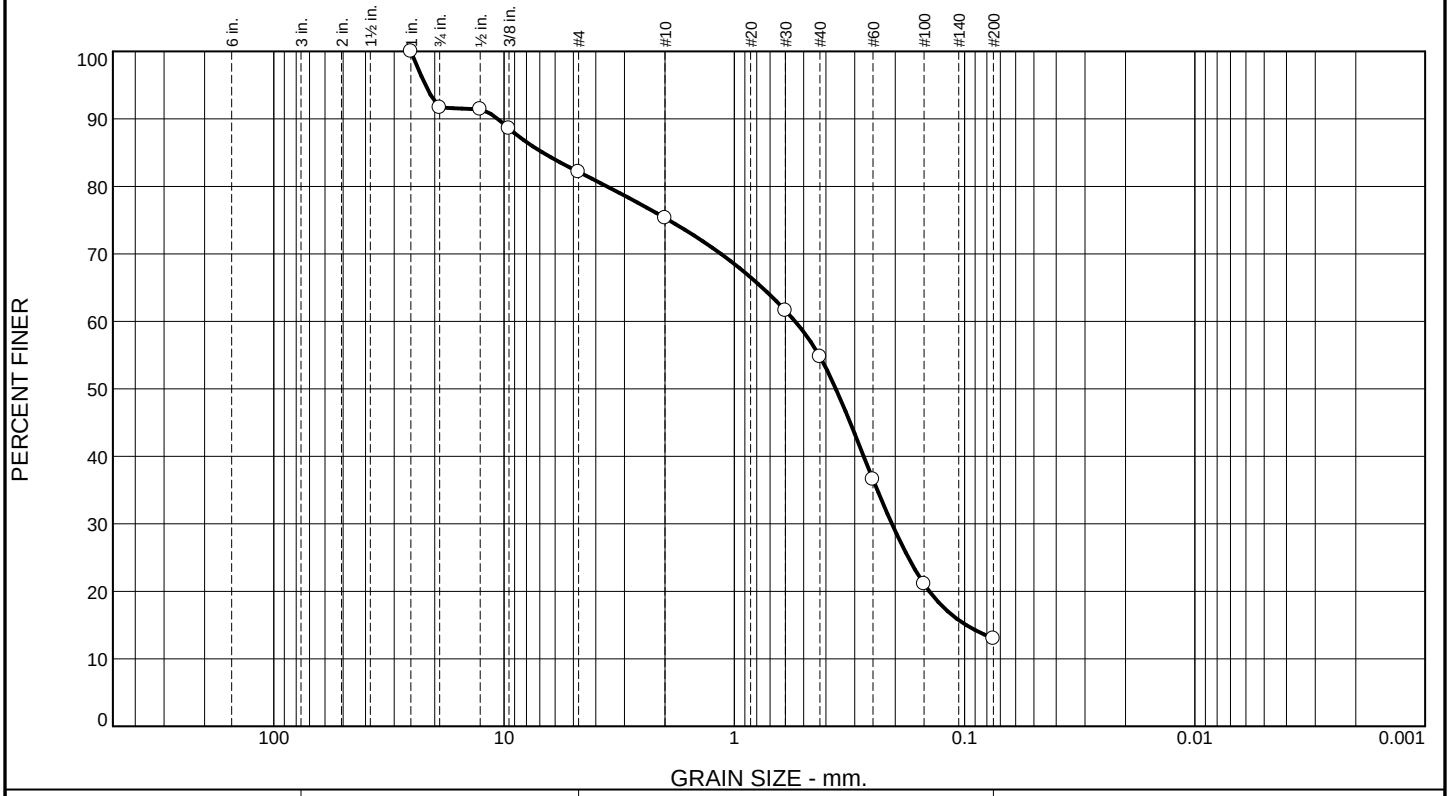
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.3	9.5	6.9	20.5	41.8	13.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.7		
.5	91.4		
.375	88.6		
#4	82.2		
#10	75.3		
#30	61.6		
#40	54.8		
#60	36.6		
#100	21.1		
#200	13.0		

* (no specification provided)

Material Description

Dark Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.6593 D_{85}= 6.7851 D_{60}= 0.5443
D_{50}= 0.3624 D_{30}= 0.2068 D_{15}= 0.0983
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-234-1C S-5 10-12'

Date: 1-13-20

RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.2	12.2	38.5	31.1	15.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.1		
#10	96.9		
#30	88.8		
#40	84.7		
#60	65.5		
#100	51.9		
#200	46.2		

* (no specification provided)

Material Description

Gray

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7167 D_{85}= 0.4299 D_{60}= 0.2123
D_{50}= 0.1307 D_{30}= 0.0214 D_{15}= 0.0049
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-234-1C S-9 35-37'

Date: 1-13-20

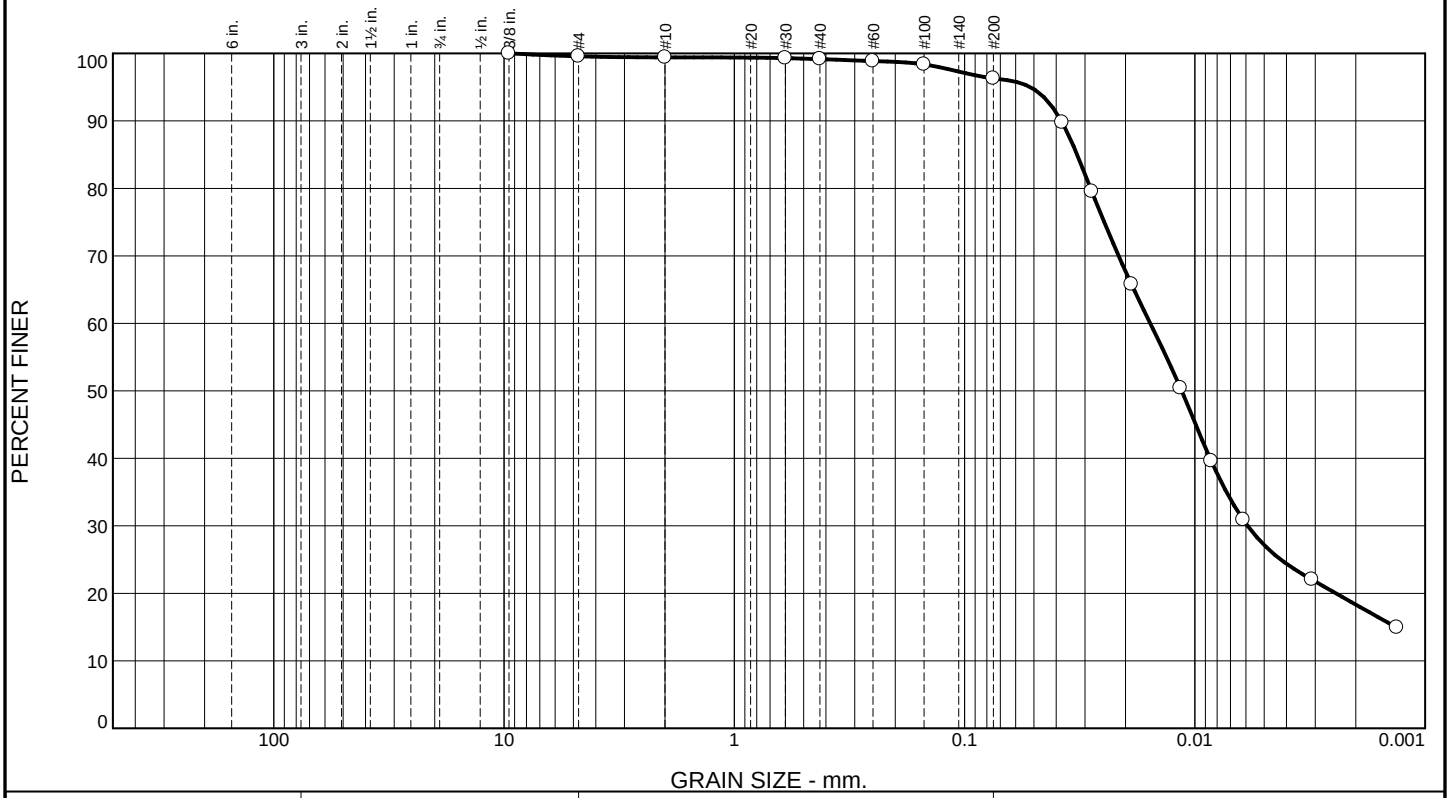
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.2	0.2	2.9	69.1	27.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	99.4		
#30	99.3		
#40	99.2		
#60	98.9		
#100	98.4		
#200	96.3		

* (no specification provided)

Material Description

Weak Red

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0380 D_{85}= 0.0325 D_{60}= 0.0156
D_{50}= 0.0114 D_{30}= 0.0059 D_{15}= 0.0013
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

SG Assumed

Sample Number: B-234-1C S-10 40-42'

Date: 1-13-20

RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

RSA Geolab

LOSS ON IGNITION (ASTM D2974)

Project:	Brooklyn Navy Yard DC Boilers Project#1119060	Project #:	909
Client:	MFS Consulting Engineers and Surveyor, DPC	Date:	1-13-20

HOLE #/ SAMPLE #	B-234-1C S-3	B-234-1C S-5	B-234-1C S-7			
DEPTH	6-8'	10-12'	25-27'			
OVEN DRIED SAMPLE + TARE (gms.)	63.73	82.47	88.99			
AFTER IGNITION SAMPLE + TARE (gms.)	63.19	81.66	81.36			
LOSS ON IGNITION (gms.)	0.54	0.81	7.63	0.00	0.00	0.00
TARE (gms.)	31.22	52.10	57.20			
INITIAL WGT. OF OVEN DRIED SAMPLE (gms.)	32.51	30.37	31.79	0.00	0.00	0.00
LOSS ON IGNITION (%)	**1.66**	**2.67**	**24.00**	**0.00**	**0.00**	**0.00**

Performed by: EE Entered by: KH Checked by: KP

RSA GEOLAB, LLC

1017 Greeley Avenue North
Union, New Jersey 07083
908-964-0786 (P)
www.RSAgeolab.com

Letter of Transmittal

Date: 1-14-20 Job No.: 909 Lab Log: 19-563

Attention: Jacob Fradkin
MFS Consulting Engineers and Surveyor, DPC
2780 Hamilton Boulevard
South Plainfield, NJ 07080

CC:

Re: Brooklyn Navy Yard DC Boilers
Project#1119060

Sample(s) ID: **B-234-1C S-12 thru B-386-2 S-15B**

Dear Mr. Fradkin,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D2216 Moisture Content (19 tests)
- ASTM D4318 Atterberg Limits (3 tests)
- ASTM D422 Washed Sieve Analysis (16 tests)

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed: _____

Dr. Raza S. Ahmed
President RSA Geolab, LLC

RSA's Geolab's Geotechnical Laboratory testing was performed and results reported in accordance with ASTM standards and accepted industry standards. No other representations or warranties either express or implied are given. RSA Geolab, LLC neither accepts responsibility for nor makes claim to the final use and purpose of the material tested.
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RSA Geolab	MOISTURE CONTENTS TEST METHOD ASTM D-2216

CLIENT:	MFS Consulting Engineers and Surveyor, DPC	**DATE:**	14-Jan-20
PROJECT:	Brooklyn Navy Yard DC Boilers Project#1119060	**PROJECT #**	909

HOLE #/ SAMPLE #	B-234-1C S-12	B-234-1C S-14	B-293-1 S-2	B-293-1 S-5	B-293-1 S-9
DEPTH	50-52'	60-62'	4-6'	10-12'	30-32'
WET WGT. + tare (gms.)	116.2	414.9	357.3	435.4	408.0
DRY WGT. + tare (gms.)	87.6	349.0	334.0	380.2	351.6
WGT. WATER (gms.)	28.6	65.9	23.3	55.2	56.4
TARE (gms.)	8.2	6.9	6.9	6.9	7.0
DRY WGT. (gms.)	79.4	342.1	327.1	373.3	344.6
MOISTURE CONTENT	36.0%	19.3%	7.1%	14.8%	16.4%

HOLE #/ SAMPLE #	B-293-1 S-13	B-293-1 S-15	B-293-1 S-16	B-293-1 S-17	B-386-1B S-1
DEPTH	50-52'	58-60'	65-67'	68-70'	6-8'
WET WGT. + tare (gms.)	389.3	349.8	151.3	379.3	469.9
DRY WGT. + tare (gms.)	312.8	288.1	110.9	309.5	413.8
WGT. WATER (gms.)	76.5	61.7	40.4	69.8	56.1
TARE (gms.)	7.0	7.1	8.3	7.0	7.1
DRY WGT. (gms.)	305.8	281.0	102.6	302.5	406.7
MOISTURE CONTENT	25.0%	22.0%	39.4%	23.1%	13.8%

Performed by: EE Entered by: KH Checked by: KP

RSA Geolab	MOISTURE CONTENTS TEST METHOD ASTM D-2216

CLIENT:	MFS Consulting Engineers and Surveyor, DPC	**DATE:**	14-Jan-20
PROJECT:	Brooklyn Navy Yard DC Boilers Project#1119060	**PROJECT #**	909

HOLE #/ SAMPLE #	B-386-1B S-5	B-386-1B S-8	B-386-1B S-11	B-386-1B S-13	B-386-1B S-15
DEPTH	20-22'	35-37'	50-52'	60-62'	68-70'
WET WGT. + tare (gms.)	430.6	297.5	381.5	139.4	408.8
DRY WGT. + tare (gms.)	378.7	263.8	330.1	103.2	332.7
WGT. WATER (gms.)	51.9	33.7	51.4	36.2	76.1
TARE (gms.)	7.0	7.0	6.9	7.1	7.0
DRY WGT. (gms.)	371.7	256.8	323.2	96.1	325.7
MOISTURE CONTENT	14.0%	13.1%	15.9%	37.7%	23.4%

HOLE #/ SAMPLE #	B-386-2 S-3	B-386-2 S-8	B-386-2 S-11	B-386-2 S-15B	
DEPTH	6-8'	25-27'	40-42'	58-60'	
WET WGT. + tare (gms.)	402.4	324.4	424.0	428.0	
DRY WGT. + tare (gms.)	352.7	279.2	342.9	348.6	
WGT. WATER (gms.)	49.7	45.2	81.1	79.4	0.0
TARE (gms.)	7.1	8.2	8.6	7.2	
DRY WGT. (gms.)	345.6	271.0	334.3	341.4	0.0
MOISTURE CONTENT	14.4%	16.7%	24.3%	23.3%	

Performed by: EE Entered by: KH Checked by: KP

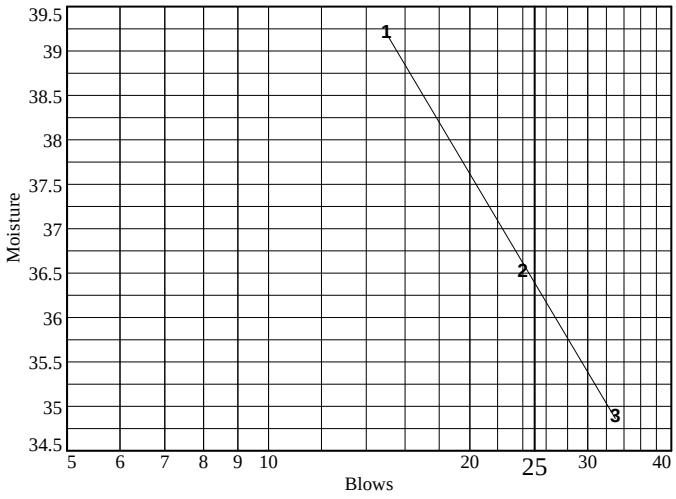
LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-234-1C S-12 50-52'
Material Description: Weak Red Clay & Silt, trace cmf Sand (visual)
Tested by: SD **Checked by:** KP
Testing Remarks: 1-14-20

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.21	8.23	9.27			
Dry+Tare	6.97	6.37	7.20			
Tare	1.26	1.28	1.27			
# Blows	15	24	33			
Moisture	39.2	36.5	34.9			

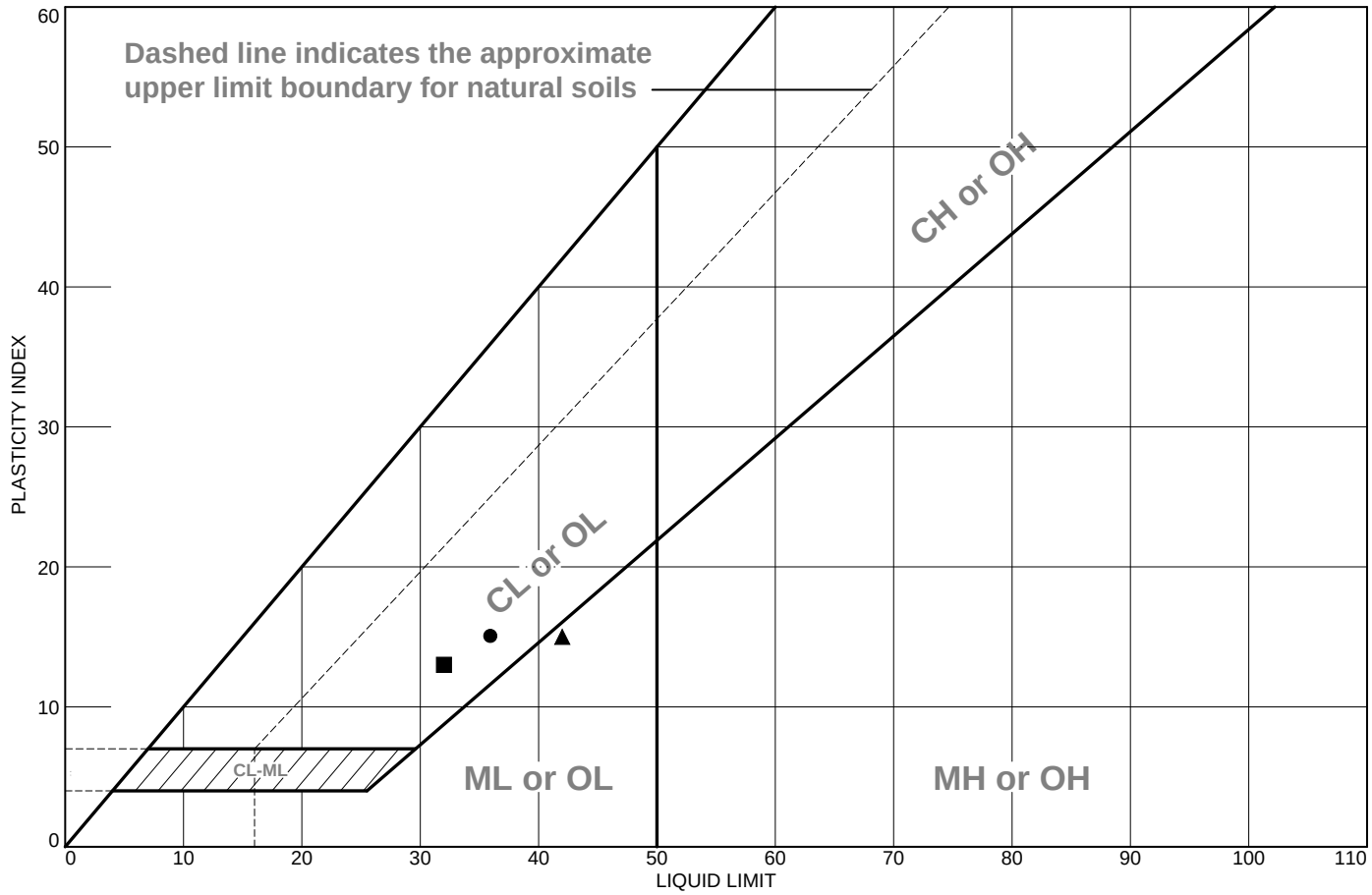


Liquid Limit= 36
Plastic Limit= 21
Plasticity Index= 15

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	6.34	7.60			
Dry+Tare	5.43	6.52			
Tare	1.26	1.26			
Moisture	21.8	20.5			

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Weak Red Clay & Silt, trace cmf Sand (visual)	36	21	15			
■	Weak Red Clay & Silt, trace cmf Sand (visual)	32	19	13			
▲	Weak Red Clay & Silt, trace cmf Sand (visual)	42	27	15			

Project No. 909 **Client:** MFS Consulting Engineers and Surveyor, DPC

Project: Brooklyn Navy Yard DC Boilers

Project No. 1119060

●**Sample Number:** B-234-1C S-12 50-52'

■**Sample Number:** B-293-1 S-16 65-67'

▲**Sample Number:** B-386-1B S-13 60-62'

Remarks:

●1-14-20

RSA Geolab

Union, New Jersey

Figure

Tested By: SD **Checked By:** KP

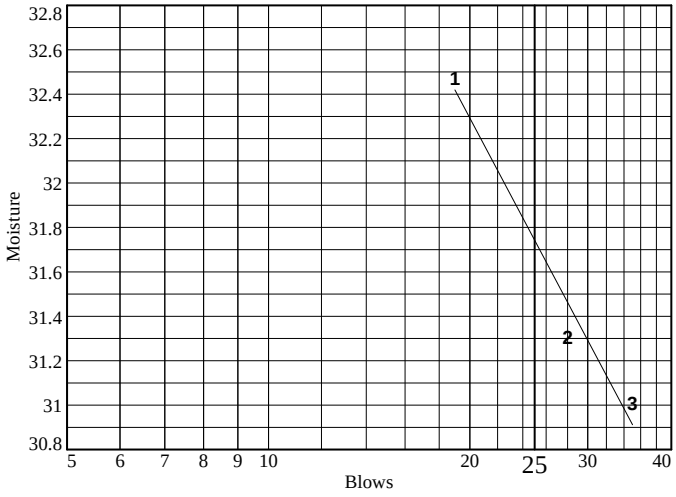
LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-293-1 S-16 65-67'
Material Description: Weak Red Clay & Silt, trace cmf Sand (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.51	8.39	8.78			
Dry+Tare	7.49	6.69	7.00			
Tare	1.27	1.26	1.26			
# Blows	19	28	35			
Moisture	32.5	31.3	31.0			



Liquid Limit= 32
Plastic Limit= 19
Plasticity Index= 13

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	9.51	8.88			
Dry+Tare	8.21	7.65			
Tare	1.26	1.26			
Moisture	18.7	19.2			

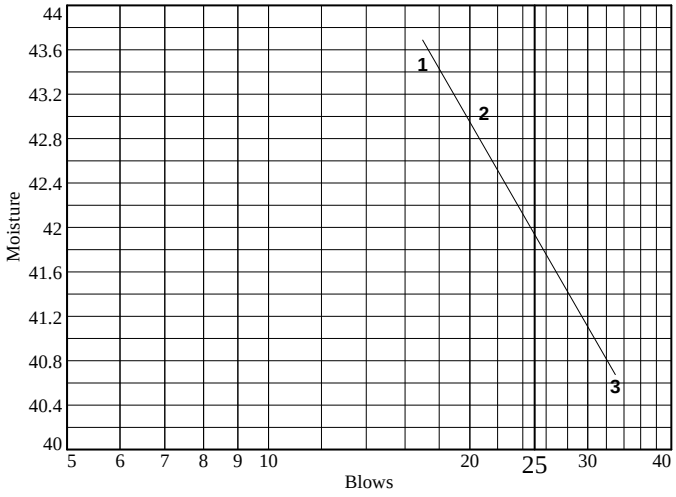
LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-386-1B S-13 60-62'
Material Description: Weak Red Clay & Silt, trace cmf Sand (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.52	9.29	8.58			
Dry+Tare	7.02	6.88	6.47			
Tare	1.27	1.28	1.27			
# Blows	17	21	33			
Moisture	43.5	43.0	40.6			

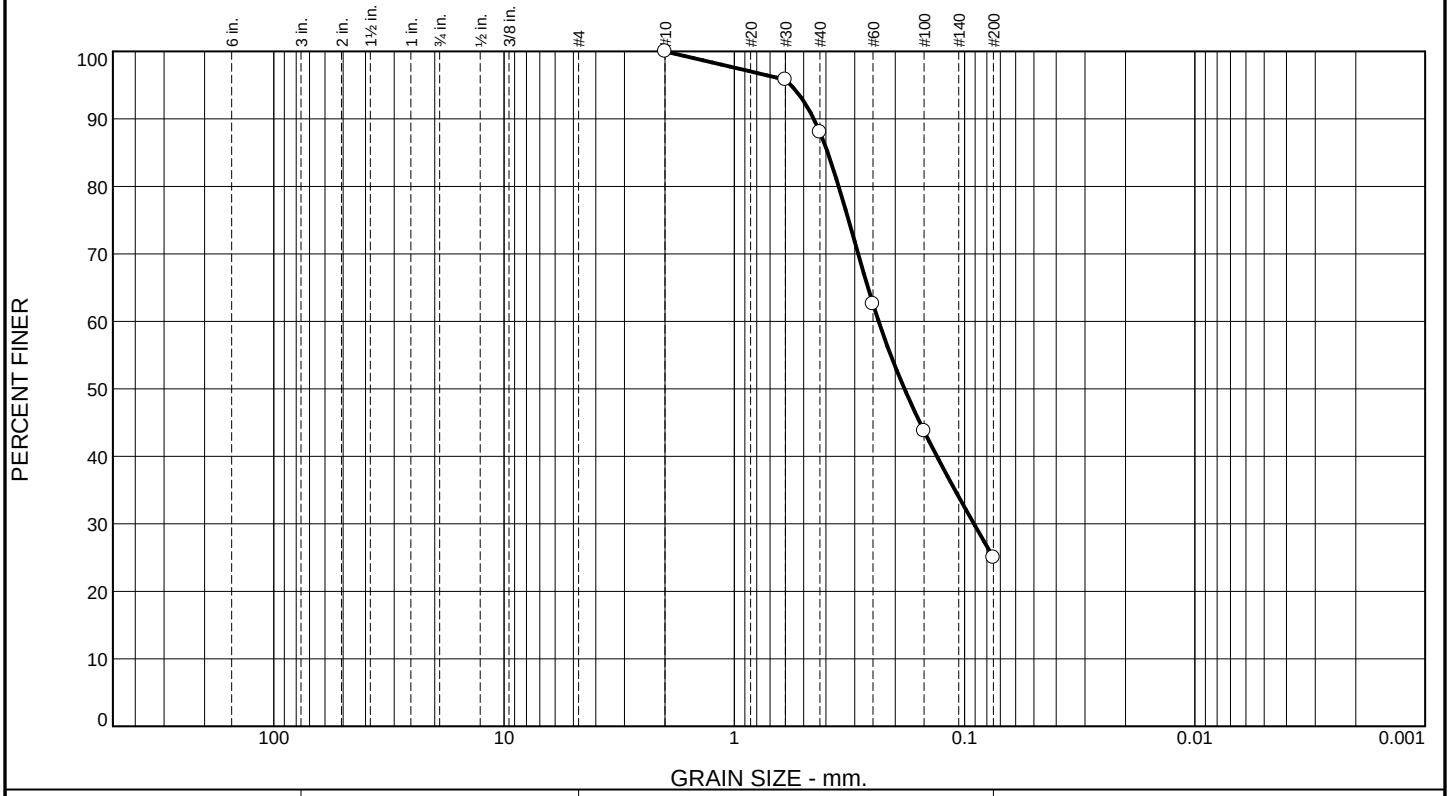


Liquid Limit= 42
Plastic Limit= 27
Plasticity Index= 15

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	9.62	8.38			
Dry+Tare	7.86	6.86			
Tare	1.27	1.25			
Moisture	26.7	27.1			

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	12.0	63.0	25.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	95.8		
#40	88.0		
#60	62.6		
#100	43.8		
#200	25.0		

* (no specification provided)

Material Description

Dark Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4513 D_{85}= 0.3930 D_{60}= 0.2362
D_{50}= 0.1825 D_{30}= 0.0911 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-234-1C S-14 60-62'

Date: 1-14-20

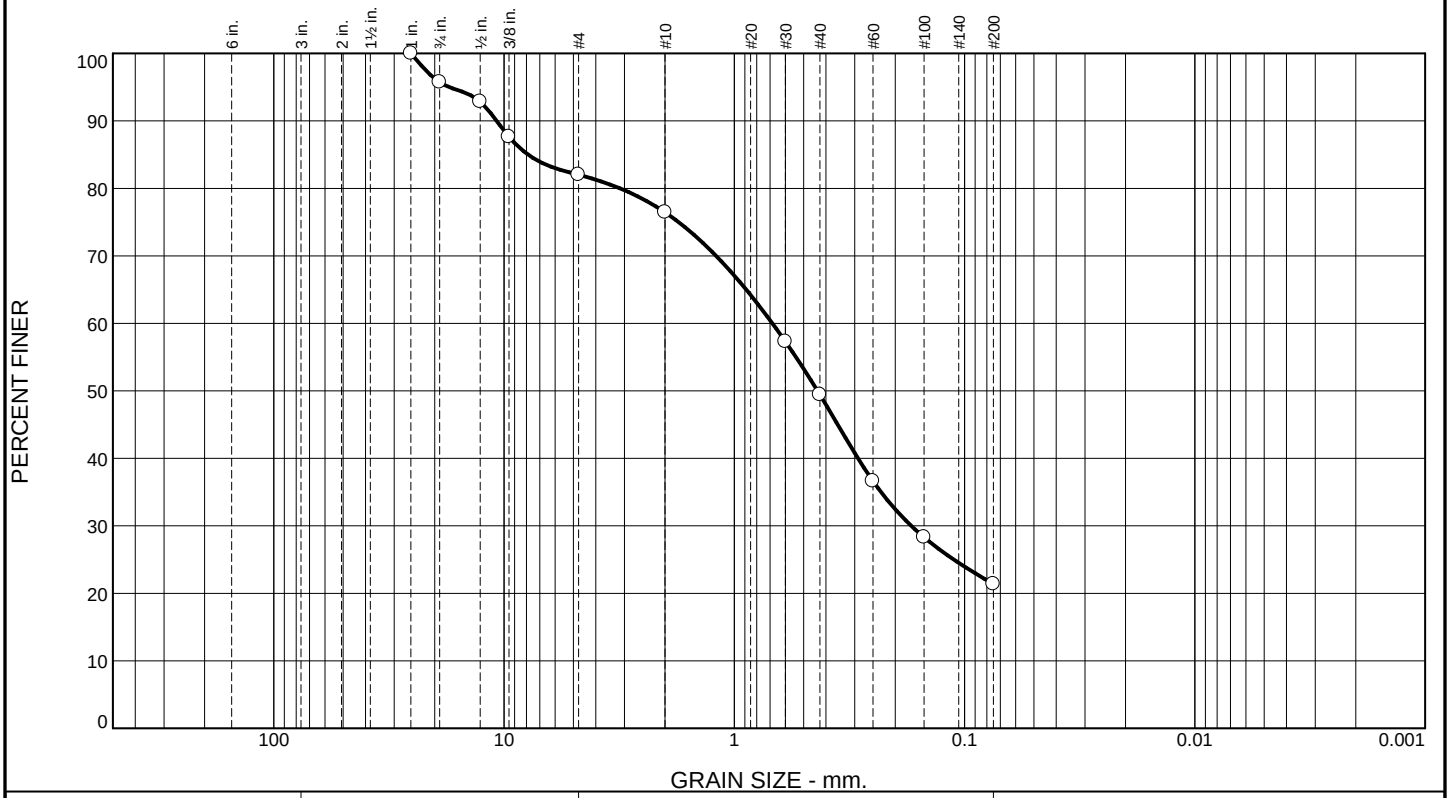
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.3	13.7	5.5	27.1	28.0	21.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.7		
.5	92.8		
.375	87.6		
#4	82.0		
#10	76.5		
#30	57.3		
#40	49.4		
#60	36.6		
#100	28.3		
#200	21.4		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.7740 D_{85}= 7.8674 D_{60}= 0.6836
D_{50}= 0.4350 D_{30}= 0.1704 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-2 4-6'

Date: 1-14-20

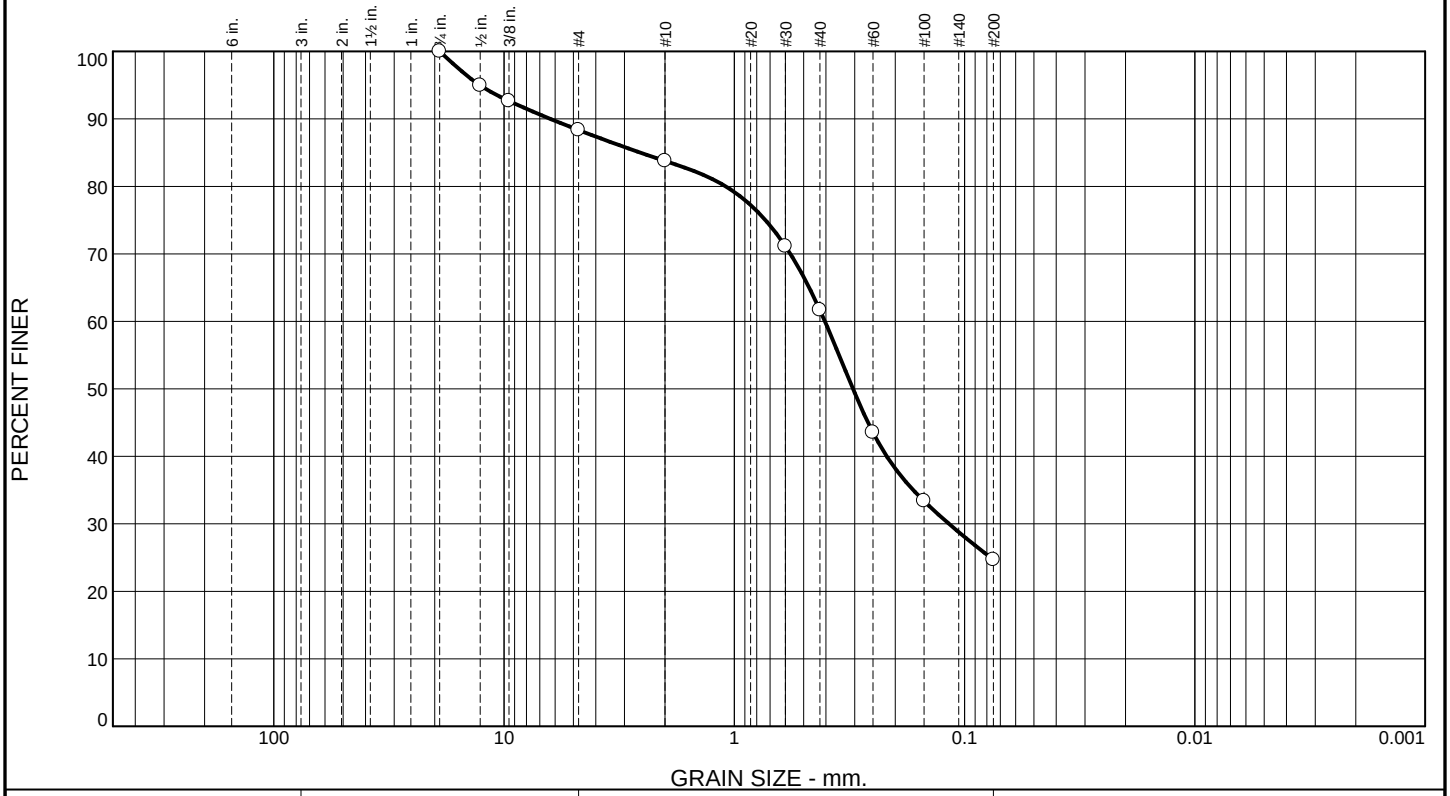
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.7	4.5	22.1	37.0	24.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.0		
.375	92.7		
#4	88.3		
#10	83.8		
#30	71.1		
#40	61.7		
#60	43.5		
#100	33.4		
#200	24.7		

* (no specification provided)

Material Description

Light Olive Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.2991 D_{85}= 2.5574 D_{60}= 0.4044
D_{50}= 0.3053 D_{30}= 0.1169 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-5 10-12'

Date: 1-14-20

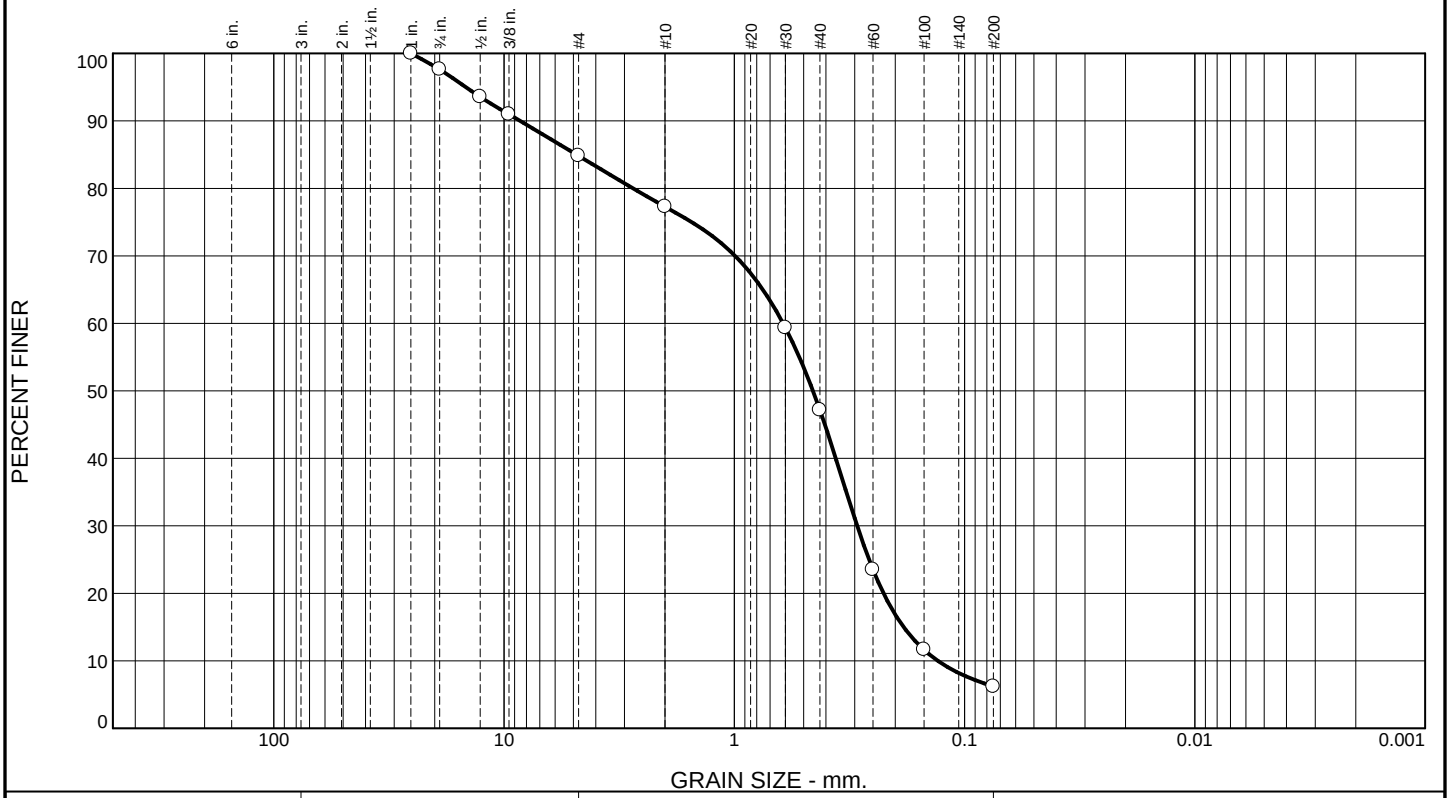
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.4	12.8	7.5	30.1	41.0	6.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.6		
.5	93.6		
.375	91.0		
#4	84.8		
#10	77.3		
#30	59.3		
#40	47.2		
#60	23.5		
#100	11.6		
#200	6.2		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 8.5175 D_{85}= 4.8453 D_{60}= 0.6141
D_{50}= 0.4555 D_{30}= 0.2928 D_{15}= 0.1840
D_{10}= 0.1307 C_u= 4.70 C_c= 1.07

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-9 30-32'

Date: 1-14-20

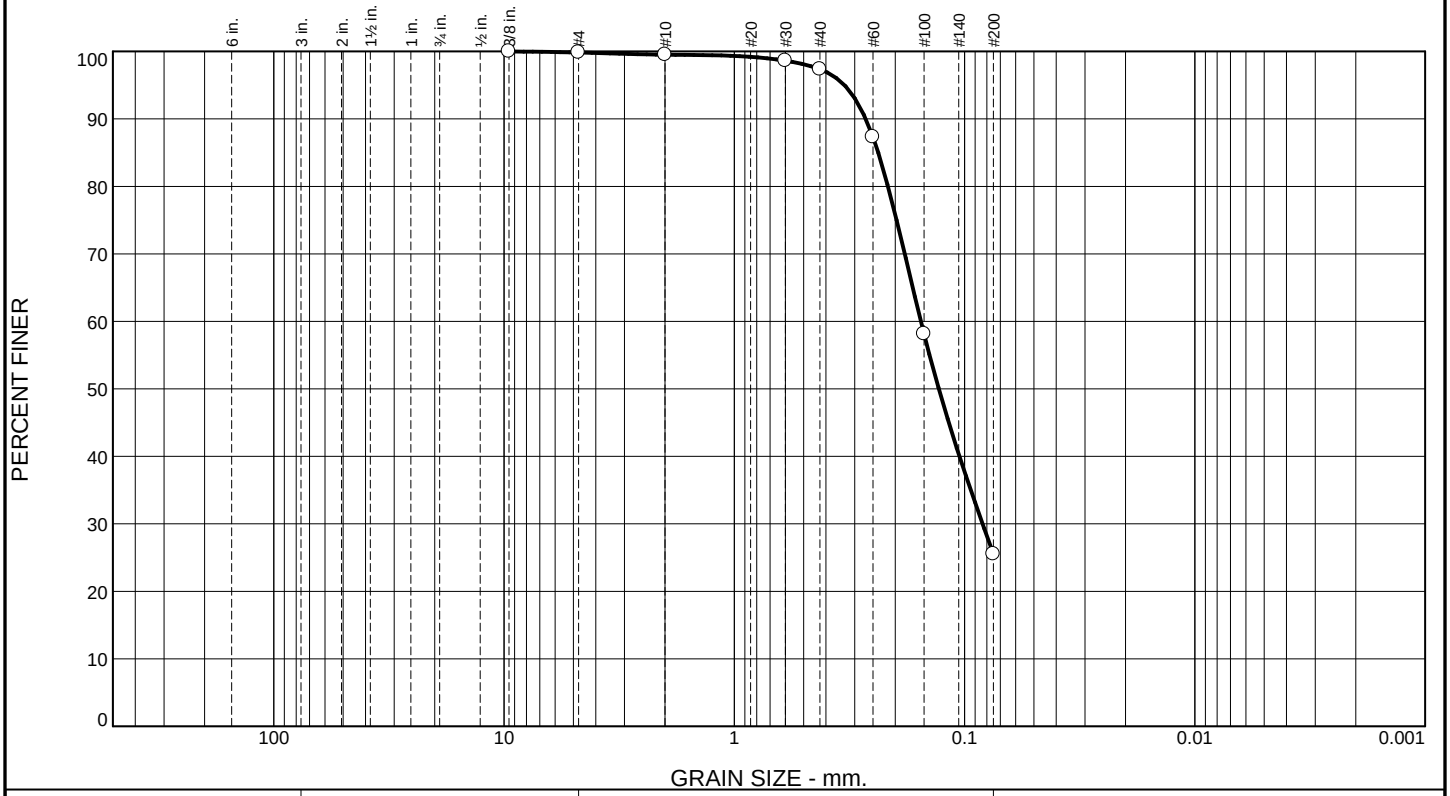
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.3	2.1	71.9	25.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.8		
#10	99.5		
#30	98.6		
#40	97.4		
#60	87.3		
#100	58.1		
#200	25.5		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2688 D_{85}= 0.2373 D_{60}= 0.1548
D_{50}= 0.1294 D_{30}= 0.0835 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-13 50-52'

Date: 1-14-20

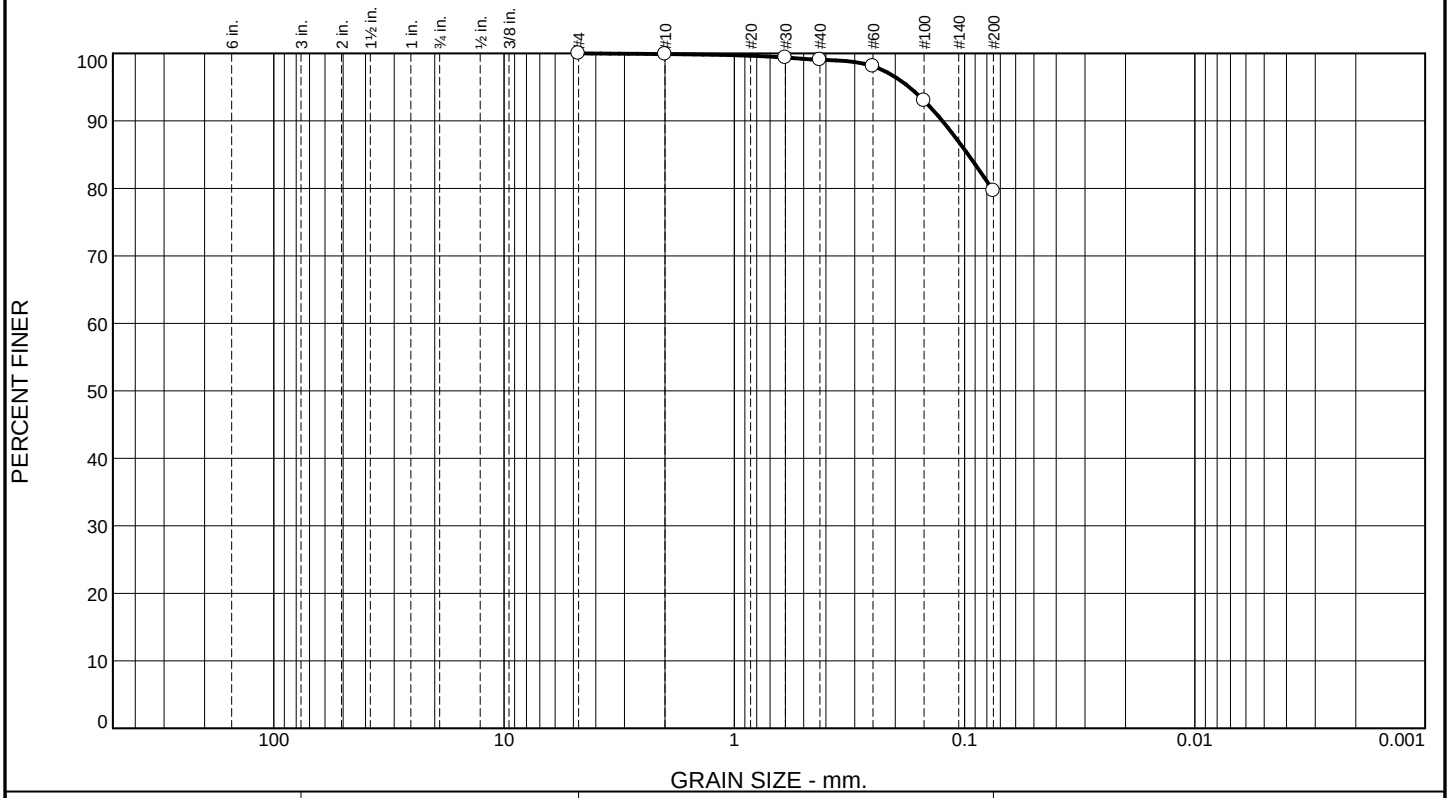
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.8	19.4	79.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#30	99.4		
#40	99.1		
#60	98.1		
#100	93.0		
#200	79.7		

* (no specification provided)

Material Description

Weak Red

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1249 D_{85}= 0.0965 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-15 58-60'

Date: 1-14-20

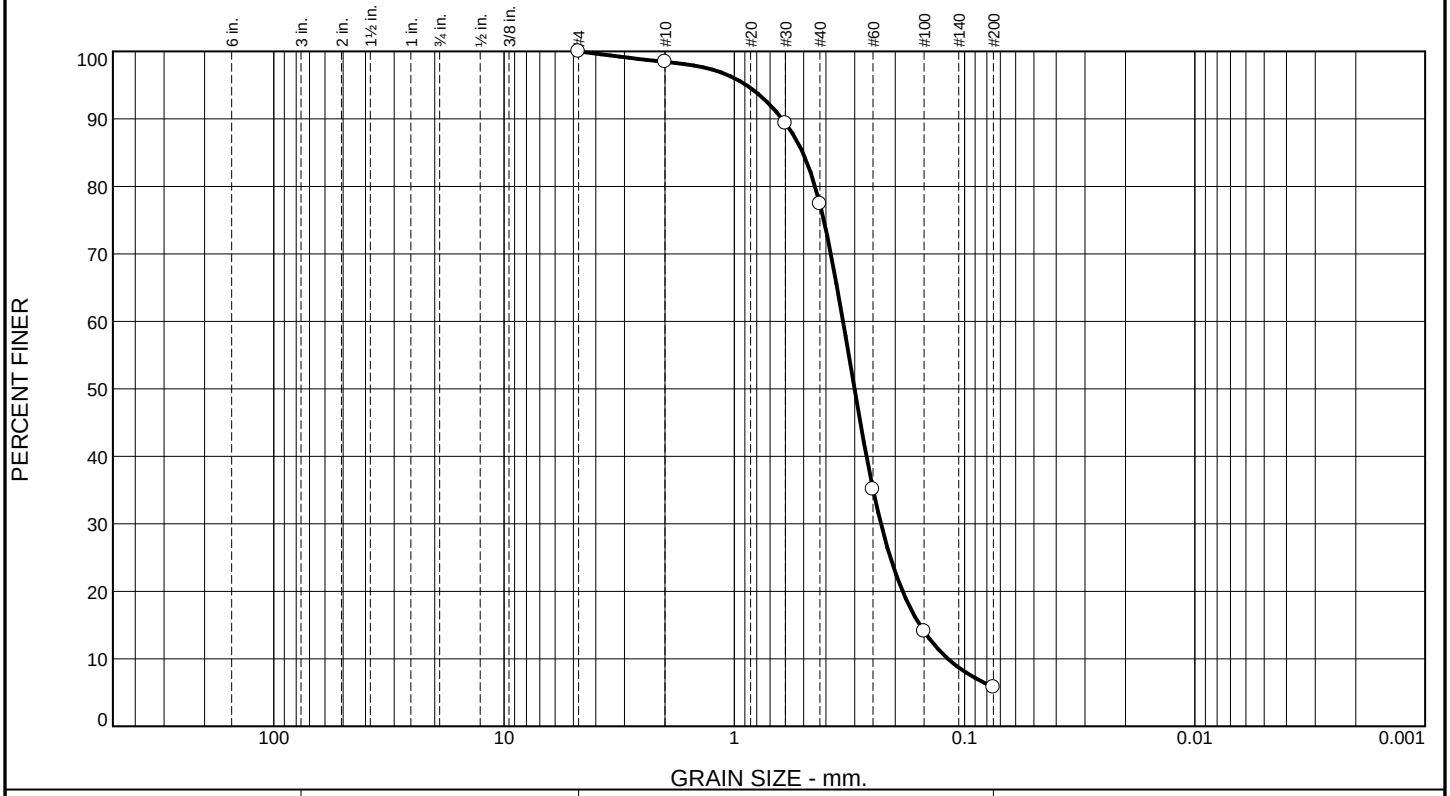
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: MF **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.6	21.0	71.6	5.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.4		
#30	89.4		
#40	77.4		
#60	35.1		
#100	14.1		
#200	5.8		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6203 D_{85}= 0.5040 D_{60}= 0.3372
D_{50}= 0.3007 D_{30}= 0.2309 D_{15}= 0.1563
D_{10}= 0.1182 C_u= 2.85 C_c= 1.34

Classification

USCS= AASHTO=

Remarks

Sample Number: B-293-1 S-17 68-70'

Date: 1-14-20

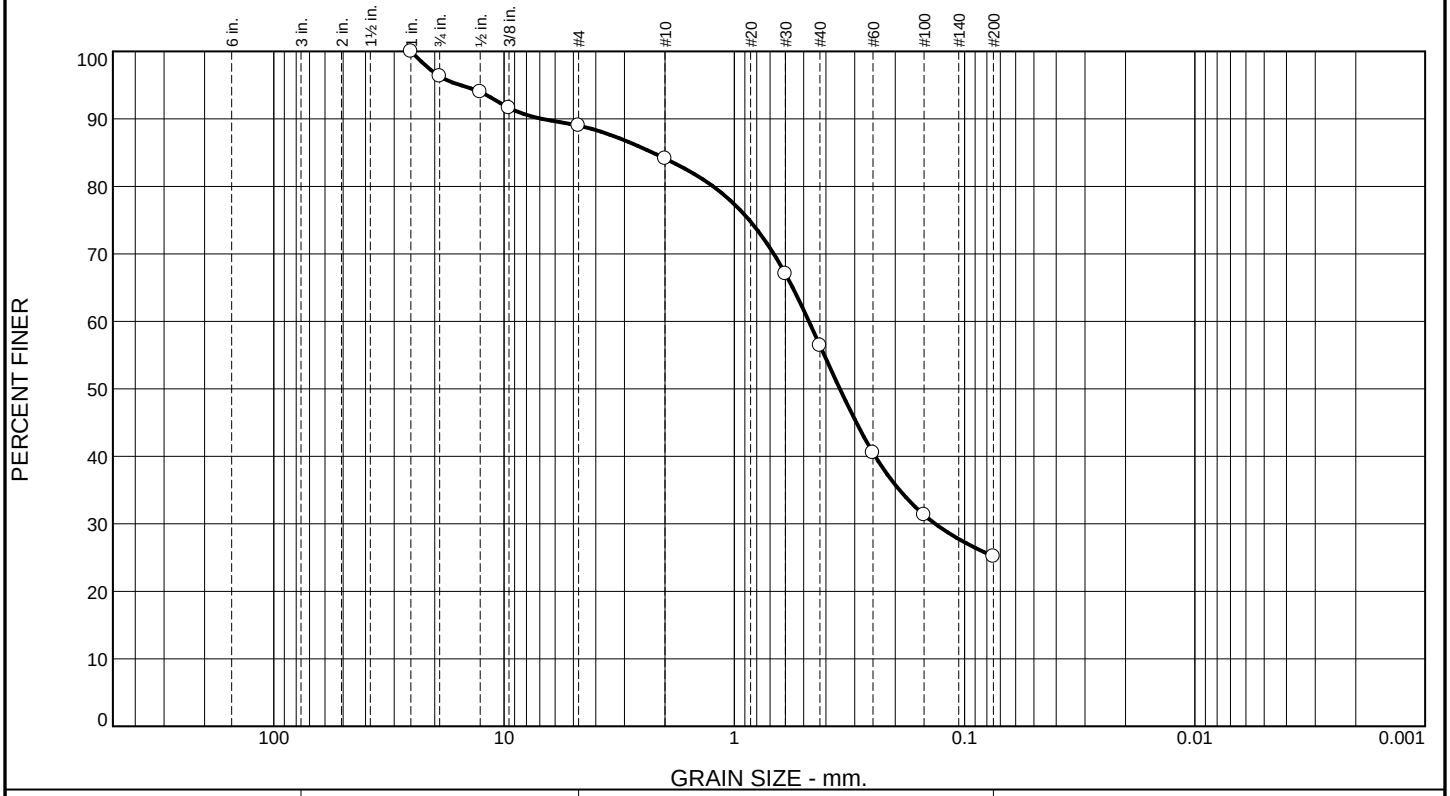
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	7.3	4.9	27.7	31.2	25.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.3		
.5	94.0		
.375	91.6		
#4	89.0		
#10	84.1		
#30	67.1		
#40	56.4		
#60	40.5		
#100	31.3		
#200	25.2		

* (no specification provided)

Material Description

Brownish Yellow

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.8394 D_{85}= 2.2655 D_{60}= 0.4745
D_{50}= 0.3481 D_{30}= 0.1341 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-1B S-1 6-8'

Date: 1-14-20

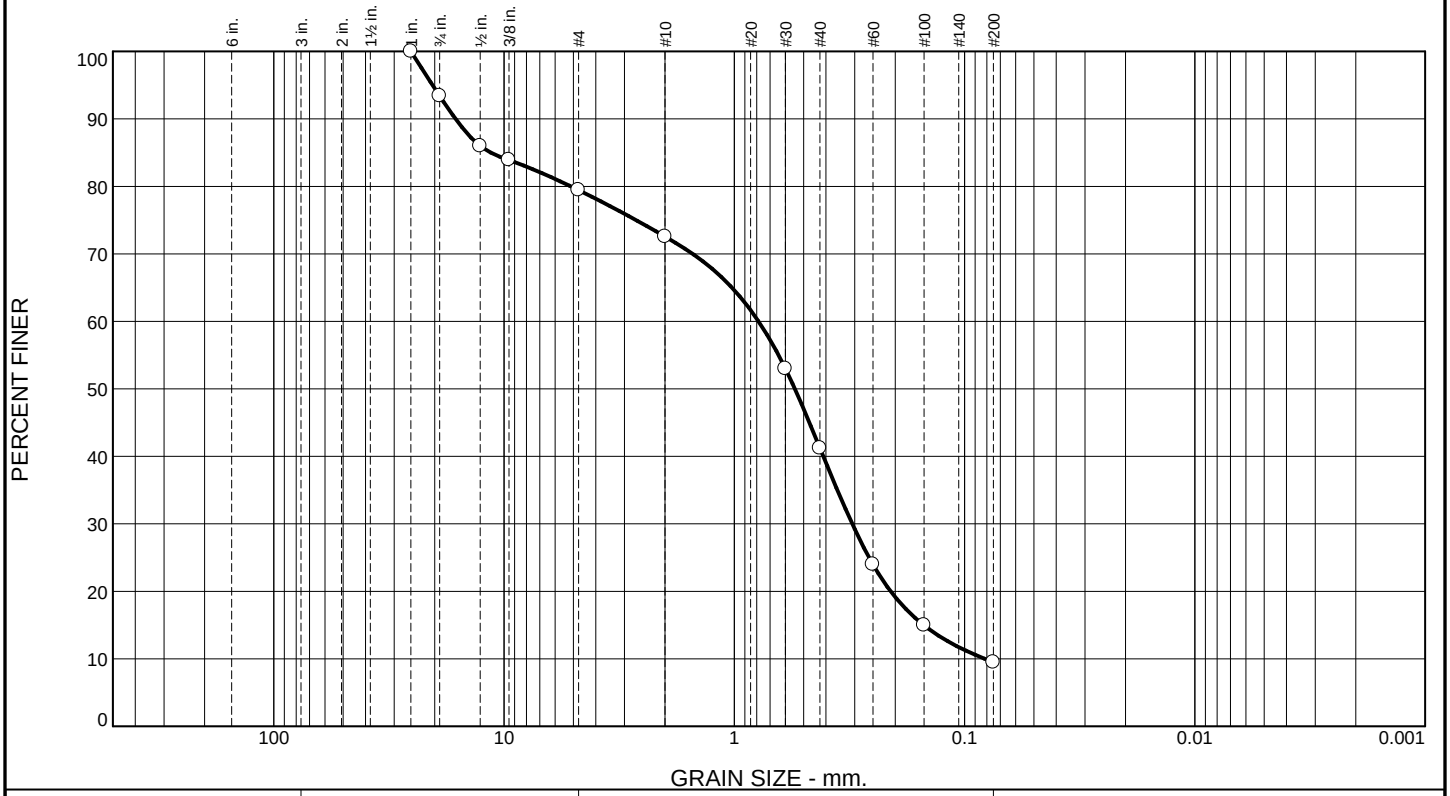
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.6	14.0	6.8	31.4	31.7	9.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.4		
.5	86.0		
.375	83.9		
#4	79.4		
#10	72.6		
#30	53.0		
#40	41.2		
#60	24.0		
#100	15.0		
#200	9.5		

* (no specification provided)

Material Description

Dark Olive

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 16.2462 D_{85}= 11.4370 D_{60}= 0.7852
D_{50}= 0.5459 D_{30}= 0.3076 D_{15}= 0.1505
D_{10}= 0.0818 C_u= 9.60 C_c= 1.47

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-1B S-5 20-22'

Date: 1-14-20

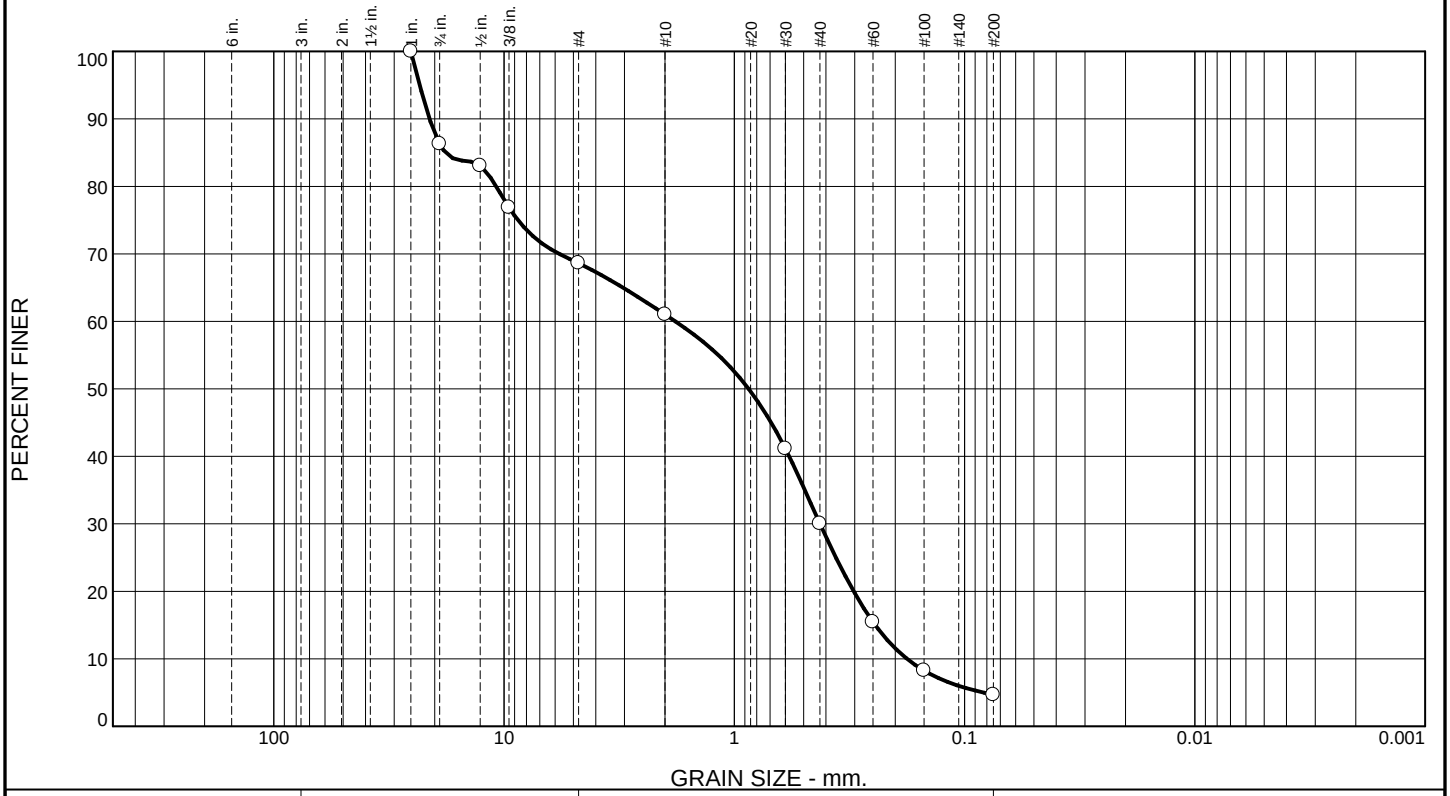
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.7	17.7	7.6	31.0	25.3	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	86.3		
.5	83.1		
.375	76.9		
#4	68.6		
#10	61.0		
#30	41.1		
#40	30.0		
#60	15.5		
#100	8.3		
#200	4.7		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 21.0663 D_{85}= 17.9524 D_{60}= 1.8043
D_{50}= 0.8670 D_{30}= 0.4247 D_{15}= 0.2444
D_{10}= 0.1778 C_u= 10.15 C_c= 0.56

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B-386-1B S-8 35-37'

Date: 1-14-20

RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.7	4.5	6.1	29.1	32.6	6.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.2		
.75	78.3		
.5	78.3		
.375	77.0		
#4	73.8		
#10	67.7		
#30	49.8		
#40	38.6		
#60	20.4		
#100	11.2		
#200	6.0		

* (no specification provided)

Material Description

Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 25.9373 D_{85}= 22.9793 D_{60}= 0.9703
D_{50}= 0.6040 D_{30}= 0.3357 D_{15}= 0.1958
D_{10}= 0.1332 C_u= 7.29 C_c= 0.87

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-1B S-11 50-52'

Date: 1-14-20

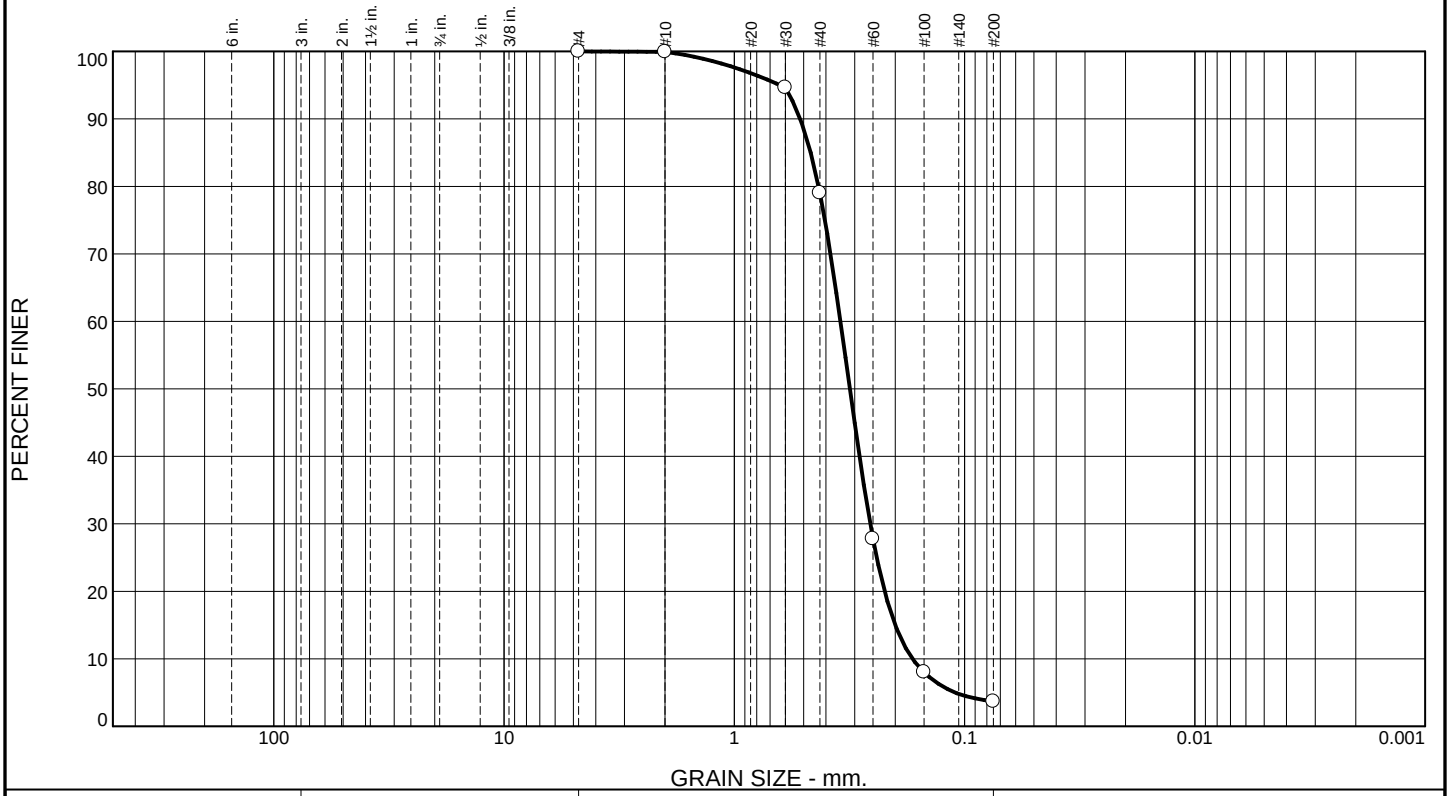
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	20.9	75.3	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#30	94.6		
#40	79.0		
#60	27.8		
#100	8.0		
#200	3.7		

* (no specification provided)

Material Description

Light Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5179 D_{85}= 0.4658 D_{60}= 0.3461
D_{50}= 0.3150 D_{30}= 0.2569 D_{15}= 0.2001
D_{10}= 0.1684 C_u= 2.05 C_c= 1.13

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B-386-1B S-15 68-70'

Date: 1-14-20

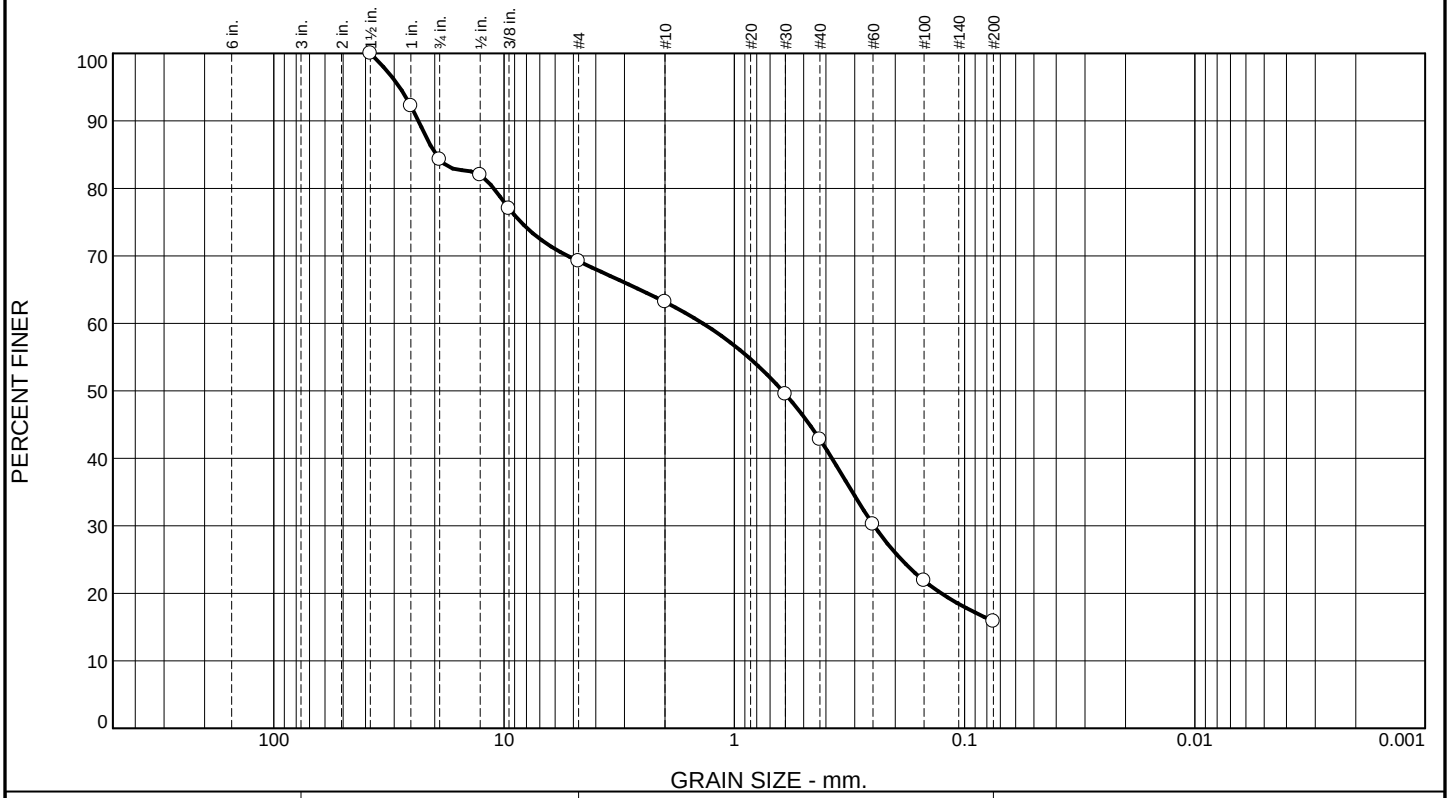
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.7	15.1	6.0	20.4	26.9	15.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.2		
.75	84.3		
.5	82.0		
.375	77.0		
#4	69.2		
#10	63.2		
#30	49.5		
#40	42.8		
#60	30.2		
#100	21.9		
#200	15.9		

* (no specification provided)

Material Description

Yellowish Brown, Dark Olive Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 23.5712 D_{85}= 19.7441 D_{60}= 1.3703
D_{50}= 0.6178 D_{30}= 0.2472 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-2 S-3 6-8'

Date: 1-14-20

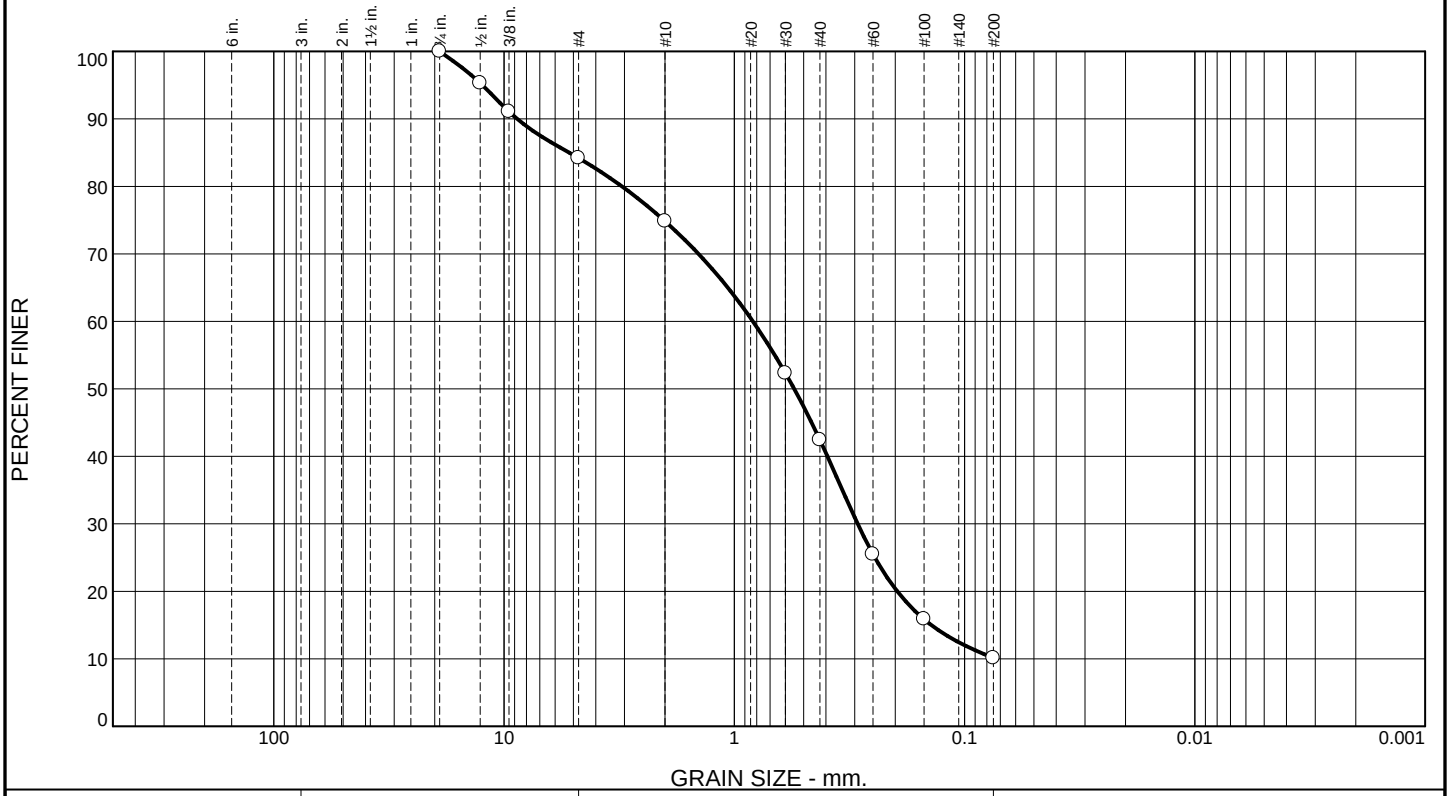
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.8	9.4	32.4	32.3	10.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.3		
.375	91.1		
#4	84.2		
#10	74.8		
#30	52.3		
#40	42.4		
#60	25.5		
#100	15.9		
#200	10.1		

* (no specification provided)

Material Description

Dark Olive

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 8.7740 D_{85}= 5.2137 D_{60}= 0.8309
D_{50}= 0.5496 D_{30}= 0.2914 D_{15}= 0.1394
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-2 S-8 25-27'

Date: 1-14-20

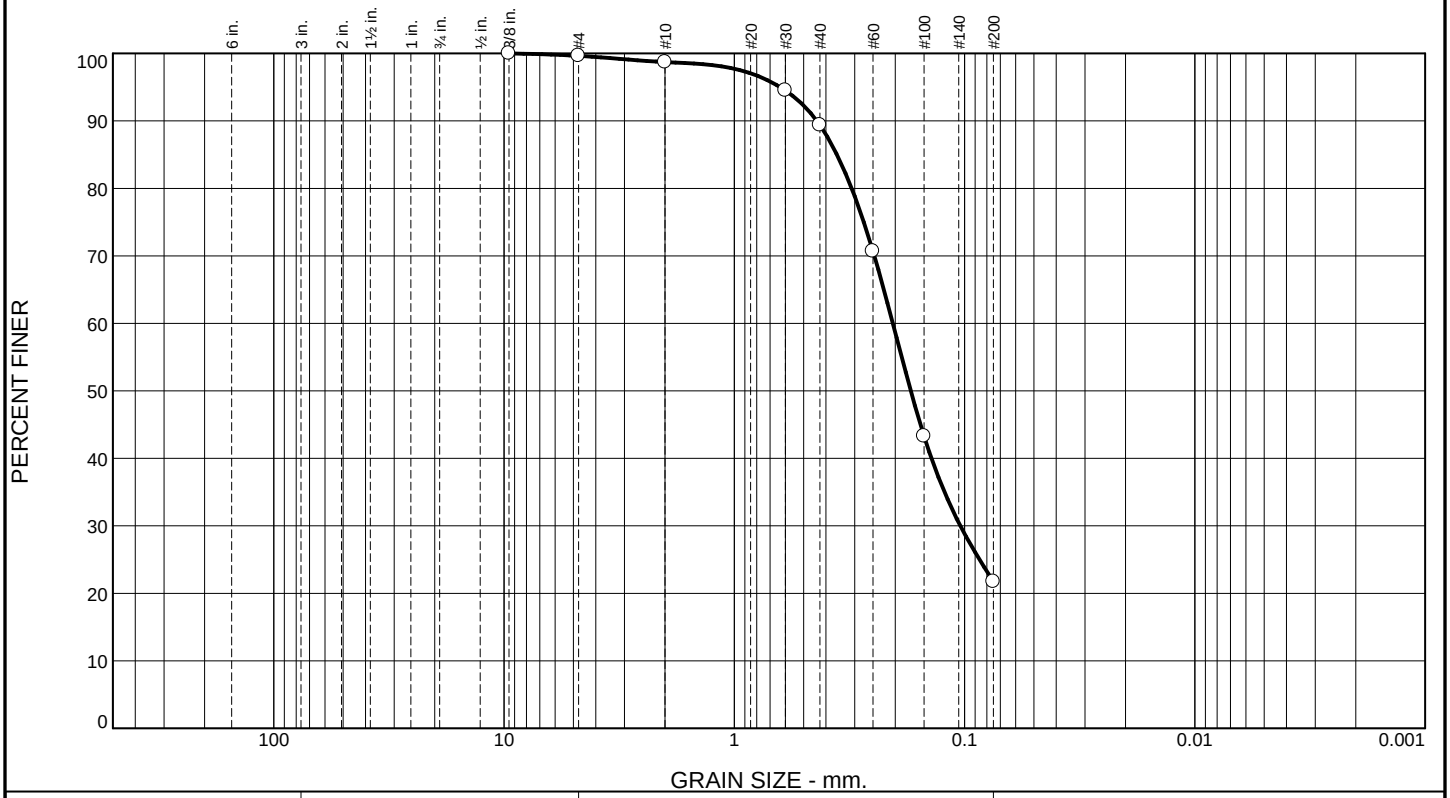
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.9	9.3	67.7	21.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.6		
#10	98.7		
#30	94.5		
#40	89.4		
#60	70.7		
#100	43.3		
#200	21.7		

* (no specification provided)

Material Description

Dark Grayish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4379 D_{85}= 0.3585 D_{60}= 0.2050
D_{50}= 0.1713 D_{30}= 0.1044 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-2 S-11 40-42'

Date: 1-14-20

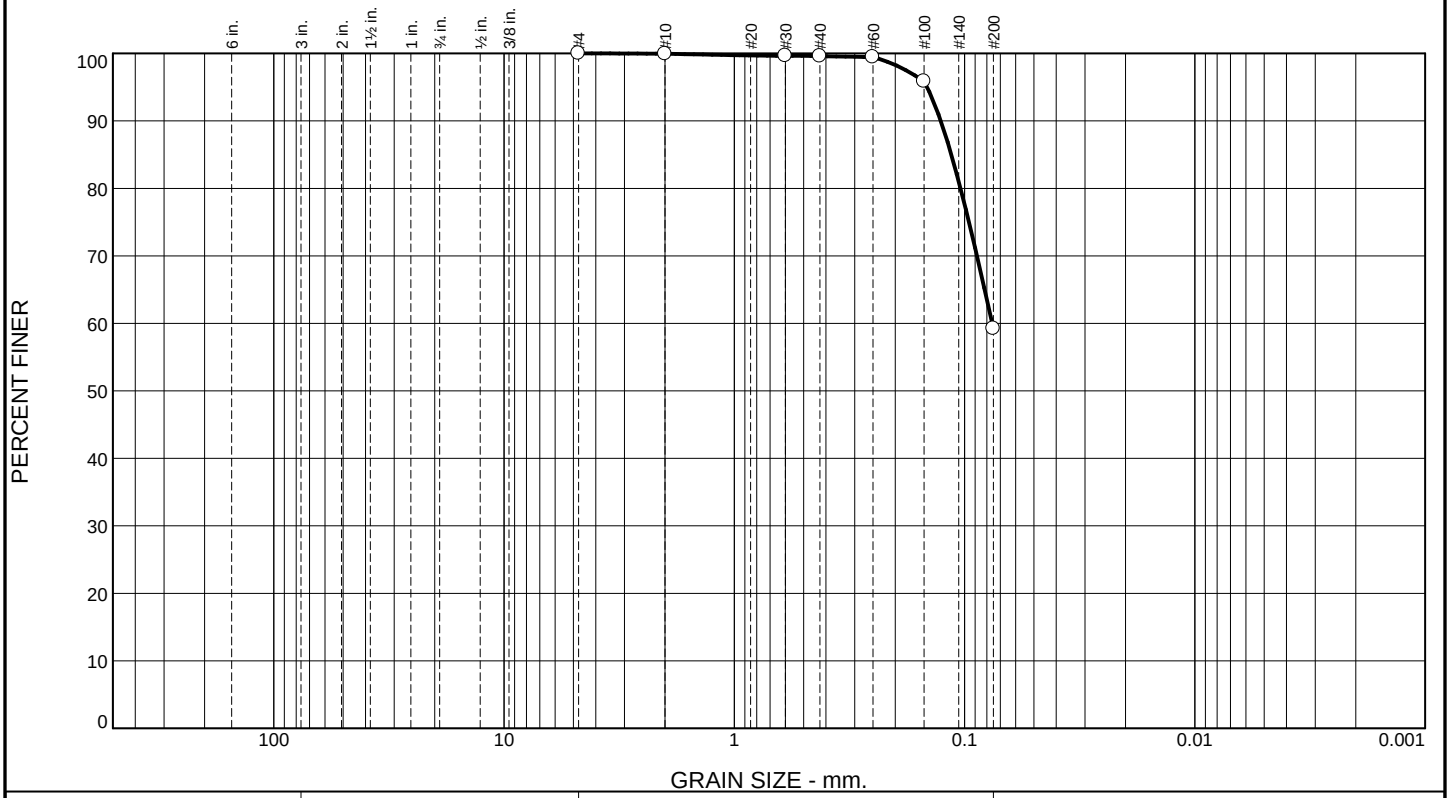
RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.3	40.4	59.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.9		
#30	99.6		
#40	99.6		
#60	99.4		
#100	95.8		
#200	59.2		

* (no specification provided)

Material Description

Pale Red

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1269 D_{85}= 0.1142 D_{60}= 0.0759
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: B-386-2 S-15B 58-60'

Date: 1-14-20

RSA Geolab

Union, New Jersey

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No: 909 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB, LLC

1017 Greeley Avenue North
Union, New Jersey 07083
908-964-0786 (P)
www.RSAgeolab.com

Letter of Transmittal

Date: 1-14-20 Job No.: 909 Lab Log: 19-563

Attention: Jacob Fradkin
MFS Consulting Engineers and Surveyor, DPC
2780 Hamilton Boulevard
South Plainfield, NJ 07080

CC:

Re: Brooklyn Navy Yard DC Boilers
Project#1119060

Sample(s) ID: **B-41A-1 U-2, B-62 U-1, B-234-1C U-1**

Dear Mr. Fradkin,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D4318 Atterberg Limits (3 tests)
- ASTM D2974 Organic Content (2 tests)
- ASTM D7263 Density (3 tests)
- ASTM D2850 UU Triaxial Shear (3 tests)

Regards,
RSA Geolab, LLC

Remarks: If you have any questions, please call 908-964-0786.

Signed: _____

Dr. Raza S. Ahmed
President RSA Geolab, LLC

RSA's Geolab's Geotechnical Laboratory testing was performed and results reported in accordance with ASTM standards and accepted industry standards. No other representations or warranties either express or implied are given. RSA Geolab, LLC neither accepts responsibility for nor makes claim to the final use and purpose of the material tested.
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LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

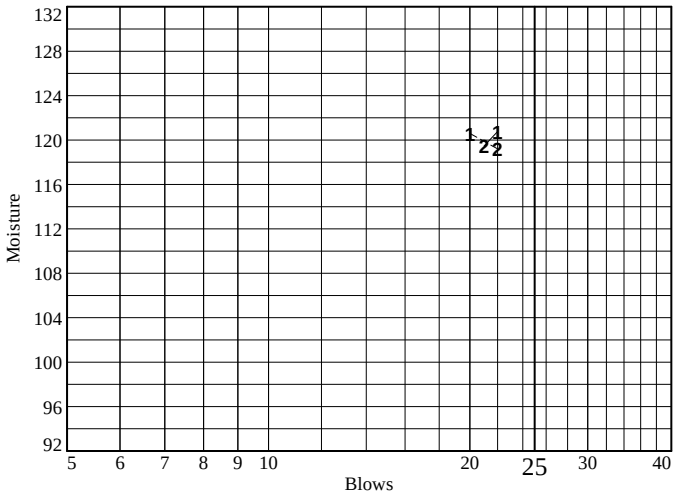
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-41A-1 U-2 24-26'
Material Description: Dark Brown, Light Gray Clay & Silt, trace cmf Sand, organics (visual)
Tested by: SD **Checked by:** KP
Testing Remarks: 1-14-20

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	8.19	8.61				
Dry+Tare	4.41	4.62				
Tare	1.28	1.28				
# Blows	22	21				
Moisture	120.8	119.5				

Organics Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	8.71	8.50				
Dry+Tare	4.67	4.59				
Tare	1.32	1.31				
# Blows	20	22				
Moisture	120.6	119.2				



Liquid Limit= 124
Liquid Limit (organics)= 117
Plastic Limit= 109
Plasticity Index= 15

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.22	7.69			
Dry+Tare	4.61	4.34			
Tare	1.28	1.28			
Moisture	108.4	109.5			

LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

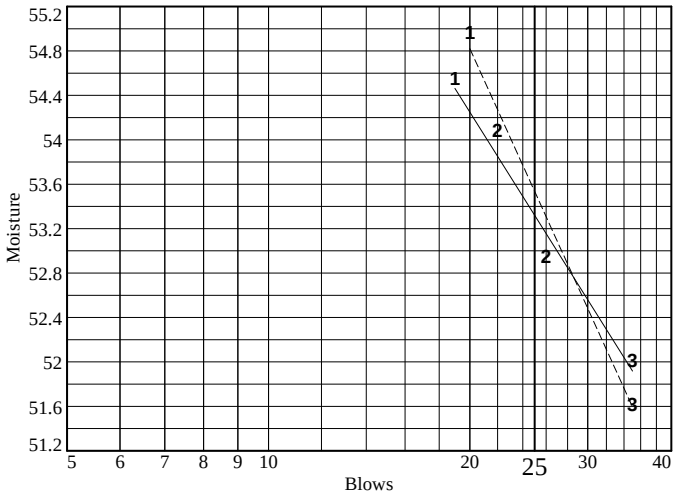
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-62-1 U-1 22-24'
Material Description: Gray Clay & Silt, trace cmf Sand, organics (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.69	9.61	9.59			
Dry+Tare	6.76	6.74	6.76			
Tare	1.39	1.32	1.32			
# Blows	19	26	35			
Moisture	54.6	53.0	52.0			

Organics Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.83	8.60	8.76			
Dry+Tare	6.79	6.02	6.22			
Tare	1.26	1.25	1.30			
# Blows	20	22	35			
Moisture	55.0	54.1	51.6			



Liquid Limit= 53
Liquid Limit (organics)= 54
Plastic Limit= 27
Plasticity Index= 26

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.73	9.25			
Dry+Tare	7.16	7.53			
Tare	1.39	1.32			
Moisture	27.2	27.7			

RSA Geolab

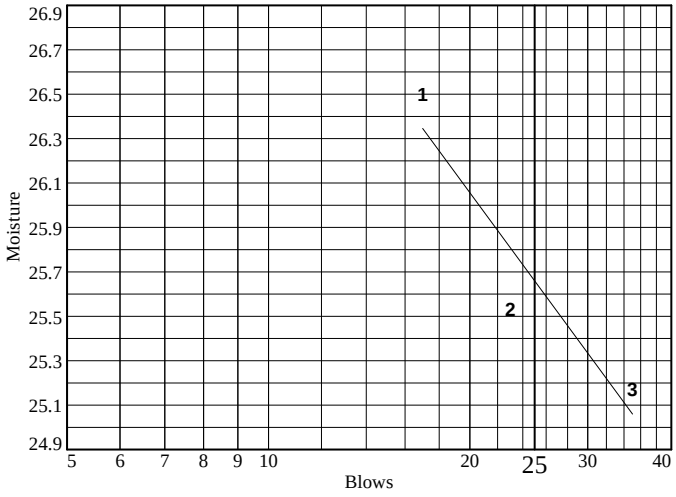
LIQUID AND PLASTIC LIMIT TEST DATA

1/14/2020

Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project Number: 909
Sample Number: B-234-1C U-1 27-29'
Material Description: Gray Clay & Silt, trace cmf Sand (visual)

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	9.06	9.48	8.47			
Dry+Tare	7.43	7.81	7.02			
Tare	1.28	1.27	1.26			
# Blows	17	23	35			
Moisture	26.5	25.5	25.2			

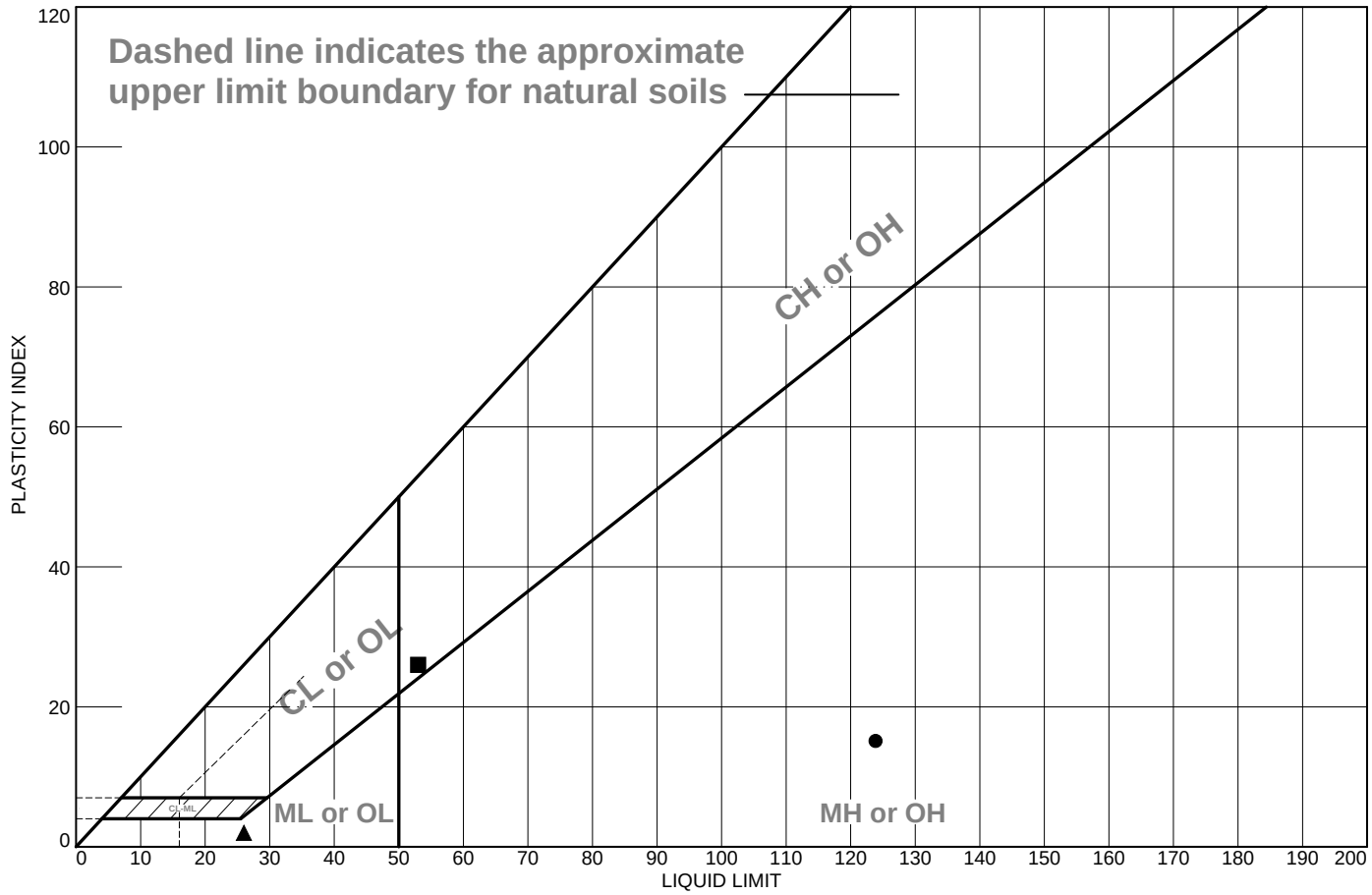


Liquid Limit= 26
Plastic Limit= 24
Plasticity Index= 2

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	7.35	7.59			
Dry+Tare	6.20	6.38			
Tare	1.28	1.28			
Moisture	23.4	23.7			

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Brown, Light Gray Clay & Silt, trace cmf Sand, organics (visual)	124	109	15			
■	Gray Clay & Silt, trace cmf Sand, organics (visual)	53	27	26			
▲	Gray Clay & Silt, trace cmf Sand (visual)	26	24	2			

Project No. 909 **Client:** MFS Consulting Engineers and Surveyor, DPC

Project: Brooklyn Navy Yard DC Boilers

Project No. 1119060

●**Sample Number:** B-41A-1 U-2 24-26'

■**Sample Number:** B-62-1 U-1 22-24'

▲**Sample Number:** B-234-1C U-1 27-29'

RSA Geolab

Union, New Jersey

Remarks:

●1-14-20

Figure

Tested By: SD **Checked By:** KP

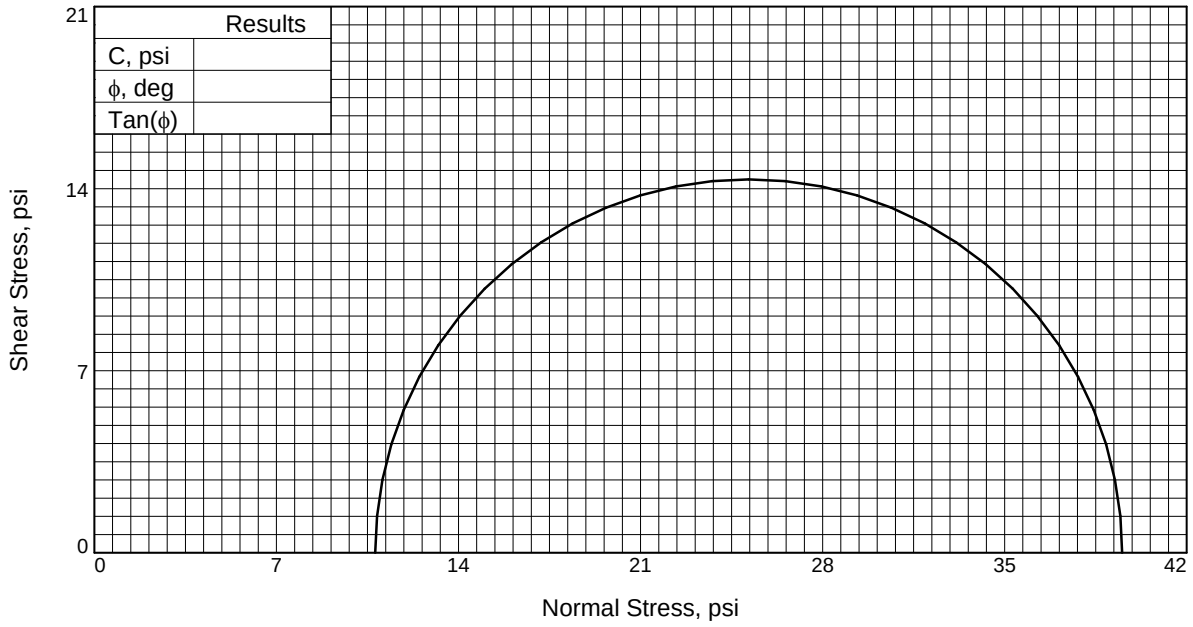
RSA Geolab

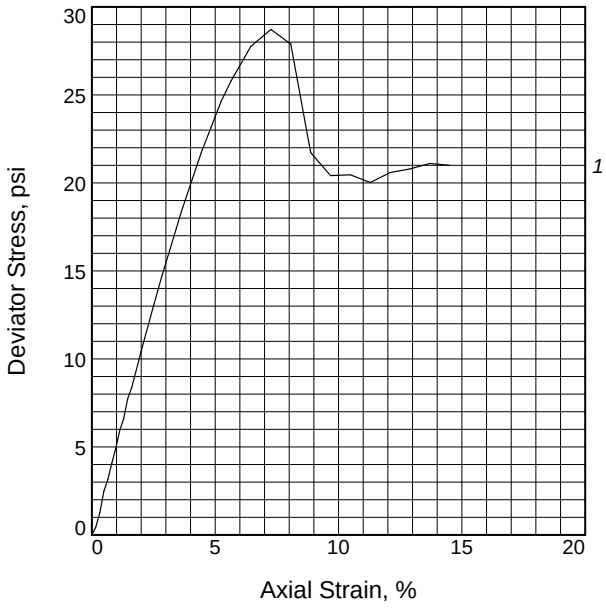
LOSS ON IGNITION (ASTM D2974)

Project:	Brooklyn Navy Yard DC Boilers Project#1119060	Project #:	909
Client:	MFS Consulting Engineers and Surveyor, DPC	Date:	1-14-20

HOLE #/ SAMPLE #	B-62-1 U-1	B-234-1C U-1				
DEPTH	22-24'	27-29'				
OVEN DRIED SAMPLE + TARE (gms.)	57.67	87.09				
AFTER IGNITION SAMPLE + TARE (gms.)	56.52	86.65				
LOSS ON IGNITION (gms.)	1.15	0.44	0.00	0.00	0.00	0.00
TARE (gms.)	26.97	52.10				
INITIAL WGT. OF OVEN DRIED SAMPLE (gms.)	30.70	34.99	0.00	0.00	0.00	0.00
LOSS ON IGNITION (%)	**3.75**	**1.26**	**0.00**	**0.00**	**0.00**	**0.00**

Performed by: EE Entered by: KH Checked by: KP





Sample No.		1
Initial	Water Content, %	231.1
	Dry Density, pcf	21.2
	Saturation, %	90.6
	Void Ratio	6.3759
	Diameter, in.	2.84
	Height, in.	6.20
At Test	Water Content, %	255.0
	Dry Density, pcf	21.2
	Saturation, %	100.0
	Void Ratio	6.3759
	Diameter, in.	2.84
	Height, in.	6.20
Strain rate, in./min.		0.050
Back Pressure, psi		0.0
Cell Pressure, psi		10.8
Fail. Stress, psi		28.7
Ult. Stress, psi		21.0
σ_1 Failure, psi		39.5
σ_3 Failure, psi		10.8

Type of Test:
Unconsolidated Undrained

Sample Type: ASTM D2850

Description: Dark Brown, Light Gray Clay & Silt, trace cmf Sand, organics (visual)

LL= 124 **PL=** 109 **PI=** 15

Assumed Specific Gravity= 2.5

Remarks: H/D = 2.19
Sample contains large amount of Peat, decayed wood.

Figure _____

Client: MFS Consulting Engineers and Surveyor, DPC

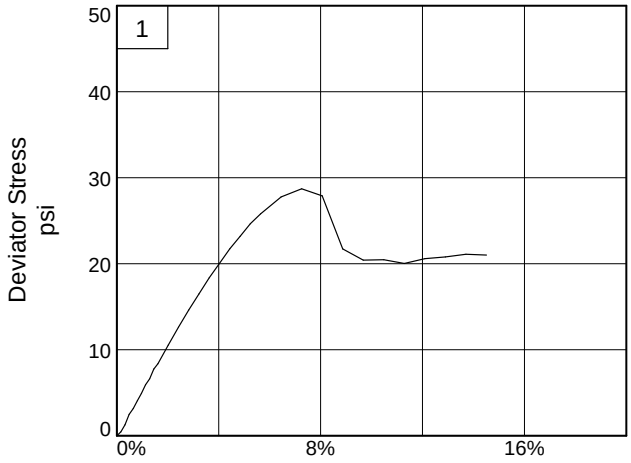
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060

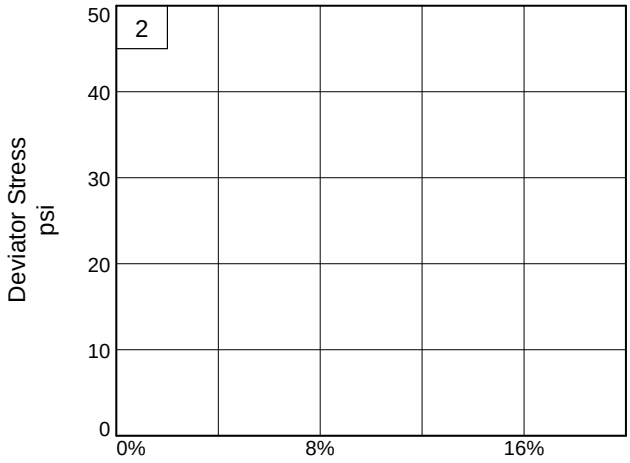
Sample Number: B-41A-1 U-2 24-26'

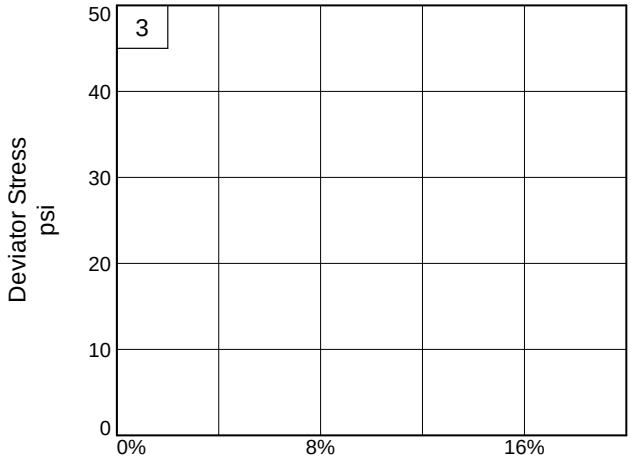
Proj. No.: 909 **Date Sampled:** 1-14-20

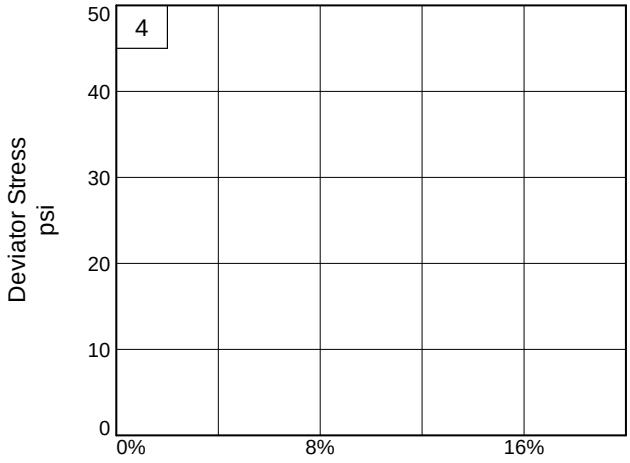
TRIAXIAL SHEAR TEST REPORT
RSA Geolab
Union, New Jersey

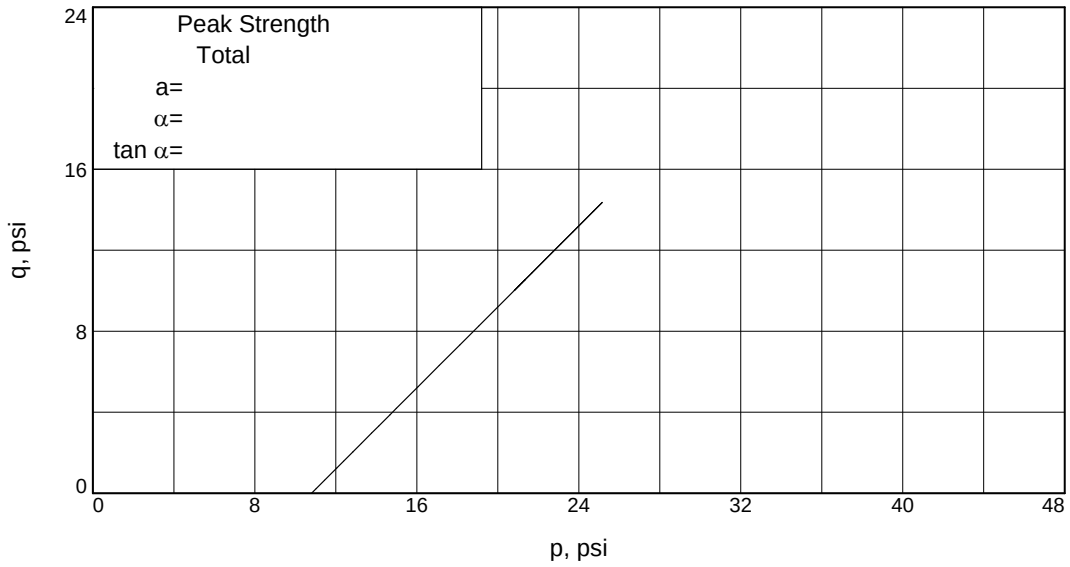
Tested By: MF











Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Sample Number: B-41A-1 U-2 24-26'
Project No.: 909

Figure _____

RSA Geolab

Tested By: MF

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

1/14/2020
10:35 AM

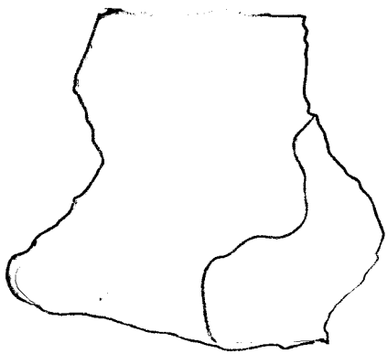
Date: 1-14-20
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No.: 909
Sample Number: B-41A-1 U-2 24-26'
Description: Dark Brown, Light Gray Clay & Silt, trace cmf Sand, organics (visual)
Remarks: H/D = 2.19
Sample contains large amount of Peat, decayed wood.
Type of Sample: ASTM D2850
Assumed Specific Gravity=2.5 **LL=**124 **PL=**109 **PI=**15
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Moisture content: Moist soil+tare, gms.	720.400		720.400
Moisture content: Dry soil+tare, gms.	217.600		217.600
Moisture content: Tare, gms.	0.000		0.000
Moisture, %	231.1	255.0	231.1
Moist specimen weight, gms.	720.4		
Diameter, in.	2.84	2.84	
Area, in.^{2}	6.32	6.32	
Height, in.	6.20	6.20	
Net decrease in height, in.		0.00	
Wet density, pcf	70.1	75.1	
Dry density, pcf	21.2	21.2	
Void ratio	6.3759	6.3759	
Saturation, %	90.6	100.0	

Test Readings for Specimen No. 1

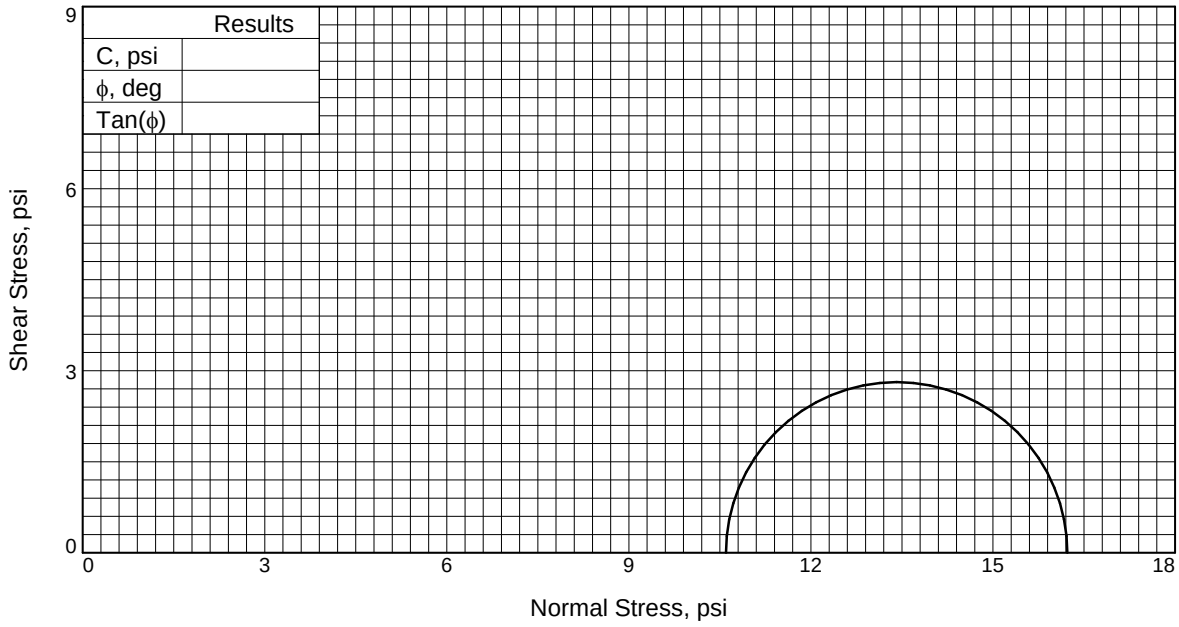
Cell pressure = 10.80 psi
Back pressure = 0.00 psi
Strain rate, in./min. = 0.050
Fail. Stress = 28.72 psi **at reading no.** 22
Ult. Stress = 21.00 psi **at reading no.** 31

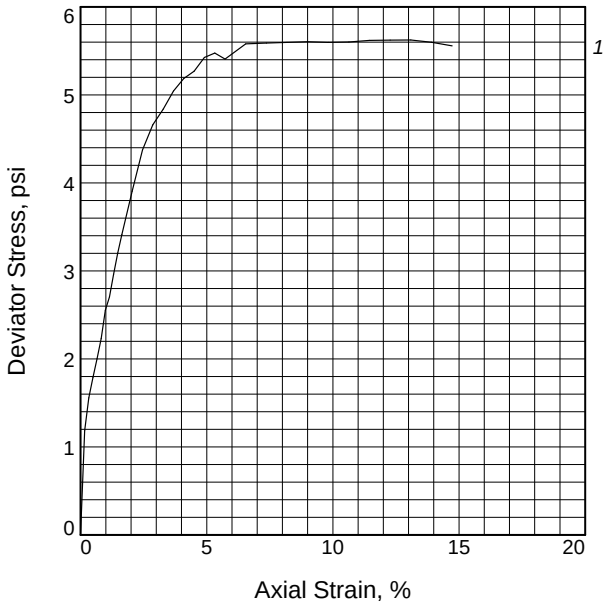


RSA Geolab

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress psi	Minor Princ. Stress psi	Major Princ. Stress psi	1:3 Ratio	P psi	Q psi
0	0.0000	3.400	0.0	0.0	0.00	10.80	10.80	1.00	10.80	0.00
1	0.0100	6.300	2.9	0.2	0.46	10.80	11.26	1.04	11.03	0.23
2	0.0200	11.500	8.1	0.3	1.28	10.80	12.08	1.12	11.44	0.64
3	0.0300	19.200	15.8	0.5	2.49	10.80	13.29	1.23	12.04	1.24
4	0.0400	23.500	20.1	0.6	3.16	10.80	13.96	1.29	12.38	1.58
5	0.0500	29.400	26.0	0.8	4.08	10.80	14.88	1.38	12.84	2.04
6	0.0600	34.800	31.4	1.0	4.92	10.80	15.72	1.46	13.26	2.46
7	0.0700	41.300	37.9	1.1	5.93	10.80	16.73	1.55	13.77	2.97
8	0.0800	45.800	42.4	1.3	6.63	10.80	17.43	1.61	14.11	3.31
9	0.0900	53.100	49.7	1.5	7.75	10.80	18.55	1.72	14.68	3.88
10	0.1000	57.200	53.8	1.6	8.38	10.80	19.18	1.78	14.99	4.19
11	0.1250	71.300	67.9	2.0	10.53	10.80	21.33	1.98	16.07	5.27
12	0.1500	85.100	81.7	2.4	12.62	10.80	23.42	2.17	17.11	6.31
13	0.1750	98.500	95.1	2.8	14.63	10.80	25.43	2.35	18.12	7.32
14	0.2000	111.100	107.7	3.2	16.50	10.80	27.30	2.53	19.05	8.25
15	0.2250	123.800	120.4	3.6	18.37	10.80	29.17	2.70	19.98	9.18
16	0.2500	135.400	132.0	4.0	20.05	10.80	30.85	2.86	20.83	10.03
17	0.2750	147.100	143.7	4.4	21.74	10.80	32.54	3.01	21.67	10.87
18	0.3000	157.300	153.9	4.8	23.18	10.80	33.98	3.15	22.39	11.59
19	0.3250	167.700	164.3	5.2	24.65	10.80	35.45	3.28	23.12	12.32
20	0.3500	176.100	172.7	5.6	25.80	10.80	36.60	3.39	23.70	12.90
21	0.4000	190.900	187.5	6.4	27.77	10.80	38.57	3.57	24.68	13.88
22	0.4500	199.000	195.6	7.3	28.72	10.80	39.52	3.66	25.16	14.36
23	0.5000	195.000	191.6	8.1	27.89	10.80	38.69	3.58	24.74	13.94
24	0.5500	154.000	150.6	8.9	21.73	10.80	32.53	3.01	21.66	10.86
25	0.6000	146.200	142.8	9.7	20.42	10.80	31.22	2.89	21.01	10.21
26	0.6500	147.800	144.4	10.5	20.46	10.80	31.26	2.89	21.03	10.23
27	0.7000	146.000	142.6	11.3	20.03	10.80	30.83	2.85	20.81	10.01
28	0.7500	151.400	148.0	12.1	20.60	10.80	31.40	2.91	21.10	10.30
29	0.8000	154.200	150.8	12.9	20.79	10.80	31.59	2.93	21.20	10.40
30	0.8500	157.900	154.5	13.7	21.11	10.80	31.91	2.95	21.35	10.55
31	0.9000	158.600	155.2	14.5	21.00	10.80	31.80	2.94	21.30	10.50





Sample No.		1
Initial	Water Content, %	58.8
	Dry Density, pcf	64.6
	Saturation, %	101.1
	Void Ratio	1.5131
	Diameter, in.	2.85
	Height, in.	6.11
At Test	Water Content, %	58.2
	Dry Density, pcf	64.6
	Saturation, %	100.0
	Void Ratio	1.5131
	Diameter, in.	2.85
	Height, in.	6.11
Strain rate, in./min.		0.050
Back Pressure, psi		0.0
Cell Pressure, psi		10.6
Fail. Stress, psi		5.6
Ult. Stress, psi		5.6
σ_1 Failure, psi		16.2
σ_3 Failure, psi		10.6

Type of Test:
Unconsolidated Undrained
Sample Type: ASTM D2850
Description: Gray Clay & Silt, trace cmf Sand, organics (visual)
LL= 53 **PL=** 27 **PI=** 26
Assumed Specific Gravity= 2.6
Remarks: H/D = 2.14

Figure _____

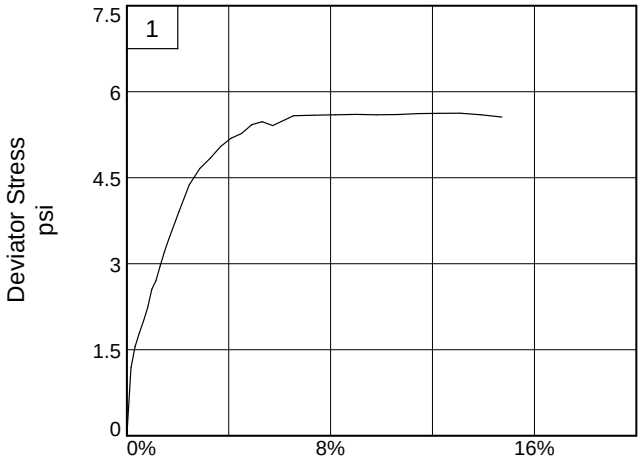
Client: MFS Consulting Engineers and Surveyor, DPC

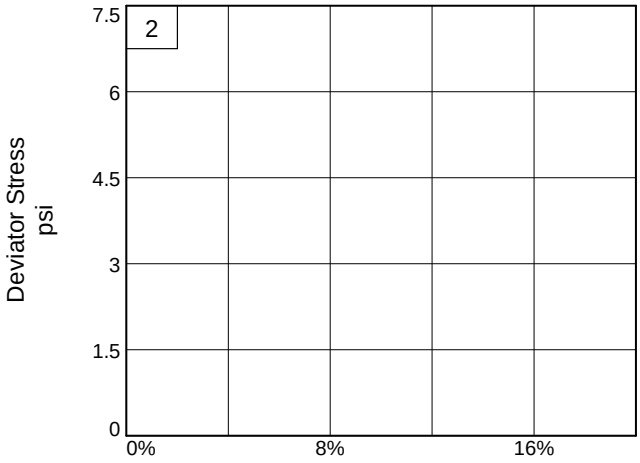
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Sample Number: B-62-1 U-1 22-24'

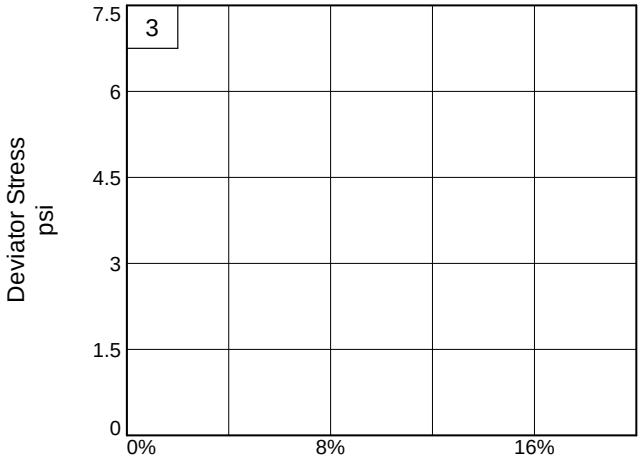
Proj. No.: 909 **Date Sampled:** 1-14-20

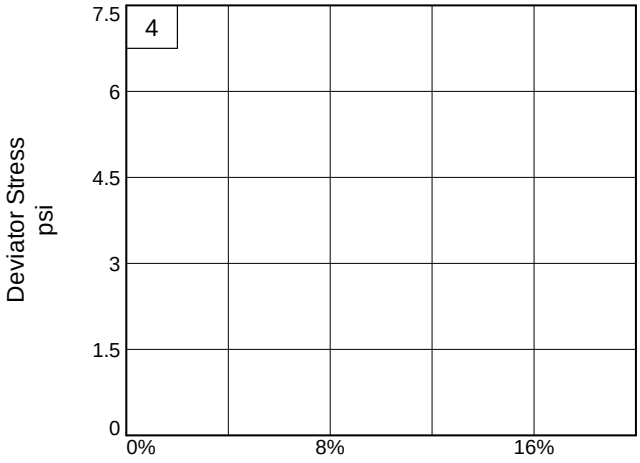
TRIAXIAL SHEAR TEST REPORT
RSA Geolab
Union, New Jersey

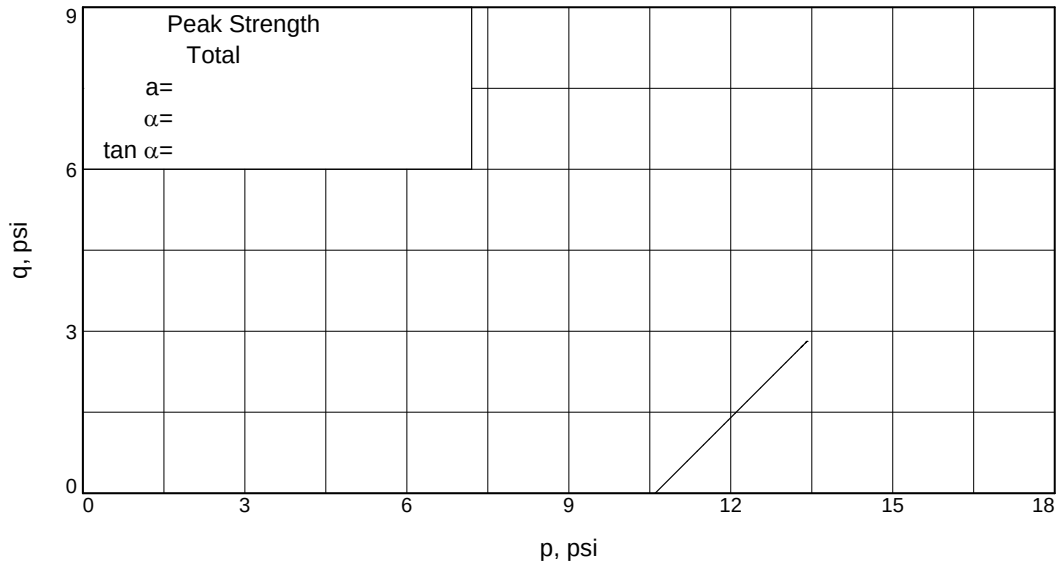
Tested By: MF











Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Sample Number: B-62-1 U-1 22-24'
Project No.: 909

Figure _____

RSA Geolab

Tested By: MF

TRIAXIAL COMPRESSION TEST
Unconsolidated Undrained

1/14/2020
10:48 AM

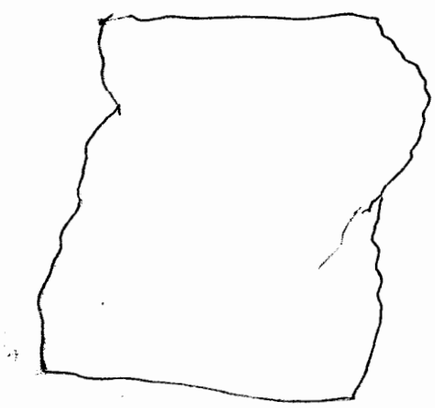
Date: 1-14-20
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No.: 909
Sample Number: B-62-1 U-1 22-24'
Description: Gray Clay & Silt, trace cmf Sand, organics (visual)
Remarks: H/D = 2.14
Type of Sample: ASTM D2850
Assumed Specific Gravity=2.6 **LL=**53 **PL=**27 **PI=**26
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Moisture content: Moist soil+tare, gms.	1053.000		1053.000
Moisture content: Dry soil+tare, gms.	662.900		662.900
Moisture content: Tare, gms.	0.000		0.000
Moisture, %	58.8	58.2	58.8
Moist specimen weight, gms.	1053.0		
Diameter, in.	2.85	2.85	
Area, in.²	6.40	6.40	
Height, in.	6.11	6.11	
Net decrease in height, in.		0.00	
Wet density, pcf	102.6	102.2	
Dry density, pcf	64.6	64.6	
Void ratio	1.5131	1.5131	
Saturation, %	101.1	100.0	

Test Readings for Specimen No. 1

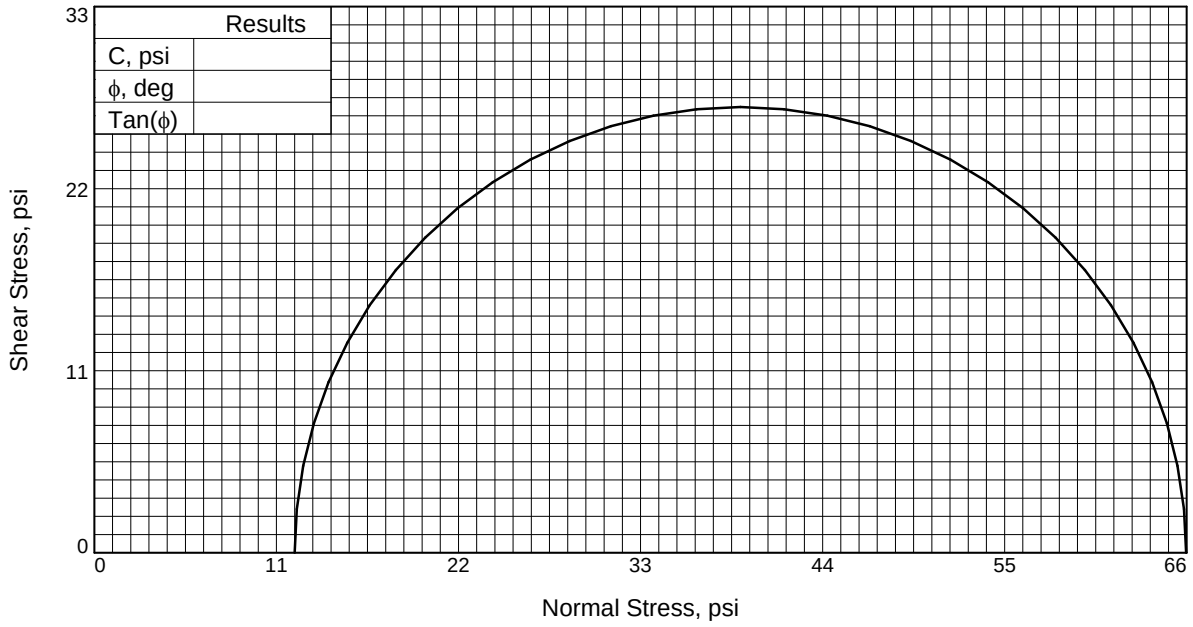
Cell pressure = 10.60 psi
Back pressure = 0.00 psi
Strain rate, in./min. = 0.050
Fail. Stress = 5.62 psi **at reading no.** 29
Ult. Stress = 5.56 psi **at reading no.** 31

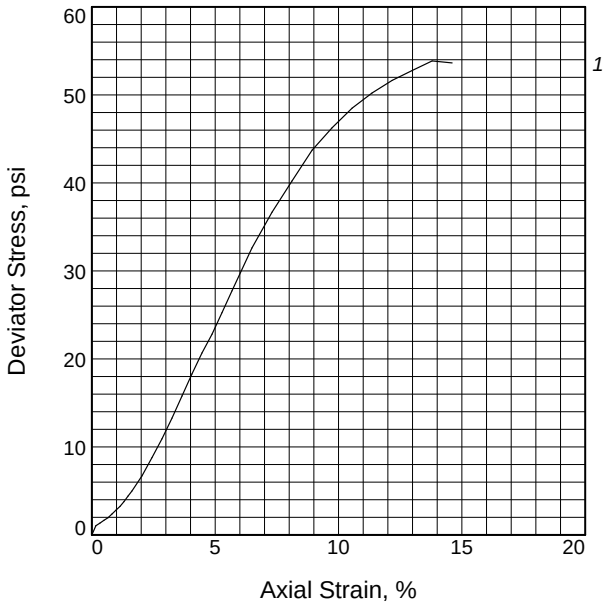


RSA Geolab

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress psi	Minor Princ. Stress psi	Major Princ. Stress psi	1:3 Ratio	P psi	Q psi
0	0.0000	2.800	0.0	0.0	0.00	10.60	10.60	1.00	10.60	0.00
1	0.0100	10.400	7.6	0.2	1.19	10.60	11.79	1.11	11.19	0.59
2	0.0200	12.800	10.0	0.3	1.56	10.60	12.16	1.15	11.38	0.78
3	0.0300	14.300	11.5	0.5	1.79	10.60	12.39	1.17	11.49	0.89
4	0.0400	15.700	12.9	0.7	2.00	10.60	12.60	1.19	11.60	1.00
5	0.0500	17.200	14.4	0.8	2.23	10.60	12.83	1.21	11.72	1.12
6	0.0600	19.300	16.5	1.0	2.55	10.60	13.15	1.24	11.88	1.28
7	0.0700	20.300	17.5	1.1	2.70	10.60	13.30	1.26	11.95	1.35
8	0.0800	22.000	19.2	1.3	2.96	10.60	13.56	1.28	12.08	1.48
9	0.0900	23.600	20.8	1.5	3.20	10.60	13.80	1.30	12.20	1.60
10	0.1000	25.000	22.2	1.6	3.41	10.60	14.01	1.32	12.31	1.71
11	0.1250	28.300	25.5	2.0	3.90	10.60	14.50	1.37	12.55	1.95
12	0.1500	31.500	28.7	2.5	4.38	10.60	14.98	1.41	12.79	2.19
13	0.1750	33.500	30.7	2.9	4.66	10.60	15.26	1.44	12.93	2.33
14	0.2000	34.800	32.0	3.3	4.84	10.60	15.44	1.46	13.02	2.42
15	0.2250	36.300	33.5	3.7	5.04	10.60	15.64	1.48	13.12	2.52
16	0.2500	37.400	34.6	4.1	5.19	10.60	15.79	1.49	13.19	2.59
17	0.2750	38.100	35.3	4.5	5.27	10.60	15.87	1.50	13.23	2.63
18	0.3000	39.300	36.5	4.9	5.43	10.60	16.03	1.51	13.31	2.71
19	0.3250	39.800	37.0	5.3	5.48	10.60	16.08	1.52	13.34	2.74
20	0.3500	39.500	36.7	5.7	5.41	10.60	16.01	1.51	13.30	2.70
21	0.4000	41.000	38.2	6.5	5.58	10.60	16.18	1.53	13.39	2.79
22	0.4500	41.400	38.6	7.4	5.59	10.60	16.19	1.53	13.39	2.79
23	0.5000	41.800	39.0	8.2	5.60	10.60	16.20	1.53	13.40	2.80
24	0.5500	42.200	39.4	9.0	5.60	10.60	16.20	1.53	13.40	2.80
25	0.6000	42.500	39.7	9.8	5.60	10.60	16.20	1.53	13.40	2.80
26	0.6500	42.900	40.1	10.6	5.60	10.60	16.20	1.53	13.40	2.80
27	0.7000	43.400	40.6	11.5	5.62	10.60	16.22	1.53	13.41	2.81
28	0.7500	43.800	41.0	12.3	5.62	10.60	16.22	1.53	13.41	2.81
29	0.8000	44.200	41.4	13.1	5.62	10.60	16.22	1.53	13.41	2.81
30	0.8500	44.400	41.6	13.9	5.60	10.60	16.20	1.53	13.40	2.80
31	0.9000	44.500	41.7	14.7	5.56	10.60	16.16	1.52	13.38	2.78





Sample No.		1
Initial	Water Content, %	25.5
	Dry Density, pcf	99.7
	Saturation, %	105.4
	Void Ratio	0.6282
	Diameter, in.	2.82
	Height, in.	6.16
At Test	Water Content, %	24.2
	Dry Density, pcf	99.7
	Saturation, %	100.0
	Void Ratio	0.6282
	Diameter, in.	2.82
	Height, in.	6.16
Strain rate, in./min.		0.050
Back Pressure, psi		0.0
Cell Pressure, psi		12.1
Fail. Stress, psi		53.9
Ult. Stress, psi		53.6
σ_1 Failure, psi		66.0
σ_3 Failure, psi		12.1

Type of Test:
Unconsolidated Undrained
Sample Type: ASTM D2850
Description: Gray Clay & Silt, trace cmf Sand (visual)

LL= 26 **PL=** 24 **PI=** 2
Assumed Specific Gravity= 2.6
Remarks: H/D = 2.19

Figure _____

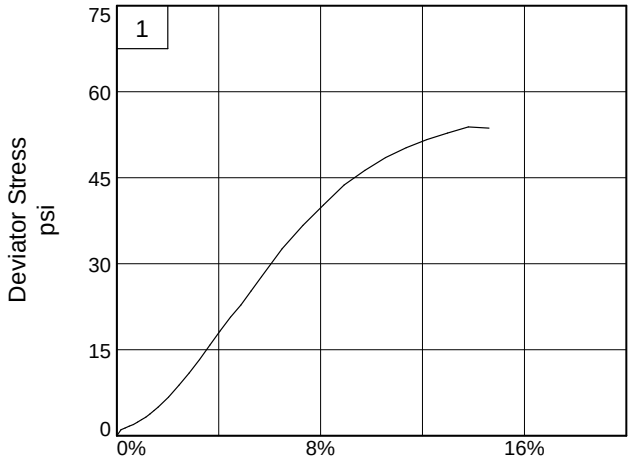
Client: MFS Consulting Engineers and Surveyor, DPC

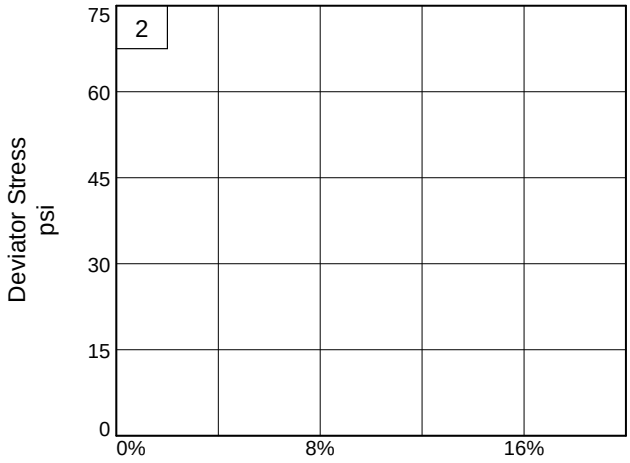
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Sample Number: B-234-1C U-1 27-29'

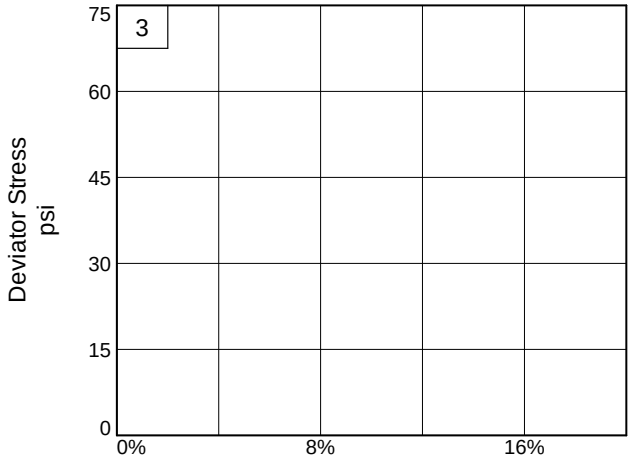
Proj. No.: 909 **Date Sampled:** 1-14-20

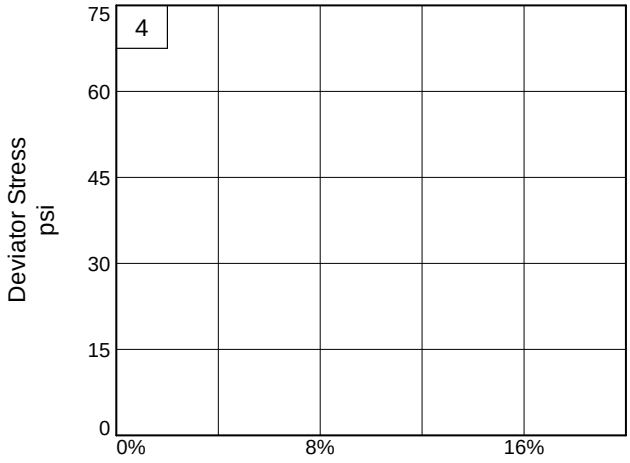
TRIAXIAL SHEAR TEST REPORT
RSA Geolab
Union, New Jersey

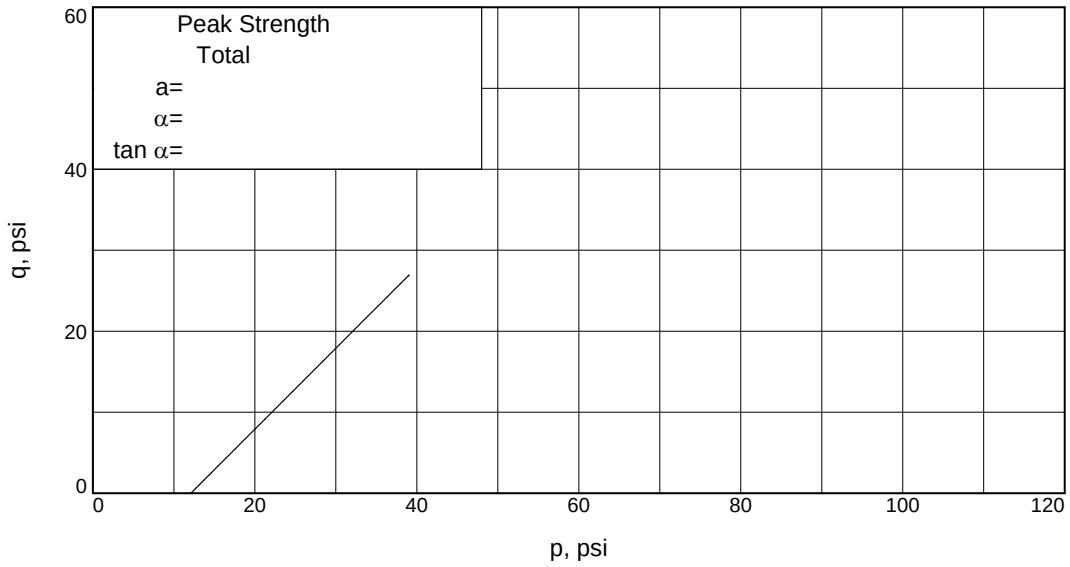
Tested By: EE











Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Sample Number: B-234-1C U-1 27-29'
Project No.: 909

Figure _____

RSA Geolab

Tested By: EE

TRIAXIAL COMPRESSION TEST

Unconsolidated Undrained

1/14/2020
10:59 AM

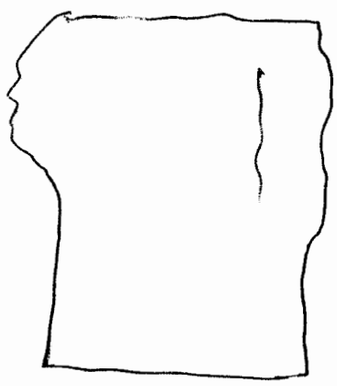
Date: 1-14-20
Client: MFS Consulting Engineers and Surveyor, DPC
Project: Brooklyn Navy Yard DC Boilers
Project No. 1119060
Project No.: 909
Sample Number: B-234-1C U-1 27-29'
Description: Gray Clay & Silt, trace cmf Sand (visual)
Remarks: H/D = 2.19
Type of Sample: ASTM D2850
Assumed Specific Gravity=2.6 **LL=**26 **PL=**24 **PI=**2
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Final
Moisture content: Moist soil+tare, gms.	1261.600		1261.600
Moisture content: Dry soil+tare, gms.	1005.500		1005.500
Moisture content: Tare, gms.	0.000		0.000
Moisture, %	25.5	24.2	25.5
Moist specimen weight, gms.	1261.6		
Diameter, in.	2.82	2.82	
Area, in.^{2}	6.24	6.24	
Height, in.	6.16	6.16	
Net decrease in height, in.		0.00	
Wet density, pcf	125.1	123.8	
Dry density, pcf	99.7	99.7	
Void ratio	0.6282	0.6282	
Saturation, %	105.4	100.0	

Test Readings for Specimen No. 1

Cell pressure = 12.10 psi
Back pressure = 0.00 psi
Strain rate, in./min. = 0.050
Fail. Stress = 53.86 psi **at reading no.** 30
Ult. Stress = 53.64 psi **at reading no.** 31



Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress psi	Minor Princ. Stress psi	Major Princ. Stress psi	1:3 Ratio	P psi	Q psi
0	0.0000	1.800	0.0	0.0	0.00	12.10	12.10	1.00	12.10	0.00
1	0.0100	8.400	6.6	0.2	1.06	12.10	13.16	1.09	12.63	0.53
2	0.0200	10.300	8.5	0.3	1.36	12.10	13.46	1.11	12.78	0.68
3	0.0300	12.300	10.5	0.5	1.68	12.10	13.78	1.14	12.94	0.84
4	0.0400	14.100	12.3	0.6	1.96	12.10	14.06	1.16	13.08	0.98
5	0.0500	16.800	15.0	0.8	2.39	12.10	14.49	1.20	13.29	1.19
6	0.0600	19.600	17.8	1.0	2.83	12.10	14.93	1.23	13.51	1.41
7	0.0700	22.300	20.5	1.1	3.25	12.10	15.35	1.27	13.72	1.62
8	0.0800	25.800	24.0	1.3	3.80	12.10	15.90	1.31	14.00	1.90
9	0.0900	29.700	27.9	1.5	4.41	12.10	16.51	1.36	14.30	2.20
10	0.1000	33.500	31.7	1.6	5.00	12.10	17.10	1.41	14.60	2.50
11	0.1250	44.600	42.8	2.0	6.72	12.10	18.82	1.56	15.46	3.36
12	0.1500	58.000	56.2	2.4	8.79	12.10	20.89	1.73	16.50	4.40
13	0.1750	72.000	70.2	2.8	10.94	12.10	23.04	1.90	17.57	5.47
14	0.2000	87.400	85.6	3.2	13.28	12.10	25.38	2.10	18.74	6.64
15	0.2250	104.000	102.2	3.7	15.79	12.10	27.89	2.30	19.99	7.89
16	0.2500	120.800	119.0	4.1	18.31	12.10	30.41	2.51	21.25	9.15
17	0.2750	136.800	135.0	4.5	20.68	12.10	32.78	2.71	22.44	10.34
18	0.3000	151.300	149.5	4.9	22.80	12.10	34.90	2.88	23.50	11.40
19	0.3250	168.100	166.3	5.3	25.26	12.10	37.36	3.09	24.73	12.63
20	0.3500	185.300	183.5	5.7	27.75	12.10	39.85	3.29	25.98	13.88
21	0.4000	219.400	217.6	6.5	32.62	12.10	44.72	3.70	28.41	16.31
22	0.4500	248.500	246.7	7.3	36.67	12.10	48.77	4.03	30.43	18.33
23	0.5000	275.000	273.2	8.1	40.25	12.10	52.35	4.33	32.22	20.12
24	0.5500	301.300	299.5	8.9	43.73	12.10	55.83	4.61	33.97	21.87
25	0.6000	321.600	319.8	9.7	46.28	12.10	58.38	4.82	35.24	23.14
26	0.6500	340.000	338.2	10.6	48.50	12.10	60.60	5.01	36.35	24.25
27	0.7000	355.200	353.4	11.4	50.22	12.10	62.32	5.15	37.21	25.11
28	0.7500	368.600	366.8	12.2	51.65	12.10	63.75	5.27	37.93	25.83
29	0.8000	380.100	378.3	13.0	52.78	12.10	64.88	5.36	38.49	26.39
30	0.8500	391.500	389.7	13.8	53.86	12.10	65.96	5.45	39.03	26.93
31	0.9000	393.600	391.8	14.6	53.64	12.10	65.74	5.43	38.92	26.82

APPENDIX - B

H 2 M architects + engineers
290 Broad Hollow Road, Ste 400E
Melville, NY 11747 | tel 631.756.8000

October 18, 2023

Email: cstabile@bnydc.org

Mr. Carmine A. Stabile
Senior Vice President, Operations & Infrastructure
Brooklyn Navy Yard Development Corporation
63 Flushing Avenue, Unit 300
Brooklyn, NY 11205

Re: Environmental Survey – Storm Resiliency
Restoration of Substation at Building 62
Brooklyn Navy Yard
63 Flushing Avenue, Brooklyn, NY
H2M Job No. BNYD1907

Dear Mr. Stabile:

In accordance with your request, H2M architects + engineers (H2M) conducted a limited asbestos (ACM), lead based paint (LBP), and polychlorinated biphenyls (PCB) inspection of Building 62 at 63 Flushing Avenue, Brooklyn, NY 11205 provided herein are the results of our findings. The report was based on 100% Drawings by H2M titled Restoration of Substation at Building 62, dated October 2023.

Asbestos Sampling

On June 30th, July 24th, of 2020 and September 27th of 2023, H2M collected limited bulk samples of suspect asbestos containing materials (ACM) that were located at the above-mentioned property and are scheduled to be disturbed during the upcoming project. The materials sampled included various surfacing, miscellaneous, and thermal system insulation. Bulk samples were collected and submitted by New York State Department of Labor (NYS DOL) certified inspector Mr. Kyle P. Vander Schuyt (NYSDOL Cert. No. 12-11293). Mr. Vander Schuyt is also certified as an asbestos investigator by the New York City Department of Environmental Protection (NYCDEP Cert. No. 149351) and was assisted by Mr. Douglas B. Milne (NYSDOL Cert No. 13-14307) and Mr. Frank J. Acciarito (NYSDOL Cert No. 18-63276). Additional Testing performed by Anthony Spantidakis (NYSDOL Cert No. 98-16544 and NYCDEP Cert. No. 117708).

Asbestos Results

According to the federal Asbestos Hazard Emergency Response Act NESHAP (AHERA), the Occupational Safety and Health Administration (OSHA 1926.1101) and the NYSDOL (12 NYCRR Part 56); asbestos containing material (ACM) is defined as any material or product which contains greater than one percent (1%) of asbestos.

TABLE 1: ASBESTOS BULK SAMPLE SUMMARY RESULTS TABLE
BUILDING 62
63 FLUSHING AVENUE, BROOKLYN, NY 11205

LOCATION	MATERIAL DESCRIPTION/ SAMPLE HA #	RESULT FINDINGS	APPROXIMATE QUANTITY OF ACM
Boiler Room	Ceiling Gypsum Board	Non-ACM	--
	Ceiling Joint Compound	Non-ACM	--
	Fiberglass Jacket	Non-ACM	--
	White Insulation Breeching	Non-ACM	--
	Brick	Non-ACM	--

TABLE 1: ASBESTOS BULK SAMPLE SUMMARY RESULTS TABLE BUILDING 62 63 FLUSHING AVENUE, BROOKLYN, NY 11205			
LOCATION	MATERIAL DESCRIPTION/ SAMPLE HA #	RESULT FINDINGS	APPROXIMATE QUANTITY OF ACM
Boiler Room	Brick Mortar	Non-ACM	--
	Louver Caulk	Non-ACM	--
Exterior	Concrete Block	Non-ACM	--
	Concrete Mortar	Non-ACM	--
	Base Expansion Joint	Non-ACM	--
Exterior, Roof	Rolled Top	Non-ACM	--
	Bottom of Rolled Top/ Top of 1st Foam	Non-ACM	--
	2nd Foam	Non-ACM	--
	Perimeter Flashing Tar	Non-ACM	--
	Exhaust Tube Flashing Tar	Non-ACM	--
	Rolled Seam Tar	Non-ACM	--
Adjacent Main Building	Interior Window Caulk	Non-ACM	--
	Exterior Window Caulk	Non-ACM	--

Table Notes:
1. ACM = Asbestos Containing Material, contains more than 1% by weight in Bold.
2. Non-ACM = Contains ≤1% or no asbestos detected in material samples.

Lead Based Paint Sampling

On June 30th of 2020, H2M collected paint chip samples of suspect lead-based paint from painted surfaces of Building 62 at 63 Flushing Avenue, Brooklyn, NY 11205. Sampling was performed by a US EPA Certified Lead Based Paint Inspector, Mr. Kyle P. Vander Schuyt (LBP-I-I173781-2).

Paint Chip samples were submitted to EMSL Analytical, Inc. (EMSL) of Carle Place, New York. EMSL is certified by the New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP), No. 11469 and EPA 7000B, AAS.

Lead Based Paint Results

According to the U.S. Environmental Protection Agency (US EPA) lead based paint is defined as paint containing equal to or more than 0.5% lead by weight in paint chip samples.

TABLE 2: LEAD PAINT BULK SAMPLE SUMMARY RESULTS TABLE BUILDING 62 63 FLUSHING AVENUE, BROOKLYN, NY 11205					
Location / Sample #	Room/Component	Substrate	Color	% by Weight	Interpretation
Exterior/ 1	Boiler Room Door	Metal	Grey	<0.0080 %	Non-Lead Containing

Table Notes:
1. Lead Based Paint (LBP) in Bold = EPA defined LBP or lead concentration equal to or above 0.5% by weight.
2. Lab detection reporting limit is 0.008%

Polychlorinated Biphenyls (PCB) Sampling

On July 9th of 2020, H2M collected samples of suspect polychlorinated biphenyls (PCB) laden sealants caulks and putty from surfaces such as windows, doors, and brick. Sampling was performed by Mr. Douglas B. Milne, Mr. Frank J. Acciarito, Anthony Spantidakis & Mr. Kyle Vander Schuyt.

Bulk samples were submitted to EMSL Analytical, Inc. (EMSL) of Carle Place, New York. EMSL is certified by the New York State Department of Health (NYSDOH), Environmental Laboratory Approval Program (ELAP), No. 11469 and EPA SW 846 3540C/8082A.

Polychlorinated Biphenyls (PCB) Results & Recommendations

According to the U.S. Environmental Protection Agency (US EPA) EPA TSCA 40 CFR Part 761, samples of suspect PCB is defined as "hazardous' when sample is containing equal to or more than 50 PPM total PCB compound concentration. Proper handling, transportation, and disposal methods are required when a material contains PCB compound concentration of equal to or more than 50 PPM.

Universal Waste, E-waste, and light fixtures potentially containing PCB ballasts; Thermostats and bulbs that may contain mercury; shall be properly disposed of in accordance with local and state regulations.

TABLE 3: SUSPECT POLYCHLORINATED BIPHENYLS (PCB) BULK SAMPLE
SUMMARY RESULTS TABLE
BUILDING 62
63 FLUSHING AVENUE, BROOKLYN, NY 11205

Location / Sample #	Room/Component	Substrate	Color	Total PCB (PPM)	Interpretation
Boiler Room/ 1	Louvre Caulk	Concrete	Grey	ND	NONPCB
Exterior/ 2	Base Expansion Joint	Concrete	Grey	ND	NONPCB
Adjacent Main Building/ 3	Interior Window Caulk	Concrete	Grey	0.84	NONPCB
Adjacent Main Building/ 4	Exterior Window Caulk	Concrete	Dark Brown /Black	0.47	NONPCB

Notes:
1. Hazardous PCB = ≥ 50 PPM, as defined by EPA
   NONPCB = Below hazardous PCB level
   ND = Not Detected above laboratory reporting limits

Universal Waste in Light Fixtures

The federal universal waste regulations are found in Title 40 of the Code of Federal Regulations (CFR) in part 273 and apply to (4) four types of universal waste:

These are:
- Batteries, such as lead/acid, lead, nickel-cadmium, silver, lithium or mercury (Information on the Rechargeable Battery Recycling Act).
- Certain Pesticides, that would otherwise be a hazardous Waste

- Thermostats and other Mercury-Containing Equipment (MCE), (Additional information on thermostat management). MCE is included as Universal Waste by the NYC DEC Commissioners Policy 39, approved in 2006.
- Lamps, (except LED lamps which fall under a different category of e-waste) Fluorescent, Halogen, Incandescent and other lamps may be laden with a mercury coating.

In NYS the DEC references the "Universal Waste Rule" (UWR), 6 NYCRR Part 374-3, as an alternate way of managing certain types of hazardous wastes, otherwise they would be subject to all applicable requirements of Parts 370 through 374 and 376. Handlers may choose to manage eligible wastes under the UWR, or under ordinary hazardous waste regulations. A Universal Waste handler falls under one or more of the following: generates, receives, stores, accumulates, and/or sends universal waste. A universal waste Transporter is involved in the transportation of Universal waste with all the accreditations required by the DOT and DEC, in the state of New York.

Universal Waste, E-waste, and light fixtures potentially hazardous containing PCB ballasts; Thermostats and bulbs that may contain mercury; shall be properly disposed of in accordance with local and state regulations.

TABLE 4: UNIVERSAL WASTE SUMMARY TABLE
BUILDING 62
63 FLUSHING AVENUE, BROOKLYN, NY 11205

Building Wing	Light Fixtures (Assumed Haz PCB Ballast)	Light Bulbs (Assumed Mercury)	Thermostats (Assumed Mercury)	Smoke Detectors	Emergency Lights
Boiler Room	5	10	0	0	1

Notes:
- Ballasts could not be opened and inspected, unless the existing ballast indicate "Non-PCB" on them they will be considered to contain PCB Dielectric fluid in Hazardous Waste levels.
- Incandescent and fluorescent bulbs are assumed to contain mercury and are to be recycled in accordance with EPA, Local waste disposal facility requirements and DOT transporting requirements.

Laboratory analytical data sheets and chain of custody forms are provided in Attachment 1. Copies of H2M's licenses and certifications are provided in Attachment 2. Copies of EMSL's certifications are provided in Attachment 3. Photographic Documentation / Sample Sketch is provided in Attachment 4

H2M surveyed visible and accessible materials during this survey without destructive exploratory means. It is possible that concealed materials such as, but not limited to, Tar within façade brick wythes and foundations, Tar on concealed spandrels and relieving angles may exist. H2M certifies that the information contained herein is based on the physical data and visual inspections conducted by H2M and lab data collected during the inspection survey. All findings stated in this report are based upon facts and circumstances as they existed at the time of inspection and at the time that this report was prepared. A change in any of the site conditions, facts or circumstances upon which this report is based may affect the findings expressed in this report.

If you have any questions, please do not hesitate to contact the undersigned at (631) 756-8000 extension 1621.

Very truly yours,
H2M architects + engineers

Kyle P. Vander Schuyt
Industrial Hygienist – Project Scientist

Douglas B. Milne
Industrial Hygienist

Frank J. Acciarito
Environmental Technician

ATTACHMENT 1

LABORATORY ANALYSIS
&
CHAIN OF CUSTODY FORM

EMSL Analytical, Inc.

200 Route 130, Cinnaminson, NJ, 08077
Telephone: 856-858-4800 Fax:856-786-5974
EMSL-CIN-01

EMSL Order ID: 012362814
LIMS Reference ID: AB62814
EMSL Customer ID: H2ML50B

Attention: Kyle Vander Schuyt
H2M Architects & Engineers [H2ML50B]
290 Broadhollow Road, Suite 400E
Melville, NY 11747
(631) 756-8000

Project Name: BNYD 1907-Building 62-Brooklyn Navy Yard
Customer PO:
EMSL Sales Rep: Jeromy Bish
Received: 09/29/2023 09:30
Reported: 10/16/2023 14:49

Sample Results

Sample: 01/Interior Window Caulk
AB62814-01 (Solid)

Analyte	Result	Q	DF	RL	Units	Prepared Date/Time	Analyzed Date/Time	Prep/Analyst Initials	Prep Method	Analytical Method
GC-SVOA										
Aroclor-1016	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1221	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1232	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1242	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1248	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1254	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1260	**0.84**		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1262	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1268	ND		1	0.61	mg/kg	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	SW846-8082A

Surrogate(s)	Recovery	Q	Limits					
Surrogate: Tetrachloro-m-xylene	*45%*		*21-123*	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	*SW846-8082A*
Surrogate: Decachlorobiphenyl	*47%*		*17-128*	10/11/23 17:28	10/13/23 18:10	MxB/TL1	SW846 3540C	*SW846-8082A*

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted."

EMSL Analytical, Inc.

200 Route 130, Cinnaminson, NJ, 08077
Telephone: 856-858-4800 Fax:856-786-5974
EMSL-CIN-01

EMSL Order ID: 012362814
LIMS Reference ID: AB62814
EMSL Customer ID: H2ML50B

Attention: Kyle Vander Schuyt
H2M Architects & Engineers [H2ML50B]
290 Broadhollow Road, Suite 400E
Melville, NY 11747
(631) 756-8000

Project Name: BNYD 1907-Building 62-Brooklyn Navy Yard
Customer PO:
EMSL Sales Rep: Jeromy Bish
Received: 09/29/2023 09:30
Reported: 10/16/2023 14:49

Sample Results
(Continued)

Sample: 02/Exterior Window Caulk
AB62814-02 (Solid)

Analyte	Result	Q	DF	RL	Units	Prepared Date/Time	Analyzed Date/Time	Prep/Analyst Initials	Prep Method	Analytical Method
GC-SVOA										
Aroclor-1016	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1221	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1232	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1242	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1248	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1254	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1260	**0.47**		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1262	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Aroclor-1268	ND		1	0.40	mg/kg	10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	SW846-8082A
Surrogate(s)	**Recovery**	**Q**		**Limits**						
Surrogate: Tetrachloro-m-xylene	*50%*			*21-123*		10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	*SW846-8082A*
Surrogate: Decachlorobiphenyl	*53%*			*17-128*		10/11/23 17:28	10/13/23 18:31	MxB/TL1	SW846 3540C	*SW846-8082A*

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted."

PCB - IN CAULK

Industrial Hygiene - Chain of Custody

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

200 Route 130 North
Cinnaminson, NJ 08077

PHONE: (800) 220-3675
EMAIL: c@emsl.com

EMSL Order Number / Lab Use Only: AB62814

If Bill-To is the same as Report-To leave this section blank. Third-party billing requires written authorization.

Customer Information

Customer ID:
Company Name: HZM ARCHITECTS + ENGINEERS
Contact Name: KYLE VANDER SCHUYT
Street Address: 290 BROAD HOLLOW ROAD
City, State, Zip: MELVILLE NY
Country:
Phone:
Email(s) for Report: KYLE VANDERSCHUYT

Billing Information

Billing ID:
Company Name:
Billing Contact:
Street Address:
City, State, Zip:
Country:
Phone:
Email(s) for Invoice:

Project Name/No: BNYD 1907 - BUILDING 62 BROOKLYN NAVY YARD
Purchase Order:

EMSL LIMS Project ID: (If applicable, EMSL will provide)
US State where samples collected:
State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)

Media Type:
Media Manufacturer/ Part Number:
Media Lot Number:

Sampled By Name: ANTHONY SPANTIDAKIS
Sampled By Signature:
No. Samples in Shipment:

Turnaround Time (TAT) Options - Please check:
(If no selection made, Standard 2 Week (EOD) TAT will apply)
☐ 2 Week ☒ 1 Week ☐ 4 Day ☐ 3 Day ☐ 2 Day ☐ 1 Day ☐ Other (Call Lab)

Client Sample ID	Location/Description	Analyte/ Method	Media	Flow (lpm)	Sample Time On	Sample Time Off	Volume/Area	Sample Type	Sample Date	Comments
01	INTERIOR WINDOW CAULK							☐ Area ☐ Personal		1ST FLOOR WINDOW
02	EXTERIOR WINDOW CAULK							☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		
								☐ Area ☐ Personal		

PCB'S IN CAULK ANALYSIS

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

Method of Shipment: HAND DELIVERED
Sample Condition Upon Receipt:

Relinquished by:	Date/Time:	Received by:	Date/Time
Relinquished by:	Date/Time:	Received by:	Date/Time: 9/29/23 9:30am.

Controlled Document - COC-21 Industrial Hygiene R4 05/12/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

21.4°C
Received in Plastic

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order:	012007796
CustomerID:	H2ML50
CustomerPO:	BNYD1907
ProjectID:	

Attn: **Kyle Vanderschuyt**
H2M Architects and Engineers
538 Broad Hollow Road
4th Floor East
Melville, NY 11747

Phone: (631) 756-8000
Fax:
Received: 07/28/20 10:20 AM

Project: **Brooklyn Navy Yard, Bldg 62 Boiler Room**

Analytical Results

Client Sample Description 1-1
Boiler Room, Louvre Caulk

Collected: 6/30/2020 ***Lab ID:*** *012007796-0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3540C/8082A	Aroclor-1016	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.87	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH

Client Sample Description 2-1
Exterior, Base Expansion Joint

Collected: 6/30/2020 ***Lab ID:*** *012007796-0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date & Analyst*		*Analysis Date & Analyst*	
GC-SVOA								
3540C/8082A	Aroclor-1016	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1221	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1232	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1242	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1248	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1254	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1260	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1262	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH
3540C/8082A	Aroclor-1268	ND D	0.93	mg/Kg	7/28/2020	RS	07/29/20 0:00	EH

Definitions:

MDL - method detection limit
J - Result was below the reporting limit, but at or above the MDL
ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit (Analytical)
D - Dilution Sample required a dilution which was used to calculate final results

OrderID: 012007796

012007796

H2M architects + engineers

Bulk Sheet and Chain of Custody

Page_____ OF _____

H2M L50	Site Address: Brooklyn Navy Yard Bldg 62	Date Submitted: 6/30/20
Address: 538 Broad Hollow Road 4th Floor East Melville, NY 11747	Work Area: Bldg 62 Boiler Rm	Turn Around Time: 1week
	Fax Results to:	E-mail Results to: KVanderSchuyt@H2M.com
		Number of Samples:

PCBs

Analytical Procedure: (Circle One) ~~NY ELAP Method 198.1~~ (friable in NY) ~~NY ELAP Method 198.6~~ (non-friable-NY) ~~NY ELAP Method 198.4~~ (TEM)

Billing # BUYD1907

Sample Number	Location	Sample Description	Comments
1-1	Boiler Room	Louvre Caulk	
2-1	Exterior	Base Expansion Joint	

RECEIVED
EMSL ANALYTICAL, INC.
CARLE PLACE, NY
20 JUL 27 AM 9:17

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of:
	7			7/28/20	10:20 AM
Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of:

21.2° Ice pack

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062013661
Customer ID:	H2ML50
Customer PO:	BNYD1907
Project ID:	

Attention:	Kyle Vanderschuyt	**Phone:**	(631) 756-8000
	H2M Architects and Engineers	**Fax:**	
	538 Broad Hollow Road	**Received Date:**	07/27/2020 9:19 AM
	4th Floor East	**Analysis Date:**	07/31/2020 - 08/02/2020
	Melville, NY 11747	**Collected Date:**	07/24/2020
Project:	Brooklyn Navy Yard, Bldg. 62, Boiler Room		

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 1-1 *062013661-0001*		**Description** Boiler Room - Ceiling - Gypsum Board **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White	3.00% Cellulose 2.00% Glass	30.00% Ca Carbonate 60.00% Gypsum 5.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 1-2 *062013661-0002*		**Description** Boiler Room - Ceiling - Gypsum Board **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White	4.00% Cellulose 2.00% Glass	27.00% Ca Carbonate 67.00% Gypsum	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 2-1 *062013661-0003*		**Description** Boiler Room - Ceiling - Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White		85.00% Ca Carbonate 6.00% Mica 9.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 2-2 *062013661-0004*		**Description** Boiler Room - Ceiling - Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White		86.00% Ca Carbonate 4.00% Mica 10.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062013661
Customer ID: H2ML50
Customer PO: BNYD1907
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 2-3 *062013661-0005*		**Description** Boiler Room - Ceiling - Joint Compound **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White		75.00% Ca Carbonate 7.00% Mica 18.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 3-1 *062013661-0006*		**Description** Boiler Room - Fiberglass Jacket **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	07/31/2020	White/ Silver	80.00% Cellulose 10.00% Glass	5.00% Matrix 5.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 3-2 *062013661-0007*		**Description** Boiler Room - Fiberglass Jacket **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	07/31/2020	White/ Silver	80.00% Glass	5.00% Gypsum 15.00% Matrix	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 3-3 *062013661-0008*		**Description** Boiler Room - Fiberglass Jacket **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable	07/31/2020	White/ Silver	20.00% Cellulose 50.00% Glass	30.00% Matrix	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 4-1 *062013661-0009*		**Description** Boiler Room - White Insulation Breaching **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White	99.00% Glass	1.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 4-2 *062013661-0010*		**Description** Boiler Room - White Insulation Breaching **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White	99.00% Glass	1.00% Non-fibrous (other)	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062013661
Customer ID:	H2ML50
Customer PO:	BNYD1907
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 4-3 *062013661-0011*		**Description** Boiler Room - White Insulation Breaching **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	White	100.00 % Glass		**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 5-1 *062013661-0012*		**Description** Boiler Room - Brick **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Red		30.00% Ca Carbonate 3.00% Mica 7.00% Non-fibrous (other) 60.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 5-2 *062013661-0013*		**Description** Boiler Room - Brick **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Red	2.00% Cellulose	33.00% Ca Carbonate 15.00% Non-fibrous (other) 50.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 6-1 *062013661-0014*		**Description** Boiler Room - Brick Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray	2.00% Cellulose	30.00% Ca Carbonate 3.00% Mica 23.00% Non-fibrous (other) 42.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 6-2 *062013661-0015*		**Description** Boiler Room - Brick Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray		34.00% Ca Carbonate 3.00% Mica 63.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062013661
Customer ID: H2ML50
Customer PO: BNYD1907
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 6-3 *062013661-0016*		**Description** Boiler Room - Brick Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray	2.00% Cellulose	33.00% Ca Carbonate 4.00% Mica 61.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 7-1 *062013661-0017*		**Description** Boiler Room - Louvre Caulk **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Gray		100.00% Other	**None Detected**
Sample ID 7-2 *062013661-0018*		**Description** Boiler Room - Louvre Caulk **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Gray		100.00% Other	**None Detected**
Sample ID 8-1 *062013661-0019*		**Description** Exterior - CMU **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray	2.00% Cellulose	33.00% Ca Carbonate 6.00% Non-fibrous (other) 59.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 8-2 *062013661-0020*		**Description** Exterior - CMU **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray		17.00% Ca Carbonate 21.00% Non-fibrous (other) 62.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062013661
Customer ID: H2ML50
Customer PO: BNYD1907
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 9-1 *062013661-0021*		**Description** Exterior - CMU Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray		30.00% Ca Carbonate 3.00% Mica 3.00% Non-fibrous (other) 64.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 9-2 *062013661-0022*		**Description** Exterior - CMU Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray	1.00% Cellulose	32.00% Ca Carbonate 1.00% Non-fibrous (other) 66.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 9-3 *062013661-0023*		**Description** Exterior - CMU Mortar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable	07/31/2020	Gray	2.00% Cellulose	34.00% Ca Carbonate 3.00% Mica 4.00% Non-fibrous (other) 57.00% Quartz	**None Detected**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB					**Not Analyzed**
TEM NYS 198.4 NOB					**Not Analyzed**
Sample ID 10-1 *062013661-0024*		**Description** Exterior - Base Expansion Joint **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Gray		100.00% Other	**None Detected**
Sample ID 10-2 *062013661-0025*		**Description** Exterior - Base Expansion Joint **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Gray		100.00% Other	**None Detected**
Sample ID 11-1 *062013661-0026*		**Description** Exterior - Roof - Rolled Top **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black/ Beige	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black/ Beige		100.00% Other	**None Detected**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062013661
Customer ID:	H2ML50
Customer PO:	BNYD1907
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 11-2 *062013661-0027*		**Description** Exterior - Roof - Rolled Top **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black/ Beige	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black/ Beige		100.00% Other	**None Detected**
Sample ID 12-1 *062013661-0028*		**Description** Exterior - Roof - Bottom of Rolled Top / Top of 1st Foam **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black/ Yellow	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black/ Yellow		100.00% Other	**None Detected**
Sample ID 12-2 *062013661-0029*		**Description** Exterior - Roof - Bottom of Rolled Top / Top of 1st Foam **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black/ Yellow	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black/ Yellow		100.00% Other	**None Detected**
Sample ID 13-1 *062013661-0030*		**Description** Exterior - Roof - 2nd Foam **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Brown/ Yellow	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Brown/ Yellow		100.00% Other	**None Detected**
Sample ID 13-2 *062013661-0031*		**Description** Exterior - Roof - 2nd Foam **Homogeneity** Heterogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Brown/ Yellow	<1.00% Min. Wool	100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Brown/ Yellow		100.00% Other	**None Detected**
Sample ID 14-1 *062013661-0032*		**Description** Exterior - Roof - Perimeter Flashing Tar **Homogeneity** Homogeneous			
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062013661
Customer ID: H2ML50
Customer PO: BNYD1907
Project ID:

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 14-2 *062013661-0033*		**Description**	Exterior - Roof - Perimeter Flashing Tar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**
Sample ID 15-1 *062013661-0034*		**Description**	Exterior - Roof - Exhaust Tube Flashing Tar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**
Sample ID 15-2 *062013661-0035*		**Description**	Exterior - Roof - Exhaust Tube Flashing Tar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**
Sample ID 16-1 *062013661-0036*		**Description**	Exterior - Roof - Rolled Seam Tar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**
Sample ID 16-2 *062013661-0037*		**Description**	Exterior - Roof - Rolled Seam Tar		
		Homogeneity	Homogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	07/31/2020	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	08/02/2020	Black		100.00% Other	**None Detected**

Initial report from: 08/03/2020 09:20:35

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062013661
Customer ID:	H2ML50
Customer PO:	BNYD1907
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	7/27/2020	Sample Receipt Time:	9:19 AM
Analysis Completed Date:	7/31/2020	Analysis Completed Time:	9:59 AM

Analyst(s):

Omatie Ramrattan-Scarallo PLM NYS 198.1 Friable (21)

Erick Rosa PLM NYS 198.6 NOB (16)

Soaiful Islam TEM NYS 198.4 NOB (16)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

NOB = Non Friable Organically Bound N/A = Not Applicable VCM = Vermiculite Containing Material

-In New York State, TEM is currently the only method that can be used to determine if NOB materials can be considered or treated as non-asbestos containing.
All samples examined for the presence of vermiculite when analyzed via NYS 198.1.
-NYS Guidelines for Vermiculite containing samples are available at http://www.wadsworth.org/labcert/elapcert/forms/VermiculiteInterimGuidance_Rev070913.pdf EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples were received in good condition unless otherwise noted.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. This report may contain data that is not covered by the NVLAP accreditation.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469

Initial report from: 08/03/2020 09:20:35

OrderID: 062013661

062.013661

H2M architects + engineers

Bulk Sheet and Chain of Custody Page 1 OF _____

H2M L50	Site Address: Brooklyn Navy Yard Bldg 62	Date Submitted: 7/24/2020
Address: 538 Broad Hollow Road 4th Floor East Melville, NY 11747	Work Area: Bldg 62. Boiler Room	Turn Around Time: 1 week
	Fax Results to:	E-mail Results to: KVanderSchuyt@H2M.com
		Number of Samples:

Analytical Procedure: (Circle One) NY ELAP Method 198.1 (friable in NY) | NY ELAP Method 198.6 (non-friable-NY) | NY ELAP Method 198.4 (TEM)

Billing # BNY01904

Sample Number	Location	Sample Description	Comments
1 - 1	Boiler Room	Ceiling Gypsum Board	
1 - 2			
2 - 1		Joint Compound	
2 - 2			
2 - 3			
3 - 1		Fiberglass Jacket	
3 - 2			
3 - 3			
4 - 1		White Insulation Breaching	
4 - 2			
4 - 3			
5 - 1		Brick	
5 - 2			
6 - 1		Mortar	
6 - 2			
6 - 3			
7 - 1		Louvre Caulk	
7 - 2			
8 - 1	Exterior	CMU	
8 - 2			
9 - 1		Mortar	
9 - 2			
9 - 3			
10 - 1		Base Expansion Joint	
10 - 2			
	* Stop at first positive		

EMSL ANALYTICAL, INC. CARLE PLACE, NY 20 JUL 27 AM 9:19

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of:
	7/30/2020			7-27-20	EMSL
Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of:

OrderID: 062013661

062013661

H2M architects + engineers

Bulk Sheet and Chain of Custody

H2M L50	Site Address: Brooklyn Navy Yard	Date Submitted: 7/24/2020
Address: 538 Broad Hollow Road 4th Floor East Melville, NY 11747	Work Area: Bldg 62	Turn Around Time: 1 week
	Fax Results to: / E-mail Results to: KVanderSchuyt@H2M.com	Number of Samples:
Analytical Procedure: (Circle One) NY ELAP Method 198.1 (friable in NY) — NY ELAP Method 198.6 (non-friable-NY) — NY ELAP Method 198.4 (TEM)		Billing # BUYD1907

Sample Number	Location	Sample Description	Comments
11 - 1	Exterior Roof	Rolled Top	
11 - 2		1	
12 - 1		Bottom of Rolled Top/Top of 1st Foam	
12 - 2		1	
13 - 1		2nd Foam	
13 - 2		1	
14 - 1		Perimeter Flashing Tar	
14 - 2		1	
15 - 1		Exhaust tube Flashing Tar	
15 - 2		1	
16 - 1		Rolled Seam Tar	
16 - 2		1	

RECEIVED
EMSL ANALYTICAL, INC.
CARLE PLACE, NY
20 JUL 27 AM 9:19

Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of:
				7/27/20	EMSL
Relinquished by (signature)	Date	Time	Received by (signature)	Date	Agent of.

EMSL Analytical, Inc.

528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order: 062318613
Customer ID: H2ML50
Customer PO:
Project ID:

Attention: Kyle P. Vander Schuyt
H2M Architects and Engineers
538 Broad Hollow Road
4th Floor East
Melville, NY 11747
Project: BNYD1907-Building 62

Phone: (631) 756-8000
Fax:
Received Date: 09/28/2023 1:41 PM
Analysis Date: 09/29/2023
Collected Date: 09/27/2023

Test Report:Asbestos Analysis of Bulk Material

Test	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos
Sample ID 001-01 *062318613-0001*		**Description**	Window Caulk (Interior)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	09/29/2023	Gray		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	09/29/2023	Gray		100.00% Other	**None Detected**
Sample ID 001-02 *062318613-0002*		**Description**	Window Caulk (Interior)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	09/29/2023	Gray/ White		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	09/29/2023	Gray/ White		100.00% Other	**None Detected**
Sample ID 002-01 *062318613-0003*		**Description**	Window Caulk (Exterior)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	09/29/2023	Black		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	09/29/2023	Black		100.00% Other	**None Detected**
Sample ID 002-02 *062318613-0004*		**Description**	Window Caulk (Exterior)		
		Homogeneity	Heterogeneous		
PLM NYS 198.1 Friable					**Not Analyzed**
PLM NYS 198.6 VCM					**Not Analyzed**
PLM NYS 198.6 NOB	09/29/2023	Brown		100.00% Other	**Inconclusive: None Detected**
TEM NYS 198.4 NOB	09/29/2023	Brown		100.00% Other	**None Detected**

Initial report from: 09/29/2023 14:08:46

EMSL Analytical, Inc.
528 Mineola Avenue Carle Place, NY 11514
Tel/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com / carleplacelab@emsl.com

EMSL Order:	062318613
Customer ID:	H2ML50
Customer PO:	
Project ID:	

Test Report:Asbestos Analysis of Bulk Material

The samples in this report were submitted to EMSL for analysis by Asbestos Analysis of Bulk Materials via NYS ELAP Approved Methods. The reference number for these samples is the EMSL Order ID above. Please use this reference number when calling about these samples.

Report Comments:

Sample Receipt Date:	9/28/2023	Sample Receipt Time:	1:41 PM
Analysis Completed Date:	9/29/2023	Analysis Completed Time:	10:14 AM

Analyst(s):

April Schmuck PLM NYS 198.6 NOB (4)

Luisa Vargas TEM NYS 198.4 NOB (4)

Samples reviewed and approved by:

Daniel Clarke, Asbestos Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. Estimation of uncertainty available upon request. This report is a summary of multiple methods of analysis, fully compliant reports are available upon request. All samples examined for the presence of vermiculite when analyzed via NYS 198.1. A combination of PLM and TEM analysis may be necessary to ensure consistently reliable detection of asbestos. Polarized-light microscopy is not consistently reliable in detecting asbestos in floor coverings and similar non-friable organically bound materials. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government . Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing. NOB= Non friable organically bound; N/A= Not applicable VCM= Vermiculite containing material.

Samples analyzed by EMSL Analytical, Inc. Carle Place, NY NYS ELAP 11469, NVLAP Lab Code 101048-10

Initial report from: 09/29/2023 14:08:46

OrderID: 062318613

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

062318613

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
PHONE: (800) 220-3675
EMAIL: CinnAsblab@EMSL.com

Walk In

Customer Information		Billing Information	
Customer ID:	H2M ARCHITECTS + ENGINEERS	Billing ID:	
Company Name:		Company Name:	
Contact Name:	KYLE VANDA SCHMITT	Billing Contact:	
Street Address:	200 BROAD HOLLOW ROAD	Street Address:	
City, State, Zip:	MELVILLE, NY	City, State, Zip:	
Country:		Country:	
Phone:		Phone:	
Email(s) for Report:	KYLE VANDA SCHMITT / DOUG MILAS	Email(s) for Invoice:	

Project Information

Project Name/No:	BNYD1907 - BUILDING 62	Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)		US State where samples collected:	State of Connecticut (CT) must select project location: ☐ Commercial (Taxable) ☐ Residential (Non-Taxable)
Sampled By Name:	ANTHONY SPANTIDAKIS	Sampled By Signature:	Date Sampled: 9/27/23
No. of Samples in Shipment	2		

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☒ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PLM - Bulk (reporting limit)

- ☐ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)
- ☐ POINT COUNT
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ POINT COUNT w/ GRAVIMETRIC
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ NIOSH 9002 (<1%)
- ☒ NYS 198.1 (Friable - NY)
- ☒ NYS 198.6 NOB (Non-Friable - NY)
- ☐ NYS 198.8 (Vermiculite SM-V)

TEM - Bulk

- ☐ TEM EPA NOB
- ☒ NYS NOB 198.4 (Non-Friable - NY)
- ☐ TEM EPA 600/R-93/116 w/ Milling Prep (0.1%)

Other Tests (please specify)

☐ Positive Stop - Clearly Identified Homogeneous Areas (HA)

Sample Number	HA Number	Sample Location	Material Description
001-01		WINDOW CAULK (INTERIOR)	
02			
002-01		WINDOW CAULK (EXTERIOR)	
02			

RECEIVED
EMSL ANALYTICAL, INC.
CINNAMINSON, NJ
2023 SEP 28 P 1:41

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

BUILDING 62 (ADJACENT BUILDING)

Method of Shipment:		Sample Condition Upon Receipt:	
Relinquished by:	Date/Time: 9/28/23	Received by:	Date/Time: 9-28-23 1411 PM
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - Asbestos Bulk R7 8/14/2021

☐ AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

9/29/23

9/29/23

EMSL Analytical, Inc.
528 Mineola Avenue, Carle Place, NY 11514
Phone/Fax: (516) 997-7251 / (516) 997-7528
http://www.EMSL.com carleplacelab@emsl.com

EMSL Order:	062013687
CustomerID:	H2ML50
CustomerPO:	
ProjectID:	

Attn: **Kyle Vanderschuyt**
H2M Architects and Engineers
538 Broad Hollow Road
4th Floor East
Melville, NY 11747

Phone:	(631) 756-8000
Fax:	
Received:	07/27/20 9:19 AM
Collected:	6/30/2020

Project: **BNY01907**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3051A/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
1-1	*062013687-0001*	6/30/2020	8/1/2020	<0.0080 % wt
	Site: Boiler Room / Door / Metal / Grey			

Alger Liang, Lead Laboratory Manager
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.
Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Analytical, Inc. Carle Place, NY Lab ID 102344 is accredited by AIHA LAP, LLC in the env. accreditation program for Lead in Paint, CT PH-0249, NYS ELAP 11469, CA 2339

Initial report from 08/01/2020 12:35:07

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody

EMSL Order ID *(Lab Use Only)*: 062013687

Company: H2ML50	EMSL-Bill to: ☐ Same ☐ Different If Bill to is Different note instructions in Comments**
Street:	*Third Party Billing requires written authorization from third party*
City: / State/Province: NY	Zip/Postal Code: / Country:
Report To (Name): KYLE VANDER SCHUYT	Telephone #:
Email Address: KVANDERSCHUYT@H2M.COM	Fax #: / Purchase Order:
Project Name/Number: BNYD1907	Please Provide Results: ☐ Fax ☐ Email
U.S. State Samples Taken:	CT Samples: ☐ Commercial/Taxable ☐ Residential/Tax Exempt

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour | ☐ 6 Hour | ~~☐ 24 Hour~~ | ☐ 48 Hour | ☐ 72 Hour | ☐ 96 Hour | ☒ 1 Week | ☐ 2 Week

**Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide*

Matrix	Method	Instrument	Reporting Limit	Check
Chips ☒ % by wt. ☐ mg/cm² ☐ ppm	SW846-7000B	Flame Atomic Absorption	0.01%	☒
Air	NIOSH 7082	Flame Atomic Absorption	4 µg/filter	☐
	NIOSH 7105	Graphite Furnace AA	0.03 µg/filter	☐
	NIOSH 7300 modified	ICP-AES/ICP-MS	0.5 µg/filter	☐
Wipe* ASTM ☐ non ASTM ☐ *if no box is checked, non-ASTM Wipe is assumed	SW846-7000B	Flame Atomic Absorption	10 µg/wipe	☐
	SW846-6010B or C	ICP-AES	1.0 µg/wipe	☐
	SW846-7000B/7010	Graphite Furnace AA	0.075 µg/wipe	☐
TCLP	SW846-1311/7000B/SM 3111B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	SW846-1131/SW846-6010B or C	ICP-AES	0.1 mg/L (ppm)	☐
Soil	SW846-7000B	Flame Atomic Absorption	40 mg/kg (ppm)	☐
	SW846-7010	Graphite Furnace AA	0.3 mg/kg (ppm)	☐
	SW846-6010B or C	ICP-AES	2 mg/kg (ppm)	☐
Wastewater Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	SM3111B/SW846-7000B	Flame Atomic Absorption	0.4 mg/L (ppm)	☐
	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.7	ICP-AES	0.020 mg/L (ppm)	☐
Drinking Water Unpreserved ☐ Preserved with HNO_3 pH < 2 ☐	EPA 200.9	Graphite Furnace AA	0.003 mg/L (ppm)	☐
	EPA 200.8	ICP-MS	0.001 mg/L (ppm)	☐
TSP/SPM Filter	40 CFR Part 50	ICP-AES	12 µg/filter	☐
	40 CFR Part 50	Graphite Furnace AA	3.6 µg/filter	☐
Other:				☐

Name of Sampler: Kyle Vander Schuyt — Signature of Sampler:

Sample #	Location	Volume/Area	Date/Time Sampled
1-1	Boiler Rm / Door / Metal / Grey	2in²	6/30/20

RECEIVED EMSL ANALYTICAL, INC. CHERRY HILL, NJ JUL 27 AM 8:16 SAMPLE PLACE, NY

Client Sample #'s — Total # of Samples: 1

Relinquished (Client):	Katie B.	Date:	7/27/20	Time:	9:19 AM
Received (Lab):		Date:		Time:	

Comments:

8/1/20

ATTACHMENT 2

H2M'S PERSONNEL LICENSES AND CERTIFICATIONS

New York State – Department of Labor
Division of Safety and Health
License and Certificate Unit
State Campus, Building 12
Albany, NY 12240

ASBESTOS HANDLING LICENSE

H2M Architects, Engineers, Land Surveying and
Landscape Architecture, D.P.C.
4th Floor East
538 Broad Hollow Road

Melville, NY 11747

FILE NUMBER: 00-0724
LICENSE NUMBER: 28582
LICENSE CLASS: RESTRICTED
DATE OF ISSUE: 12/11/2020
EXPIRATION DATE: 12/31/2021

Duly Authorized Representative – Debra Mattina:

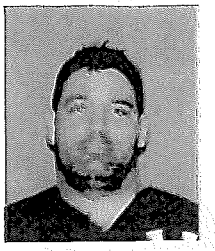
This license has been issued in accordance with applicable provisions of Article 30 of the Labor Law of New York State and of the New York State Codes, Rules and Regulations (12 NYCRR Part 56). It is subject to suspension or revocation for a (1) serious violation of state, federal or local laws with regard to the conduct of an asbestos project, or (2) demonstrated lack of responsibility in the conduct of any job involving asbestos or asbestos material.

This license is valid only for the contractor named above and this license or a photocopy must be prominently displayed at the asbestos project worksite. This license verifies that all persons employed by the licensee on an asbestos project in New York State have been issued an Asbestos Certificate, appropriate for the type of work they perform, by the New York State Department of Labor.

Eileen M. Franko, Director
For the Commissioner of Labor

SH 432 (8/12)

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE



FRANK J ACCIARITO
CLASS(EXPIRES)
C ATEC(07/21) D INSP(07/21)
H PM (07/21)

CERT# 18-63276
DMV# 500811396

MUST BE CARRIED ON ASBESTOS PROJECTS

01213 005370354 28

EYES HAZ
HAIR BLK
HGT 5' 08"

IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240

NYC DEP ASBESTOS CONTROL PROGRAM
ASBESTOS CERTIFICATE

MILNE,
DOUGLAS
INVESTIGATOR
160491

EXPIRES: 02/12/2023
DOB:02/12/1994 M 6' 02"

MUST BE CARRIED ON ALL ASBESTOS PROJECTS

01213 0049127777 27

DMV ID: 316381023

This certificate must be shown to a NYCDEP representative upon request. Report loss immediately to NYCDEP Asbestos Control Program, 8th floor 59-17 Junction Blvd., Flushing, NY 11373

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

DOUGLAS B MILNE
CLASS(EXPIRES)
C ATEC(02/21) D INSP(02/21)
H PM (02/21)

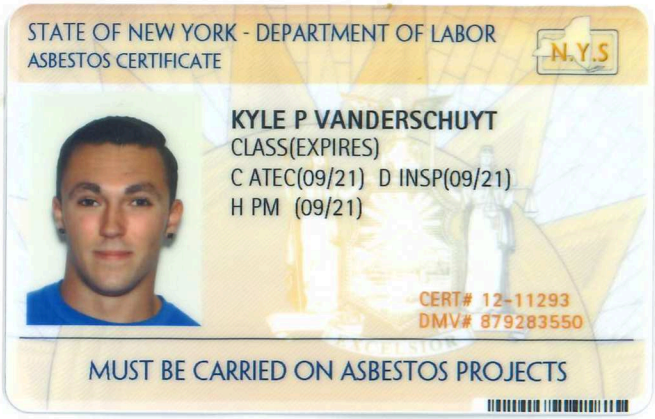
CERT# 13-14307
DMV# 316381023

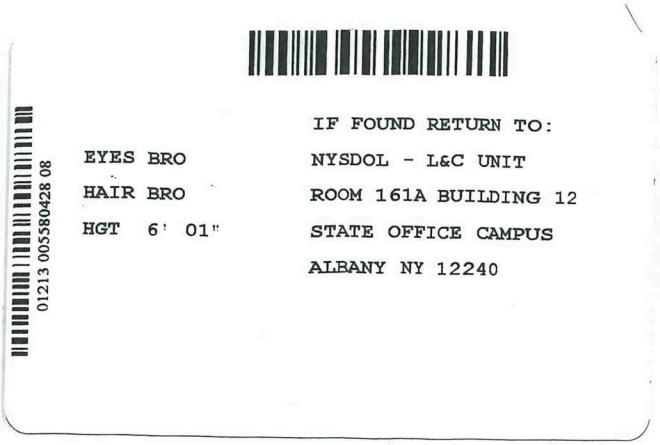
MUST BE CARRIED ON ASBESTOS PROJECTS

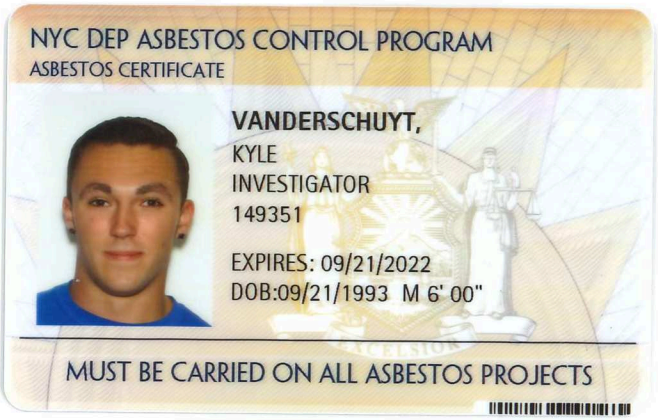
01213 0053675 71 62

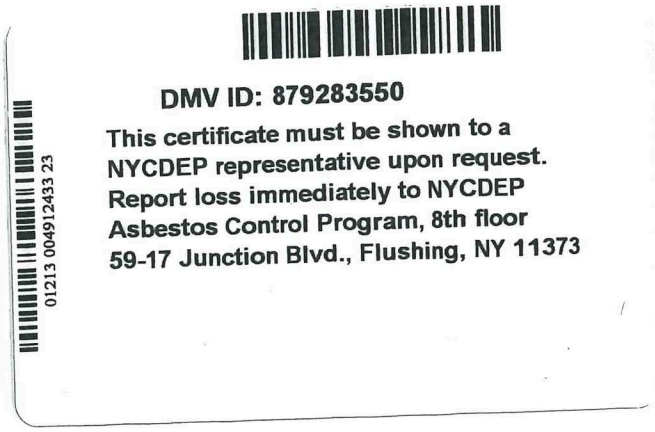
EYES BLU
HAIR BLN
HGT 6' 03"

IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240


STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE
N.Y.S
KYLE P VANDERSCHUYT
CLASS(EXPIRES)
C ATEC(09/21) D INSP(09/21)
H PM (09/21)
CERT# 12-11293
DMV# 879283550
MUST BE CARRIED ON ASBESTOS PROJECTS


01213 005580428 08
EYES BRO
HAIR BRO
HGT 6' 01"
IF FOUND RETURN TO:
NYSDOL - L&C UNIT
ROOM 161A BUILDING 12
STATE OFFICE CAMPUS
ALBANY NY 12240


NYC DEP ASBESTOS CONTROL PROGRAM
ASBESTOS CERTIFICATE
VANDERSCHUYT,
KYLE
INVESTIGATOR
149351
EXPIRES: 09/21/2022
DOB:09/21/1993 M 6' 00"
MUST BE CARRIED ON ALL ASBESTOS PROJECTS


01213 004912433 23
DMV ID: 879283550
This certificate must be shown to a
NYCDEP representative upon request.
Report loss immediately to NYCDEP
Asbestos Control Program, 8th floor
59-17 Junction Blvd., Flushing, NY 11373

STATE OF NEW YORK - DEPARTMENT OF LABOR
ASBESTOS CERTIFICATE

N.Y.S

ANTHONY SPANTIDAKIS
CLASS(EXPIRES)
D INSP(03/23) E MGPL(03/23)
I PD (03/23)

CERT# 98-16544
[redacted]

MUST BE CARRIED ON ASBESTOS PROJECTS

NYC DEP ASBESTOS CONTROL PROGRAM

ASBESTOS CERTIFICATE

SPANTIDAKIS,
ANTHONY
INVESTIGATOR
117708

EXPIRES: 03/29/2024
[redacted] M 5' 06"

MUST BE CARRIED ON ALL ASBESTOS PROJECTS

United States Environmental Protection Agency

This is to certify that

H2M Architects + Engineers

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires July 07, 2022

LBP-1482-2

Certification #

May 13, 2019

Issued On

Michelle Price, Chief

Lead, Heavy Metals, and Inorganics Branch

United States Environmental Protection Agency

This is to certify that

Kyle P Vander Schuyt

has fulfilled the requirements of the Toxic Substances Control Act (TSCA) Section 402, and has received certification to conduct lead-based paint activities pursuant to 40 CFR Part 745.226 as:

Inspector

In the Jurisdiction of:

All EPA Administered Lead-based Paint Activities Program States, Tribes and Territories

This certification is valid from the date of issuance and expires March 17, 2023

LBP-I-I173781-2

Certification #

February 21, 2020

Issued On

Susan Schulz, Acting Chief

Chemicals and Multimedia Programs Branch

ATTACHMENT 3

EMSL'S CERTIFICATIONS

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101048-10

EMSL Analytical, Inc.

Carle Place, NY

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-07-01 through 2021-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

EMSL Analytical, Inc.
528 Mineola Ave.
Carle Place, NY 11514
Daniel Clarke
Phone: 516-997-7251
Email: dclarke@emsl.com
http://www.emsl.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 101048-10**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.

For the National Voluntary Laboratory Accreditation Program

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2021
Issued April 01, 2020

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. DANIEL CLARKE
EMSL ANALYTICAL, INC.
528 MINEOLA AVE.
CARLE PLACE, NY 11514

NY Lab Id No: 11469

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Characteristic Testing

TCLP	EPA 1311

Metals I

Lead, Total	EPA 7000B

Sample Preparation Methods

	EPA 3051A

NEW YORK STATE Department of Health

Serial No.: 61401

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NELAP RECOGNIZED TNI ACCREDITATION BODY

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2021
Issued April 01, 2020

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. DANIEL CLARKE
EMSL ANALYTICAL, INC.
528 MINEOLA AVE.
CARLE PLACE, NY 11514

NY Lab Id No: 11469

is hereby APPROVED as an Environmental Laboratory for the category
ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved subcategories and/or analytes are listed below:

Miscellaneous

Asbestos in Friable Material	Item 198.1 of Manual
	EPA 600/M4/82/020
Asbestos in Non-Friable Material-PLM	Item 198.6 of Manual (NOB by PLM)
Asbestos in Non-Friable Material-TEM	Item 198.4 of Manual
Asbestos-Vermiculite-Containing Material	Item 198.8 of Manual
Lead in Dust Wipes	EPA 7000B
Lead in Paint	EPA 7000B

Sample Preparation Methods

	EPA 3051A

NEW YORK STATE Department of Health

Serial No.: 61402

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2021
Issued April 01, 2020
Revised April 07, 2020

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MR. PHILLIP M. WORBY
EMSL ANALYTICAL INC
200 ROUTE 130 NORTH
CINNAMINSON, NJ 08077

NY Lab Id No: 10872

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category ENVIRONMENTAL ANALYSES SOLID AND HAZARDOUS WASTE
All approved analytes are listed below:

Polychlorinated Biphenyls	
Aroclor 1016 (PCB-1016)	EPA 8082A
Aroclor 1221 (PCB-1221)	EPA 8082A
Aroclor 1232 (PCB-1232)	EPA 8082A
Aroclor 1242 (PCB-1242)	EPA 8082A
Aroclor 1248 (PCB-1248)	EPA 8082A
Aroclor 1254 (PCB-1254)	EPA 8082A
Aroclor 1260 (PCB-1260)	EPA 8082A
Aroclor 1262 (PCB-1262)	EPA 8082A
Aroclor 1268 (PCB-1268)	EPA 8082A
PCB 1	EPA 8082A
PCB 101	EPA 8082A
PCB 110	EPA 8082A
PCB 138	EPA 8082A
PCB 141	EPA 8082A
PCB 151	EPA 8082A
PCB 153	EPA 8082A
PCB 170	EPA 8082A
PCB 18	EPA 8082A
PCB 180	EPA 8082A
PCB 183	EPA 8082A
PCB 187	EPA 8082A
PCB 206	EPA 8082A
PCB 31	EPA 8082A
PCB 44	EPA 8082A
PCB 5	EPA 8082A
PCB 52	EPA 8082A

Polychlorinated Biphenyls	
PCB 66	EPA 8082A
PCB 87	EPA 8082A
Polynuclear Aromatic Hydrocarbons	
2-Acetylaminofluorene	EPA 8270D
Acenaphthene	EPA 8270D
Acenaphthylene	EPA 8270D
Anthracene	EPA 8270D
Benzo(a)anthracene	EPA 8270D
Benzo(a)pyrene	EPA 8270D
Benzo(b)fluoranthene	EPA 8270D
Benzo(g,h,i)perylene	EPA 8270D
Benzo(k)fluoranthene	EPA 8270D
Chrysene	EPA 8270D
Dibenzo(a,h)anthracene	EPA 8270D
Fluoranthene	EPA 8270D
Fluorene	EPA 8270D
Indeno(1,2,3-cd)pyrene	EPA 8270D
Naphthalene	EPA 8270D
Phenanthrene	EPA 8270D
Pyrene	EPA 8270D
Priority Pollutant Phenols	
2,3,4,6 Tetrachlorophenol	EPA 8270D
2,4,5-Trichlorophenol	EPA 8270D
2,4,6-Trichlorophenol	EPA 8270D
2,4-Dichlorophenol	EPA 8270D

NEW YORK STATE | Department of Health

Serial No.: 61934

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

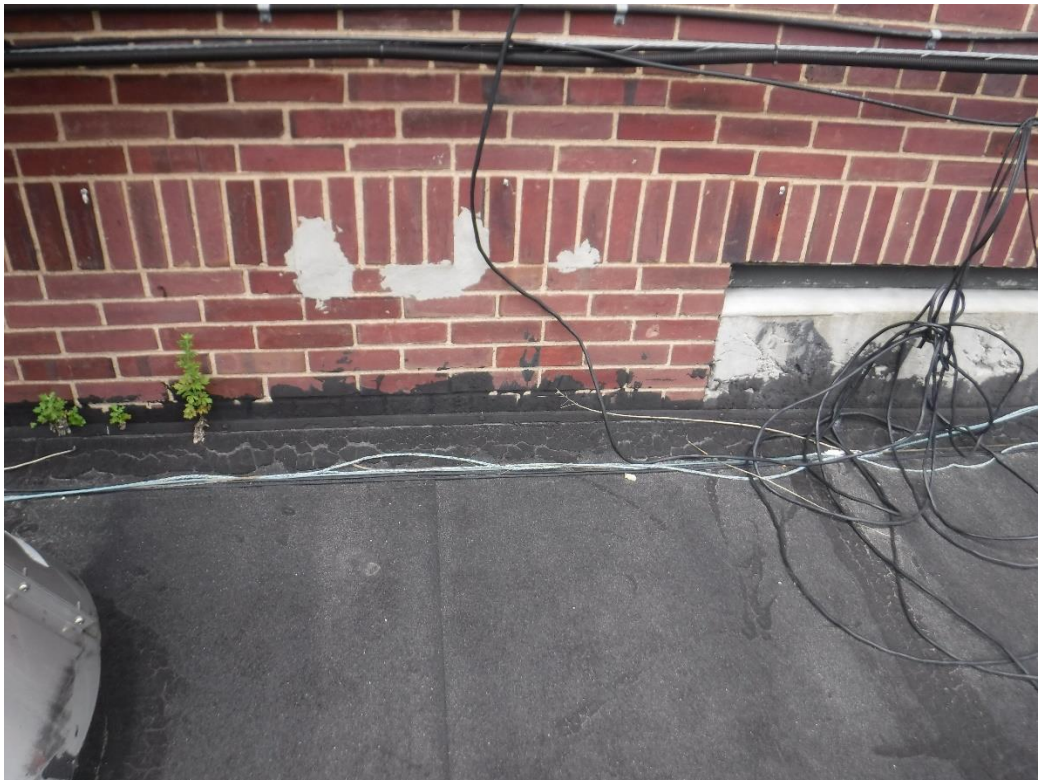
ATTACHMENT 4

PHOTOGRAPHIC DOCUMENTATION

Building 62

Building 62: Non-lead based grey paint on metal door.

Roof – Non-ACM Exhaust Tube Flashing Tar

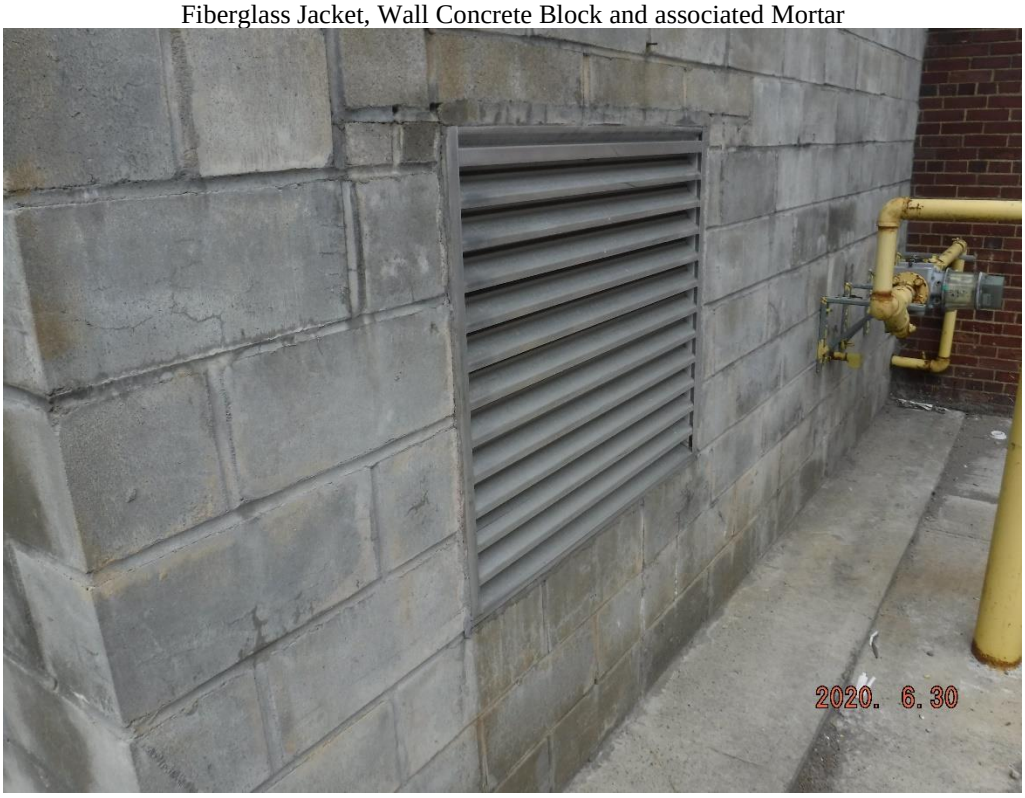


Roof of Building 62: Non-asbestos containing perimeter flashing tar and rolled seam tar.

Roof of Building 62 – Non-ACM rolled top, bottom of rolled top/top of first foam, 2nd foam

Interior, Building 62: Non-asbestos containing brick, and brick mortar.

Interior, Building 62: Non-asbestos containing Ceiling gypsum Board, Ceiling Joint Compound, Pipe Fiberglass Jacket, Wall Concrete Block and associated Mortar



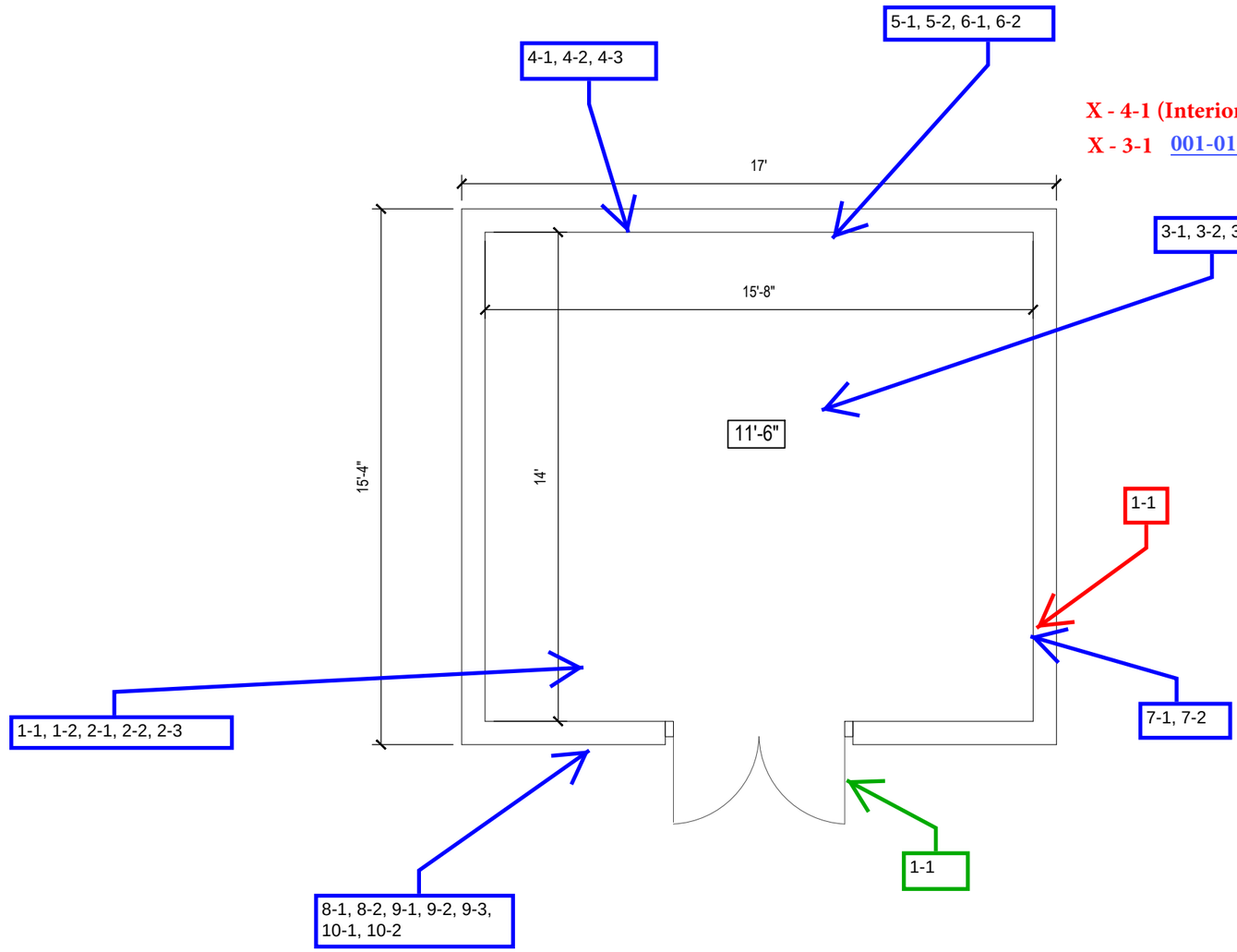
Exterior – Non-ACM Base Expansion Joint, Concrete Block & Associated Mortar
NONPCB Base Expansion Joint

Boiler Room – Non-ACM Louver Caulk
NONPCB Louver Caulk

Interior – Non-ACM White Breaching

Key:
= Asbestos Samples
= Lead Samples
= PCB Samples

Interior



X - 4-1 (Interior Building) 002-01; 002-02
X - 3-1 001-01; 001-02

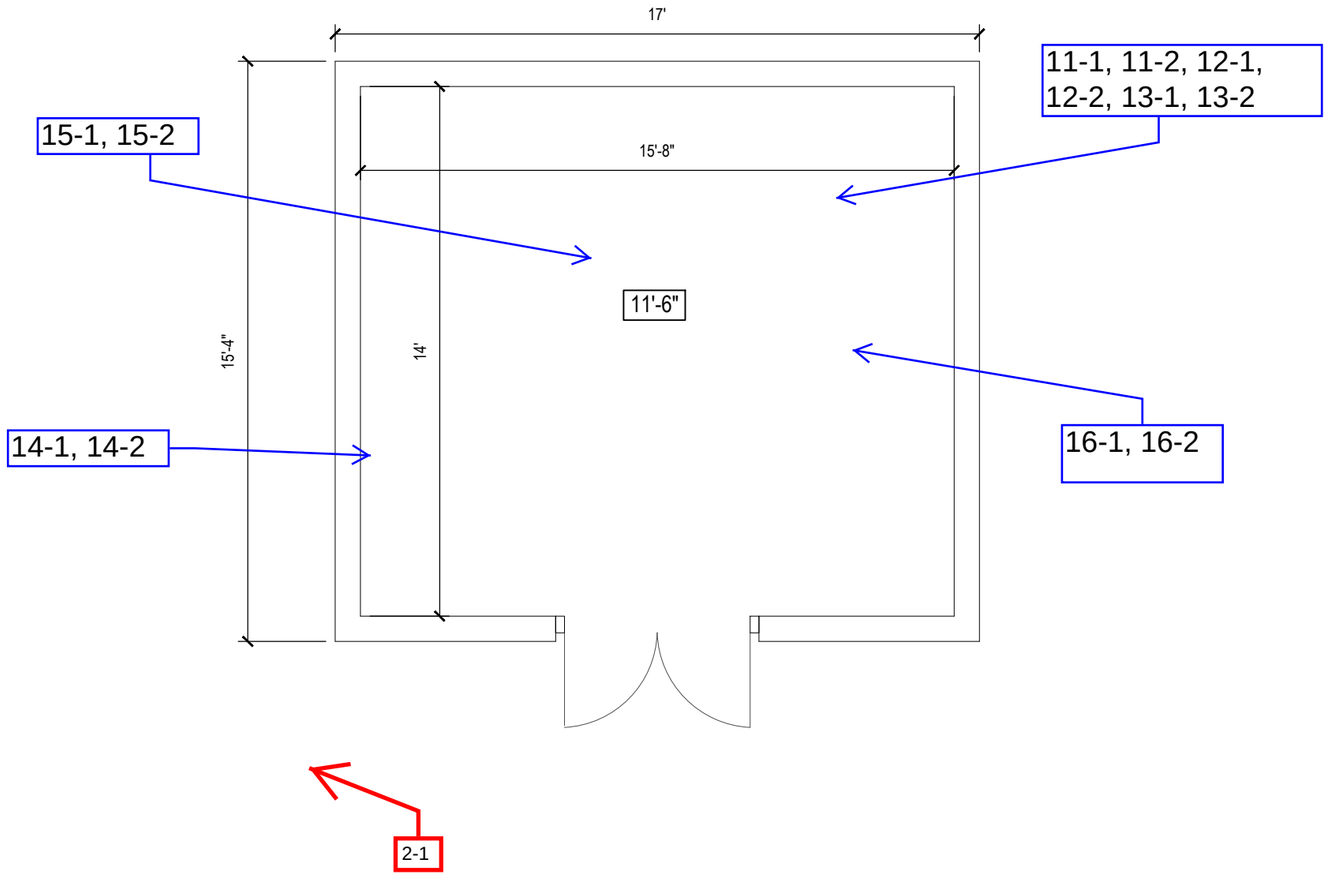
BROOKLYN NAVY YARD
BUILDING 62

Project #
BNYD-1904

DATE:
AUG 2018

H 2 M
architects + engineers
www.h2m.com

ROOF



BROOKLYN NAVY YARD
BUILDING 62

Project #
BNYD-1904

DATE:
AUG 2018

H 2 M
architects
+
engineers
www.h2m.com

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT N

ADDITIONAL M/WBE PROVISIONS

A. Pre-award waiver of the Participation Goals.

1. A Bidder may seek a pre-award full or partial waiver of the Participation Goals in accordance with Section 6-129, which requests that BNYDC change the Participation Goal on the grounds that the Participation Goal is unreasonable in light of the availability of certified firms to perform the services required, or by demonstrating that it has legitimate business reasons for proposing a lower level of subcontracting in its M/WBE Utilization Plan.

2. To apply for a full or partial waiver of the Participation Goal, a bidder must complete Part B of Exhibit O and submit such request no later than seven (7) calendar days prior to the date and time the bids are due, in writing to the BNYDC by email at dmagdich@bnydc.org **and** mwbe@bnydc.org. Full or partial waiver requests that are received later than seven (7) calendar days prior to the date and time the bids are due may be rejected as untimely. Bidders who have submitted timely requests will receive a BNYDC response by no later than two (2) calendar days prior to the due date for bids; provided, however, that if that date would fall on a weekend or holiday, a BNYDC response will be provided by close-of-business on the business day before such weekend or holiday date.

3. If BNYDC determines that the Participation Goal is unreasonable in light of the availability of certified firms to perform the services required, it shall revise the solicitation and extend the deadline for bids.

4. BNYDC may grant a full or partial waiver of the Participation Goal to a bidder who demonstrates—before submission of the bid— that it has legitimate business reasons for proposing the level of subcontracting in its M/WBE Utilization Plan. In making its determination, BNYDC shall consider factors that shall include, but not be limited to, whether the bidder has the capacity and the bona fide intention to perform the Contract without any subcontracting, or to perform the Contract without awarding the amount of subcontracts represented by the Participation Goal. In making such determination, BNYDC may consider whether the M/WBE Utilization Plan is consistent with past subcontracting practices of the bidder whether the bidder has made efforts to form a joint venture with a certified firm, and whether the bidder has made good faith efforts to identify other portions of the Contract that it intends to subcontract.

B. Modification of M/WBE Utilization Plan.

1. A Contractor may request a modification of its M/WBE Utilization Plan (a "Modification") after award of this Contract. BNYDC may grant a request for Modification of a Contractor's M/WBE Utilization Plan if it determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts to meet the Participation Goal. In making such determination, BNYDC shall consider evidence of the following efforts, as applicable, along with any other relevant factors:

a. The Contractor advertised opportunities to participate in the Contract, where appropriate, in general circulation media, trade and professional association publications and small business media, and publications of minority and women's business organizations;
b. The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
c. The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs or WBEs that their interest in the Contract was solicited;
d. The Contractor made efforts to identify portions of the work that could be substituted for portions originally designated for participation by MBEs and/or WBEs in the M/WBE Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
e. The Contractor held meetings with MBEs and/or WBEs prior to the date their bids were due, for the purpose of explaining in detail the scope and requirements of the work for which their bids were solicited;
f. The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts, or act as suppliers or service providers;
g. Timely written requests for assistance made by the Contractor to BNYDC's M/WBE liaison officer at mwbe@bnydc.org and to DSBS and DMWBD;
h. Description of how recommendations made by DSBS, DMWBD and BNYDC were acted upon and an explanation of why action upon such recommendations did not lead to the desired level of participation of MBEs and/or WBEs.

BNYDC's M/WBE liaison officer shall provide written notice to the Contractor of the determination.

2. BNYDC may modify the Participation Goal when the scope of the work has been changed by BNYDC in a manner that affects the scale and types of work that the Contractor indicated in its M/WBE Utilization Plan would be awarded to subcontractors.

C. Substitutions

Substitutions to the MBEs and/or WBEs that Contractor identified as firms they intended to use in connection with the performance of the Contract may only be made with the approval of BNYDC, which shall only be given when the Contractor has proposed to use a firm that would satisfy the Participation Goal to the same extent as the firm previously identified, unless BNYDC determines that the Contractor has established, with appropriate documentary and other evidence, that it made reasonable, good faith efforts. In making such determination, BNYDC shall require evidence of the efforts listed in Section B(1) above, as applicable, along with any other relevant factors.

D. Indefinite Quantity Contracts

If this Contract is for an indefinite quantity of construction or is a requirements type contract and the Contractor has submitted an M/WBE Utilization Plan and has committed to subcontract work to

MBEs and/or WBEs in order to meet the Participation Goal, the Contractor will not be deemed in violation of the M/WBE Program requirements for this Contract with regard to any work which was intended to be subcontracted to an MBE and/or WBE to the extent that BNYDC has determined that such work is not needed.

E. Progress Review, Evaluation and Assessment

At least once annually during the term of the Contract, BNYDC shall review the Contractor's progress toward attainment of its M/WBE Utilization Plan, including but not limited to, by reviewing the percentage of work the Contractor has actually awarded to MBE and/or WBE subcontractors and the payments the Contractor made to such subcontractors.

BNYDC shall evaluate and assess the Contractor's performance in meeting those goals, and such evaluation and assessment shall become part of the Contractor's overall contract performance evaluation.

F. Miscellaneous Provisions

1. The Contractor shall take notice that the resulting contract may be audited. Furthermore, such resulting contract may also be examined by the City's Comptroller to assess compliance with its M/WBE Utilization Plan.
2. DSBS and DMWBD are available to assist contractors and potential contractors in determining the availability of MBEs and/or WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and/or WBEs in contracts.
3. Prospective contractors are encouraged to enter into qualified joint venture agreements with MBEs and/or WBEs as defined by Section 6-129(c)(30).
4. By submitting a bid the Contractor hereby acknowledges its understanding of the M/WBE Program requirements set forth herein, and if awarded this Contract, the Contractor hereby agrees to comply with the M/WBE Program requirements of this Contract, all of which shall be deemed to be material terms of this Contract. The Contractor hereby agrees to make all reasonable, good faith efforts to solicit and obtain the participation of MBEs and/or WBEs to meet the required Participation Goals.

G. Enforcement

1. If BNYDC determines that a bidder has, in relation to this procurement, violated the M/WBE Program requirements of this Contract, BNYDC may disqualify such bidder from competing for this Contract and BNYDC may revoke such bidder's prequalification status, if applicable.
2. Whenever BNYDC believes that the Contractor or a subcontractor is not in compliance with the M/WBE Program or its M/WBE Utilization Plan, BNYDC shall send a written notice to the Contractor describing the alleged noncompliance and offering the Contractor an opportunity to be heard. BNYDC shall then conduct an investigation to determine whether such Contractor or subcontractor is in compliance.
3. In the event that the Contractor has been found to have violated the M/WBE Program or

its M/WBE Utilization Plan, BNYDC may determine that one of the following actions should be taken:

a. entering into an agreement with the Contractor allowing the Contractor to cure the violation;

b. revoking the Contractor's pre-qualification to bid for future contracts;

c. making a finding that the Contractor is in default of the Contract;

d. terminating the Contract;

e. declaring the Contractor to be in breach of Contract;

f. withholding payment or reimbursement;

g. determining not to renew the Contract;

h. assessing actual and consequential damages;

i. assessing liquidated damages or reducing fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the M/WBE Program, or in meeting the purposes of the Contract, the costs of meeting utilization goals through additional procurements, the administrative costs of investigation and enforcement, or other factors set forth in the Contract;

j. exercising rights under the Contract to procure goods, services or construction from another contractor and charge the cost of such contract to the Contractor that has been found to be in noncompliance; or

k. taking any other appropriate remedy.

4. If the Contractor has been found to have failed to fulfill its Participation Goals contained in its M/WBE Utilization Plan or the Participation Goal as modified by BNYDC pursuant to Section B of this Exhibit N, BNYDC may assess liquidated damages in the amount of ten percent (10%) of the difference between the dollar amount of work required to be awarded to MBE and/or WBE firms to meet the Participation Goal and the dollar amount the Contractor actually awarded and paid, and/or credited, to MBE and/or WBE firms. In view of the difficulty of accurately ascertaining the loss which BNYDC will suffer by reason of Contractor's failure to meet the Participation Goal, the foregoing amount is hereby fixed and agreed as the liquidated damages that BNYDC will suffer by reason of such failure, and not as a penalty. BNYDC may deduct and retain out of any monies which may become due under this Contract the amount of any such liquidated damages; and in case the amount which may become due under this Contract shall be less than the amount of liquidated damages suffered by BNYDC, the Contractor shall be liable to pay the difference.

5. Whenever BNYDC has reason to believe that an MBE and/or WBE is not qualified for certification, or is participating in a contract in a manner that does not serve a commercially useful function (as defined in Section 6-129(c)(8)), BNYDC shall notify the Commissioner of DSBS or DMWBD, as applicable, who shall determine whether the certification of such business enterprise should be revoked.

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

6. Statements made in any instrument submitted to BNYDC pursuant to the M/WBE Program shall be submitted under penalty of perjury and any false or misleading statement or omission shall be grounds for the application of any applicable criminal and/or civil penalties for perjury. The making of a false or fraudulent statement by an MBE and/or WBE in any instrument submitted pursuant the M/WBE Program shall, in addition, be grounds for revocation of its certification.

7. The Contractor's record in implementing its M/WBE Utilization Plan shall be a factor in the evaluation of its performance. Whenever BNYDC determines that a Contractor's compliance with an M/WBE Utilization Plan has been unsatisfactory, BNYDC shall, after consultation with the BNYDC M/WBE liaison officer, file an advice of caution form for inclusion in PASSPort as caution data.

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT O

M/WBE UTILIZATION PLAN

[attached on following page]

EXHIBIT O

M/WBE Utilization Plan

(To be completed by the bidder/proposer unless granted a full waiver, which must be submitted with the bid/proposal in lieu of this form)

Project name: RESTORATION OF BOILERS AT BUILDING 62

Total MWBE Participation Goal for this Project: __30%____

PART A

Section 1: Prime Contractor Contact Information

Tax ID# _____

FMS Vendor ID# _____

Business Name_____

Business Name Contact Person _____

Business Address_____ City _____State _____ ZIP_____

Telephone _____ Email _____

Section 2: M/WBE Utilization Goal Calculation

Prime Contractor Adopting M/WBE Participation Goals

For Prime Contractors (including Qualified Joint Ventures and M/WBE firms) adopting M/WBE Participation Goals.

Total Bid/Proposal Value $ _____

multiplied by x

Total Participation Goal ___30_____% for this IFB

Calculated M/WBE Participation Amount $ _____

Section 3: Contractor M/WBE Utilization Plan

Please review the IFB for more information on how to obtain credit for M/WBE participation. Check applicable box. The Proposer or Bidder will fulfill the M/WBE Participation Goals:

☐ As an M/WBE Prime Contractor that will self-perform and/or subcontract to other M/WBE firms a portion of the contract the value of which is at least the Calculated M/WBE Participation Amount set forth in Section 2. The value of any work subcontracted to non-M/WBE firms will not be credited towards fulfillment of M/WBE Participation Goals.

Please check all that apply to Prime Contractor: ☐ MBE ☐ WBE

☐ As a Qualified Joint Venture with an M/WBE partner, in which the value of the M/WBE partner's participation and/or the value of any work subcontracted to other M/WBE firms is at least the Calculated M/WBE Participation Amount set forth in Section 2. The value of any work subcontracted to non-M/WBE firms will not be credited towards fulfillment of M/WBE Participation Goals.

☐ As a non-M/WBE Prime Contractor that will enter into subcontracts with M/WBE firms the value of which is at least the Calculated M/WBE Participation Amount set forth in Section 2.

Section 4: General Contract Information

Enter a brief description of the type(s) and dollar value of subcontracts for all services you plan to subcontract if awarded this contract, along with the anticipated start and end dates for such subcontracts. For each item, indicate whether the work is designated for participation by an M/WBE. **For all M/WBE subcontractors listed below, please also include as attachments to this M/WBE Utilization Plan, a printout of the certification by DSBS or DMWBD given to such subcontractor.**

What is the expected percentage of the total contract dollar value that you expect to award in subcontracts for services, regardless of M/WBE status? _____%

	Description of Work	Start Date	End Date	Planned	Designated for M/WBE?		Vendor Name	Address	Telephone
		(MM/YY)	(MM/YY)	$ Amount	Y	N			
1	_____	_____	_____	$_____	___	___	_____	_____	_____
2	_____	_____	_____	$_____	___	___	_____	_____	_____
3	_____	_____	_____	$_____	___	___	_____	_____	_____
4	_____	_____	_____	$_____	___	___	_____	_____	_____
5	_____	_____	_____	$_____	___	___	_____	_____	_____
6	_____	_____	_____	$_____	___	___	_____	_____	_____
7	_____	_____	_____	$_____	___	___	_____	_____	_____
8	_____	_____	_____	$_____	___	___	_____	_____	_____
9	_____	_____	_____	$_____	___	___	_____	_____	_____
10	_____	_____	_____	$_____	___	___	_____	_____	_____

Section 5: Vendor Certification and Required Affirmations

I hereby:

1. *acknowledge my understanding of the M/WBE participation requirements as set forth herein and the pertinent provisions of Section 6-129 of the Administrative Code of the City of New York ("Section 6-129"), and the rules promulgated thereunder;*
2. *affirm that the information supplied in support of this M/WBE Utilization Plan is true and correct;*
3. *agree, if awarded this Contract, to comply with the M/WBE participation requirements of this Contract, the pertinent provisions of Section 6-129, and the rules promulgated thereunder, all of which shall be deemed to be material terms of this Contract;*
4. *agree and affirm that it is a material term of this Contract that the Vendor will award the total dollar value of the M/WBE Participation Goals to certified MBEs and/or WBEs, unless a full waiver is obtained or such Goals are modified by BNYDC; and*
5. *agree and affirm, if awarded this Contract, to make all reasonable, good faith efforts to meet the M/WBE Participation Goals, or If a partial waiver is obtained or such Goals are modified by BNYDC, to meet the modified Participation Goals by soliciting and obtaining the participation of certified MBE and/or WBE firms.*

Signature _____ Date _____

Print Name _____ Title _____

REQUEST OF WAIVER OF M/WBE PARTICIPATION REQUIREMENTS

PART B – To be completed ONLY if requesting a full or partial waiver of the M/WBE Participation requirements. This waiver request must be submitted at least 7 calendar days prior to the Bid Submission Deadline.

Section 1. Contractor Contact Information

Tax ID# _____
FMS Vendor ID# _____
Business Name _____
Business Name Contact Person _____
Business Address_____ City _____State _____ ZIP_____
Telephone _____ Email _____
Bid Due Date _____

Section 2. Basis for Waiver Request

Check appropriate box & explain in detail below (attach additional pages if needed)

☐ Vendor does not subcontract services, and has the capacity and good faith intention to perform all such work itself with its own employees.

☐ Vendor subcontracts some of this type of work but at a lower % than bid/solicitation describes, and has the capacity and good faith intention to do so on this contract. Identify your subcontracting plan in Section 4, Vendor Certification below.

☐ Vendor has other legitimate business reasons for proposing the M/WBE Participation Goal requested here.

Explain below (or on additional pages, as needed)

_____

_____

_____

Section 3. Vendor Contract History

Vendor Contract History

List all contracts (for City and Non-City work) performed within the last 3 years below (attach additional pages if needed) and provide the requested information for each contract.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

From the list of all contracts, provide reference information below for the 5 most relevant contracts in size, scale and scope (performed for New York City or any other entity) to the bid or proposal for which you are submitting this waiver request. Provide the requested information for each subcontract awarded during the life of the listed reference contract.

Please make sure to highlight the 5 reference contracts provided below among the comprehensive list of all your contract awards.

Reference 1

Agency/Organization_____ Contract #_____

Reference Contact_____ Telephone_____ Email_____

Contract Start Date _____ Contract End Date_____ Total Contract Value $_____

Prime Contract description

Did the vendor perform as a Prime Contractor or as a Subcontractor? ☐ Prime Contractor ☐ Subcontractor

Was the Prime Contract subject to any Goals? ☐ City M/WBE Goals ☐ State Goals ☐ Federal Goals ☐ No Applicable Goals

Did the Prime Contractor meet Goal requirements? ☐ Yes ☐ No ☐ N/A

If the Prime Contractor did not meet Goal requirements or contract is still ongoing, please explain

If you performed as the Prime Contractor, please provide a description and value of all work subcontracted to other vendors.

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

_____ $_____

Percentage of total contract value subcontracted to other vendors _____ %

If you performed as the Subcontractor, please provide a description and value of work areas you self-performed.

_____ $

Reference 2

Agency/Organization_____ Contract #_____

Reference Contact_____ Telephone_____ Email_____

Contract Start Date _____ Contract End Date_____ Total Contract Value $_____

Prime Contract description

Did the vendor perform as a Prime Contractor or as a Subcontractor? ☐ Prime Contractor ☐ Subcontractor

Was the Prime Contract subject to any Goals? ☐ City M/WBE Goals ☐ State Goals ☐ Federal Goals ☐ No Applicable Goals

Did the Prime Contractor meet Goal requirements? ☐ Yes ☐ No ☐ N/A

If the Prime Contractor did not meet Goal requirements or contract is still ongoing, please explain

If you performed as the Prime Contractor,

_____ $_____

_____ $

_____

_____

_____

please provide a description and value of all work subcontracted to other vendors.

_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____

Percentage of total contract value subcontracted to other vendors _____ %

If you performed as the Subcontractor, please provide a description and value of work areas you self-performed.

_____ $_____

Reference 3

Agency/Organization_____ Contract #_____

Reference Contact_____ Telephone_____ Email_____

Contract Start Date _____ Contract End Date_____ Total Contract Value $_____

Prime Contract description

Did the vendor perform as a Prime Contractor or as a Subcontractor? ☐ Prime Contractor ☐ Subcontractor

Was the Prime Contract subject to any Goals? ☐ City M/WBE Goals ☐ State Goals ☐ Federal Goals ☐ No Applicable Goals

Did the Prime Contractor meet Goal requirements? ☐ Yes ☐ No ☐ N/A

If the Prime Contractor did not meet Goal requirements or contract is still ongoing, please explain

If you performed as the Prime Contractor, please provide a description and value of all work subcontracted to other vendors.

_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____
_____ $_____

Percentage of total contract value subcontracted to other vendors _____ %

If you performed as the Subcontractor, please provide a description and value of work areas you self-performed.

_____ $ _____

Reference 4

Agency/Organization _____ Contract # _____

Reference Contact _____ Telephone _____ Email _____

Contract Start Date _____ Contract End Date _____ Total Contract Value $ _____

Prime Contract description

Did the vendor perform as a Prime Contractor or as a Subcontractor? ☐ Prime Contractor ☐ Subcontractor

Was the Prime Contract subject to any Goals? ☐ City M/WBE Goals ☐ State Goals ☐ Federal Goals ☐ No Applicable Goals

Did the Prime Contractor meet Goal requirements? ☐ Yes ☐ No ☐ N/A

If the Prime Contractor did not meet Goal requirements or contract is still ongoing, please explain

If you performed as the Prime Contractor, please provide a description and value of all work subcontracted to other vendors.

_____ $ _____

_____ $ _____

_____ $ _____

_____ $ _____

_____ $ _____

_____ $ _____

Percentage of total contract value subcontracted to other vendors _____ %

If you performed as the Subcontractor, please provide a description and value of work areas you self-performed.

$ _____

Reference 5

Agency/Organization _____ Contract # _____

Reference Contact _____ Telephone _____ Email _____

Contract Start Date _____ Contract End Date _____ Total Contract Value $ _____

Prime Contract description

Did the vendor perform as a Prime Contractor or as a Subcontractor? ☐ Prime Contractor ☐ Subcontractor

Was the Prime Contract subject to any Goals? ☐ City M/WBE Goals ☐ State Goals ☐ Federal Goals ☐ No Applicable Goals

Did the Prime Contractor meet Goal requirements? ☐ Yes ☐ No ☐ N/A

If the Prime Contractor did not meet Goal requirements or contract is still ongoing, please explain

If you performed as the Prime Contractor, please provide a

_____ $ _____

_____ $ _____

_____ $

description and value of all work subcontracted to other vendors.		$
		$
		$
	Percentage of total contract value subcontracted to other vendors	%

If you performed as the Subcontractor, please provide a description and value of work areas you self-performed.

_____ $_____

Section 4. Vendor Certification

Identify/list all the work areas you intend on subcontracting on the current anticipated contract for which you are submitting this waiver request.

I hereby affirm that the information supplied in support of this waiver request is true and correct, and that this request is made in good faith. I further affirm that the work that I did not list as work that will be subcontracted on this contract for which I am submitting this waiver request is work that I have performed on past contracts and will not subcontract if awarded this contract.

Signature_____

Date_____

Print Name_____ Title_____

Brooklyn Navy Yard
Development Corporation
BrooklynNavyYard.org

Building 77
141 Flushing Ave, Suite 801
Brooklyn, NY 11205

EXHIBIT P

CONFIRMATION OF DOL CONTRACTOR REGISTRATION COMPLIANCE FORM

In connection with Section 220-I of the Labor Law, Bidders must provide a copy of their and their contractors' (if applicable) Certificate of Registration(s) from the DOL.

☐ By checking this box, Bidder hereby certifies that Bidder and its subcontractors (if applicable) are registered with the DOL and have received Certificate(s) of Registration. Such certificate(s) are attached hereto.

More information about the required materials for registration can be found here: https://dol.ny.gov/what-you-need-register-contractor-and-subcontractor-registry?utm_medium=email&utm_source=govdelivery

More information about how to register can be found here: https://dol.ny.gov/how-register-contractor-and-subcontractor-registry?utm_medium=email&utm_source=govdelivery

More information on how to acquire your certificate of registration can be found here: https://dol.ny.gov/after-you-register-contractor-and-subcontractor-registry?utm_medium=email&utm_source=govdelivery