NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
REQUEST FOR PROPOSALS
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

REQUEST FOR PROPOSALS

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT FDC RESILIENCY
REQUEST FOR PROPOSALS
FOR THE PROVISION OF DESIGN ENGINEERING SERVICES
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PART I
INTRODUCTION

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
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PART I
INTRODUCTION

1. INVITATION TO SUBMIT PROPOSAL

NYCEDC is pleased to invite you to submit a proposal in response to this Request for Proposals ("RFP"). The Services to be performed, the Project and the Project Site are outlined in the RFP Summary below (Part I, Section 2), along with such other information as the anticipated dates for the execution of a Contract with the Consultant, if one is selected pursuant to this RFP, and the anticipated Contract Term. All undefined capitalized terms set forth in this RFP shall have the same definitions as set forth in Appendix A to Part III of the draft Contract (the "Contract Draft") annexed to this RFP as Exhibit 6.

Subject to the availability of funds and the responses to this RFP, NYCEDC may select one or more Consultant(s) to provide the Services. The Consultant(s) shall be experienced in all aspects of the Services. The Consultant(s) will commence the Services upon a written Notice to Proceed from NYCEDC or upon execution of the Contract by the Consultant(s) and NYCEDC substantially in the form of the Contract Draft. The Contract Draft is an initial draft subject to further review and revision by NYCEDC prior to execution. NYCEDC shall not be bound to the terms of any aspect of the Contract Draft, and the final acceptance of any successful proposal shall be subject to, and contingent upon, the negotiation between the parties of a Contract in form and substance acceptable to NYCEDC. Nevertheless, **you should review the Contract Draft and be familiar with all of the terms and conditions set forth therein prior to submitting your proposal.**

2. RFP SUMMARY

2.1 **In General.** This summary of terms, deadlines and requirements specific to this RFP is set forth for your immediate reference and convenience only. It does not set forth all of the requirements of this RFP, but should be read in conjunction with the General Requirements (Part II) and the Specific Requirements (Part III) of this RFP. You should review and become familiar with all parts of this RFP prior to submitting your proposal.

2.2 **Specific Terms, Deadlines and Requirements.**

2.2.1 **Project Information**.

2.2.1.1 **The Project:** Hunts Point Energy Resiliency Project

2.2.1.2 **The Project Sites:** 600 Food Center Drive; 550 Food Center Drive; 400 Food Center Drive; Hunts Point Site D; 730 Bryant Avenue, Bronx, NY 10474; 1290 Spofford Avenue, Bronx, NY 10474

2.2.1.3 **Type of Services:** Design Engineering Services(the "**Services**"), as more specifically described in the Scope of Services (Appendix B of the Contract Draft)

2.2.2 **The Consultant(s)**:

2.2.2.1 **Type:** Design Engineer

2.2.2.2 **The Consultant Team:** It is anticipated that the Consultant will lead a team of consultants (collectively, with the Consultant, the "**Consultant Team**") in providing the Services. The members of the Consultant's staff and/or the Consultant's Subcontractors on the Consultant Team are expected to include, without limitation, the following:

2.2.2.2.1 **Required Consultant Team Members:**

2.2.2.2.1.1 Electrical Engineer

2.2.2.2.1.2 Mechanical Engineer

2.2.2.2.1.3 Geotechnical Engineer

2.2.2.2.1.4 Structural Engineer

2.2.2.2.1.5 Economic Analyst

2.2.2.2.1.6 Cost Estimator

2.2.2.2.1.7 Civil Engineer

2.2.2.2.2 **Other Possible Consultant Team Members**

2.2.2.2.2.1 Value Engineer

2.2.2.2.2.2 Permit Specialist

2.2.2.3 **Experience Required:** The Consultant shall be experienced in the following:

2.2.2.3.1 The Consultant shall have experience managing projects similar to the Project within the five years immediately preceding this RFP

2.2.3 **Contract Information**.

2.2.3.1 **Anticipated Contract Execution Date:** July 2019

2.2.3.2 **Anticipated Contract Term**: Three (3) years

2.2.4 **Questions Regarding RFP.**

2.2.4.1 **Question/Clarification Deadline:**

(i) Date: April 29, 2019

(ii) Time: 5:00 PM

2.2.4.2 **Permitted Method:** At Pre-Proposal Meeting, if one is conducted; otherwise in writing to Recipient at Recipient's Mailing Address or Email Address as listed in Section 2.2.6 below only**.**

2.2.4.3 **Question Response Date:** May 13, 2019

2.2.4.4 **Answers to Questions Available at www.nycedc.com** (the "**Website**")

2.2.5 **Pre-Proposal Meeting.**

2.2.5.1 **Date:** April 22, 2019

2.2.5.2 **Time:** 3:00 PM

2.2.5.3 **Meeting Place**:110 William Street, New York, NY 10038 (Report to reception on 6th Floor)

2.2.5.4 **Confirmation Contact:** Email address as listed in Section 2.2.6 below

2.2.5.5 **Attendance Mandatory:** No

2.2.6 **Proposal Submission Requirements.**

2.2.6.1 **Label on Envelope:**

2.2.6.1.1 **One for the Proposal Only: "Proposal for Design Engineering Services for Hunts Point Energy Resiliency Project"**

2.2.6.1.2 **One for Prices Only: "Price Proposals for Design Engineering Services for Hunts Point Energy Resiliency Project"**

2.2.6.1.3 **One for the <u>Doing Business Data Form Only</u>:** "**Doing Business Data Form Design Engineering Services for Hunts Point Energy Resiliency Project"**

2.2.6.1.4 **One for <u>M/WBE Forms Only</u>, if required by Part I, Section 2.2.7: "M/WBE Forms Design Engineering Services for Hunts Point Energy Resiliency Project**

2.2.6.2 **Number of Sets of Proposals to be submitted: Three (3) hard copies and two (2) electronic versions (on CD or USB Flash Drive)**

2.2.6.3 **Submission Deadline:**

(i) Date: June 6, 2019

(ii) Time: 4:00 PM

2.2.6.4 **Method:** By Hand or Express Mail or other nationally-known overnight courier

2.2.6.5 **Submit to the following Recipient:**

Maryann Catalano
Chief Contracting Officer

2.2.6.6 **Recipient's Mailing Address:**

NYCEDC
110 William Street, 4th Floor
New York, NY 10038

2.2.6.7 **Recipient's E-mail address: huntspointenergy**@edc.nyc

2.2.7 **<u>M/WBE Participation Goal</u>.** 20-30%

2.2.8 **<u>Selection Criteria</u>.** NYCEDC will base its selection upon the following criteria:

30% The respondent's and, as applicable, the proposed Consultant Team's experience in providing services similar to the Scope of Services described herein; the quality of the respondent's management, reputation and references; the terms under which the respondent will commit its personnel; the quality of the proposed Consultant Team; favorable history, if any, in contracting or doing business with the City and/or NYCEDC

25% The quality of the proposal and the degree to which it demonstrates the respondent's full understanding of and the ability to perform the Services

to be rendered; the content of the proposal demonstrating the respondent's full understanding of the Project schedule and budget.

30% The proposed fee and cost schedules

15% The Respondent's proposed plans for encouraging participation by minority and women-owned business enterprises in connection with the Services including, as applicable, the respondent's M/W/DBE Subcontractors Participation Plan or M/WBE Narrative Form.

2.2.9 **Outside Funding Source** The payments to be made to the Consultant by the Corporation pursuant to this Contract will be made from funds identified below and in accordance with the provisions of the Contract Draft.

2.2.9.1 Type of Funds: Disaster Relief Appropriations Act of 2013 (Public Law 113-2), Communitity Development Block Grant Disaster Recovery ("CDBG-DR") program codified at 42 U.S.C. § 5172

2.2.9.2 Funding Agencies: U.S. Department of Housing and Urban Development ("HUD")

2.2.9.3 Applicable Requirements: See Appendix J of the Exhibit 6 Draft Contract

2.2.9.4 Applicable Agreements: See Appendix K of the Exhibit 6 Draft Contract

2.2.9.5 Certifications Required: See Exhibit 5 of this RFP

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PART II
GENERAL REQUIREMENTS

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PART II
GENERAL REQUIREMENTS

1. SERVICES TO BE PERFORMED AND WORK PRODUCT

The Consultant shall perform all work and services and deliver all of the Work Product specifically described in and required by the Scope of Services annexed as Appendix B in Part III of the Contract Draft. **Prior to submitting your proposal, please be sure that you review and fully understand the Scope of Services.**

2. STAFFING

2.1 **Personnel**. The Consultant shall, at its own expense, employ all personnel and retain all Subcontractors (including the subconsultants on the Consultant Team, if any) as may be required to perform the Services, and shall be solely responsible for their work, compensation, direction and conduct during the Contract Term. The Consultant and its Subcontractors will be expected to cooperate fully with NYCEDC personnel. The respondent shall submit with its proposal resumes of its personnel and those of its Subcontractors who will perform the Services. The respondent, if selected, will be expected to use substantially the same personnel and Subcontractors described in the proposal to perform the Services. All personnel furnished by the Consultant as required under the Contract shall be employees or approved Subcontractors of the Consultant and not of NYCEDC or the City.

2.2 **Subcontractors**. If the Consultant is authorized under the Contract to enter into subcontracts for specialized services as required for performance of the Services, such authorization shall be subject to the prior written approval by NYCEDC of the Subcontractor (other than members of the Consultant Team which have been previously approved), the scope of services, compensation, and the principal responsible for supervising the performance of the Subcontractor's activities. The Consultant, and not NYCEDC, will be responsible for the Subcontractor's work, acts and omissions. Respondents are directed to Article 4 of the Contract Draft for further information as to the requirements regarding subcontracting under the Contract.

2.3 **Person in Charge**. In its proposal, respondent shall identify the member of the respondent's staff who will have primary responsibility to perform and/or supervise and coordinate the performance of the Services.

3. COMPENSATION

Subject to and in accordance with the final terms of the Contract, NYCEDC shall compensate the selected Consultant as follows:

3.1 **In General.** Under the Contract, NYCEDC will agree to pay to the Consultant an amount not to exceed a Maximum Contract Price to be negotiated between NYCEDC and the Consultant based upon its response to this RFP. The Maximum Contract Price shall be the maximum compensation for all of the Services provided by the Consultant pursuant to the Contract and all expenses of the Consultant in connection therewith, including costs of any Subcontractors. The Maximum Contract Price shall be payable as provided for in Sections 2.1 and 2.2 of the General Terms and Conditions (Part II) of the Contract and Appendix C (Part III of the Contract).

3.2 **Payments.** In order to receive payment for Services, the Consultant will be required to submit a Requisition setting forth in detail, for the period for which payment is requested, the Services actually rendered during that period and the amount of payment requested and due therefor. Requisitions may not be submitted more than once per month. All Requisitions shall be subject to NYCEDC's review, verification and approval, and all payments shall be conditioned upon NYCEDC's determination that all Services have been performed satisfactorily and in accordance with the terms of the Contract.

3.3 **Sales and Use Tax.** NYCEDC is exempt from state and local sales and use tax. SUCH TAX IS NOT TO BE INCLUDED IN PROPOSALS or in invoices submitted under the Contract. NYCEDC will provide the selected Consultant with an appropriate "sales and use tax exemption certificate".

4. MINORITY AND WOMEN-OWNED BUSINESS ENTERPRISE PARTICIPATION

4.1 **M/WBE Program**. Local Law No. 129 of 2005 added and Local Law 1 of 2013 amended Section 6-129 of the Administrative Code of the City of New York (hereinafter "Section 6-129"). Section 6-129 establishes a program for participation in City procurement by minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs", together with "MBEs" collectively referred to as "M/WBEs"), certified in accordance with Section 1304 of the City Charter. As stated in the 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. NYCEDC endorses these goals and has adopted an M/WBE Program to further participation by MBEs and WBEs in the provision of the Services. All respondents shall comply with all requirements of the Corporation's M/WBE Program applicable to this RFP.

4.2 **Minority and Women -Owned Business Enterprises**. M/WBE firms must be certified by DSBS to credit such firms' participation toward attainment of the Participation Goals. Such certification must occur prior to the firms' commencement of work. A list of M/WBE firms may be obtained 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. Eligible firms that have not yet been certified may contact DSBS in order to seek certification by visiting www.nyc.gov/getcertified, emailing MWBE@sbs.nyc.gov, or calling the DSBS certification helpline at (212) 513-6311. No credit shall be given for participation by a graduate M/WBE, as defined in Section 6-129(c)(20).

4.3 **M/WBE Participation Goal**.

4.3.1 The Participation Goal for the Contract is set forth in Part 2.2.7. 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 as MBEs or WBEs, and/or by crediting the participation of the respondent as provided in Section 4.3.4 below.

4.3.2 The Participation Goal is expressed as a range, the lower bound of which will be the minimal participation goal for which NYCEDC will award points in the selection criteria. The high percentage in the range represents the optimum participation goal. Respondents submitting proposals with a Participation Goal lower than the minimal participation goal shall receive a score of zero (0) for selection criteria. The M/WBE selection criteria accounts for 15% of respondent's total score.

4.3.3 The Participation Goal is a material term of the Contract and the selected Consultant shall be subject to the NYCEDC approved Participation Goal.

4.3.4 An M/WBE respondent shall be permitted to count its own participation toward fulfillment of the Participation Goal. A respondent may not subcontract more than 50% of the total value of the Contract unless it is working under a retainer contract or a construction management contract. The value of an M/WBE respondent's participation shall be determined by subtracting from the total value of the Contract any amounts that the respondent will pay to direct Subcontractors. If a respondent is not an M/WBE, it must meet the Participation Goal through the awarding of subcontracts to firms certified with DSBS as MBEs or WBEs. If a respondent is in the process of being certified by DSBS, the respondent should submit, as part of its proposal, the following information to attest minority or women ownership:

4.3.4.1 Copy of the application submitted to DSBS;

4.3.4.2 Email confirmation of application submittal;

4.3.4.3 DSBS Application processing number;

4.3.4.4 Contact information of DSBS analyst processing application;

4.3.4.5 List of recent experience that shows business presence in New York City;

4.3.4.6 Current letter of certification from one of the following:

4.3.4.6.1 New York City School Construction Authority

4.3.4.6.2 The Port Authority of New York and New Jersey

4.3.4.6.3 Women Presidents' Educational Organization

4.3.4.6.4 New York and New Jersey Minority Supplier Development Council

4.3.4.6.5 New York State Department of Economic Development, Division of Minority and Women's Business Development

4.3.5 A respondent that is a Qualified Joint Venture shall be permitted to count a percentage of its own M/WBE participation toward fulfillment of the Participation Goal. The value of the Qualified Joint Venture's participation shall be determined by first subtracting from the total value of the Contract, any amounts that the Qualified Joint Venture will pay to direct Subcontractors. Thereafter, the M/WBE percentage of the Qualified Joint Venture shall be applied to the remaining value of the Contract to determine the overall Participation Goal.

4.4 **M/WBE Proposal Submission Forms**

4.4.1 If Part I, Section 2.2.7 sets forth a Participation Goal, then the respondent must complete and submit as part of its proposal a subcontractors participation plan (the "Subcontractors Participation Plan") and an Intent to Perform as Subcontractor form (the "ITP Form") in the form annexed at Exhibit 4 to this RFP. The respondent's Subcontractors Participation Plan must set forth:

4.4.1.1 the proposed Participation Goal;

4.4.1.2 whether the Respondent is an MBE, WBE or qualified joint venture;

4.4.1.3 the percentage of work it intends to award to direct Subcontractors

4.4.1.4 the identity of all proposed M/WBE Subcontractors to which the respondent intends to award subcontracts;

4.4.1.5 a description of the type and dollar value of work designated for participation by M/WBEs; and

4.4.1.6 the time frames in which such work by M/WBEs is scheduled to begin and end.

4.4.2 Each Subcontractor listed in the respondent's Subcontractor Participation Plan must complete an ITP Form, which the respondent must include with its proposal.

4.4.3 The Subcontractors Participation Plan, as approved by the Corporation, shall be annexed to and made part of the Contract.

4.4.4 In the event that the Corporation does not approve a Subcontractor proposed by the Consultant, the Consultant shall have a reasonable time to propose alternate Subcontractors.

4.5 **Qualified Joint Ventures**. Respondents are encouraged to enter into joint ventures with MBEs and WBEs. Respondents who submit a proposal as a Joint Venture must include a copy of the Joint Venture agreement. Only Qualified Joint Ventures may be permitted to count its own participation toward fulfilling the Participation Goal as set forth in in Part 2.2.7.

4.6 **Subcontractor Payment Tracking. Subcontractor Payment Tracking**. NYCEDC requires contractors and consultants to track subcontractor award and payment information online through the Compliance Tracking System ("CTS"). Prime contractors and consultants are responsible for entering contact and award information on all subcontractors associated with the project, and ensuring that any direct subcontractors do the same for second-tier subcontractors they are using on the project. When prime contractors/consultants receive payments from NYCEDC, they will receive a system-generated notification prompting them to access CTS and enter information on how much of that payment was retained, the amounts paid to each subcontractor and the dates of payment. Prime contractors/consultants have seven (7) business days from receipt of this notification to enter the required information in the CTS. In addition, any changes to subcontractors and award amounts must be tracked in the CTS.

The CTS can be access at the following link: https://nycedc.mwdbe.com.

4.7 **Violations by Respondents to RFPs**. If the Corporation determines that a respondent has violated the requirements of the Corporation's M/WBE Program, then the Corporation may disqualify the respondent from competing for the Contract and may remove the respondent from the list of qualified consultants maintained by the Corporation.

4.8 **Statements**. Statements made in any instrument submitted to the Corporation in connection with the Corporation's M/WBE Program or the M/WBE requirements applicable to this RFP or the Contract 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.

4.9 **Other M/WBE Requirements**. Article 9 of the General Terms and Conditions (Part II) of the Contract Draft contains additional provisions related to the Corporation's M/WBE Program regarding, without limitation, reporting, change orders, modifications to Subcontractors Participation Plans, compliance audits, enforcement and evaluations. **Please be sure that you review and understand all of the requirements of the Corporation's M/WBE Program applicable to this RFP and the Contract prior to submitting your proposal.**

5. DOING BUSINESS DATA FORM REQUIREMENTS.

5.1 Pursuant to the City's Local Law No. 34 ("**LL34**"), 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 LL34.

5.2 In order for the City to obtain information necessary to establish the required

database, each respondent must complete a Doing Business Data Form in the form available at the Website and described in Exhibit 3 and return it in a separate envelope with the respondent's proposal.

5.3 The submission of a Doing Business Data Form that is not accurate and complete may result in appropriate sanctions. Respondents are encouraged to consult legal counsel with respect to the impact of LL34. Respondents may also wish to review the document "Q&A: The Doing Business Data Form and the Doing Business Database" available at the Website and described in for further information. Note that responding to this RFP constitutes "doing business with the city" under LL34.

6. CONTRACT CONDITIONS

6.1 **In General.** The acceptance of any proposal shall be subject to, and contingent upon, the execution by NYCEDC of a Contract substantially in the form of the Contract Draft annexed hereto. NYCEDC shall not be bound to the terms of the Contract Draft but shall use such form as a basis of negotiating a final Contract with the selected Consultant, if any. **However, please note that the General Terms and Conditions (Part II) and the Appendices (Part III), other than Appendix B and Appendix C, are NOT NEGOTIABLE.**

6.2 **Specific Terms.** The Contract shall contain, among other terms, certain provisions required by law, by policies of the City, and the City Contract including, without limitation, the following:

6.2.1 Executive Order 50 Supply and Service Rider - attached as Appendix F in Part III of the Contract. This rider contains equal opportunity requirements mandated under Executive Order No. 50 (1980).

6.2.2 Provisions providing that the Consultant:

6.2.2.1 is an independent contractor and that neither it nor any of its employees is or shall be an agent, servant or employee of the City or NYCEDC;

6.2.2.2 shall defend, indemnify and hold harmless the City and NYCEDC against any claims or damages relating to its acts and omissions;

6.2.2.3 shall maintain financial and other records relating to the Contract, including, without limitation, payroll records, for a period of six (6) years from the end of the Contract Term, and shall make such records available for inspection and audit;

6.2.2.4 has no conflicts of interest with, or outstanding financial obligations owing to, the City;

6.2.2.5 maintains insurance as specified in Article 6 of the General Terms and Conditions (Part II) of the Contract and Appendix E of Part III of the Contract with insurers licensed or authorized to provide insurance and in good standing in the State of New York, such policies to be in a form acceptable to, and include any

conditions reasonably required by NYCEDC, and naming NYCEDC and the City as additional insureds;

6.2.2.6 is licensed to conduct business in the State of New York;

6.2.2.7 shall comply with the City's requirements regarding vendor background investigations, which include a review by the City's Department of Investigation of the City's past experience with the Consultant;

6.2.2.8 shall register with the New York City Mayor's Office of Contract Services' Procurement and Sourcing Solutions Portal ("PASSPort") and complete a vendor enrollment package (collectively, the "Background Clearance Package");

6.2.2.9 shall complete and submit the Doing Business Data Forms;

6.2.2.10 shall represent and warrant that neither it nor any of its directors, officers, members, or employees has any interest, nor shall they acquire any interest, directly or indirectly, which would conflict in any manner or degree with the performance of the Services as set forth in the Contract. The Consultant must further agree that it shall employ no person having such a conflict of interest in the performance of the Services;

6.2.2.11 shall agree to New York County as the venue in any legal action or proceeding between the Consultant and NYCEDC;

6.2.2.12 acknowledges that the Contract shall be assignable to the City;

6.2.2.13 shall comply with the City's prohibition of certain business practices with respect to Northern Ireland;

6.2.2.14 shall comply with the City's prohibition of certain business practices with respect to Iran; and

6.2.2.15 shall comply with the City's Whistleblower protections.

Respondents are directed to the Contract Draft (Exhibit 6 to this RFP) for the exact language of the provisions referred to in the foregoing paragraphs.

7. GENERAL CONDITIONS, TERMS, LIMITATIONS AND REQUIREMENTS

7.1 **Proposal as Offer to Contract.** Unless a specific exception is noted, submission of a proposal in response to this RFP shall constitute an offer on the part of the successful respondent to execute the Contract substantially in the form annexed hereto as Exhibit 5. Any supporting documents or other items attached as exhibits to this RFP shall be incorporated into the Contract. The successful respondent shall cooperate in supplying any information as may be required with respect to the Background Clearance Package, which is available on the PASSPort

website at http://www1.nyc.gov/site/passport/index.page (the "PASSPort Website"), and any other government review and approval forms. Respondent's proposal shall remain open for acceptance by NYCEDC and shall remain firm and binding upon the respondent for at least sixty (60) days after the date on which the proposals are received by NYCEDC, except that NYCEDC may by written notice to the respondent extend that date for an additional forty-five (45) days.

7.2 **News Releases.** Recipients of this RFP shall make no news or press release pertaining to this RFP or anything contained or referenced herein without prior written approval from NYCEDC. All news and press releases pertaining to this RFP must be made in coordination with NYCEDC.

7.3 **Investigations/Derogatory Information.** The respondent, the members of its Consultant Team, and all officers, principals, principal shareholders, partners and members thereof, if applicable, must complete a background questionnaire and shall be subject to investigation by NYCEDC and the City's Department of Investigation. The selection of a respondent may be rejected or revoked, or the Contract, if awarded, terminated for cause, in NYCEDC's sole discretion, in the event any materially derogatory information is revealed by such investigation or otherwise including, without limitation, that any such persons or any other persons substantially involved in the respondent's activities has committed any of the acts or omissions specified as the grounds for debarment in the City's *Procurement Policy Board Rules*.

7.4 **Freedom of Information Law**. All proposals submitted to NYCEDC in response to this RFP may be disclosed in accordance with the standards specified in the Freedom of Information Law, Article 6 of the Public Officers Law of the State of New York ("FOIL"). A respondent may provide in writing, at the time of its submission, a detailed description of the specific information contained in its submission which it has determined is a trade secret and which, if disclosed, would substantially harm such entity's competitive position. This characterization shall not be determinative, but will be considered by NYCEDC when evaluating the applicability of any exemptions in response to a FOIL request.

7.5 **Costs.** NYCEDC shall not be liable for any cost incurred by the respondent in the preparation of its proposal or for any work or services performed by the respondent prior to the execution and delivery of the Contract. NYCEDC is not obligated to pay any costs, expenses, damages or losses incurred by any respondent at any time unless NYCEDC has expressly agreed to do so in writing.

7.6 **NYCEDC Rights.** This is a "Request for Proposals" and **not** a "Request for Bids". NYCEDC shall be the sole judge of whether a proposal conforms to the requirements of this RFP and of the merits and acceptability of the individual proposals. Notwithstanding anything to the contrary contained herein, NYCEDC reserves the right to take any of the following actions in connection with this RFP: amend, modify or withdraw this RFP; waive any requirements of this RFP; require supplemental statements and information from any respondents to this RFP, including, if the proposer is a joint venture, a copy of a joint venture agreement; award a contract to as many or as few or none of the respondents as NYCEDC may select; accept or reject any or all proposals received in response to this RFP; extend the deadline

for submission of proposals; negotiate or hold discussions with one or more of the respondents; permit the correction of deficient proposals that do not completely conform with this RFP; waive any conditions or modify any provisions of this RFP; reject any or all proposals and cancel this RFP, in whole or in part, for any reason or no reason, in NYCEDC's sole discretion. NYCEDC may exercise any such rights at any time, without notice to any respondent or other parties and without liability to any respondent or other parties for their costs, expenses or other obligations incurred in the preparation of a proposal or otherwise. All proposals become the property of NYCEDC.

7.7 **Applicable Law.** This RFP and any Contract, Subcontract or any other agreement resulting herefrom are subject to all applicable laws, rules, regulations and executive orders, policies, procedures and ordinances of all Federal, State and City authorities, as the same may be amended from time to time, including without limitation, equal employment opportunity laws.

7.8 **Modifications and Questions.**

7.8.1 NYCEDC will advise RFP respondents of any modifications to this RFP by posting them on the Website. (See Part I, Section 2.2.4.4.) Nothing stated at any time by any representative of NYCEDC or of any other entity shall effect a change in, or constitute a modification to this RFP unless posted on the Website or confirmed in writing by NYCEDC.

7.8.2 Respondents may submit questions and/or request clarifications from NYCEDC by submitting them ***in writing*** to the Recipient at the Recipient's Mailing Address or E-Mail Address listed in the RFP Summary (Part I, Section 2.2.6). All questions and requests for clarifications must be submitted no later than the Question/Clarification Deadline listed in the RFP Summary (Part I, Section 2.2.4.1). Any questions or requests for clarifications received after this date will not be answered. All questions received through the Question/Clarification Deadline will be answered no later than the Question Response Date listed in the RFP Summary (Part I, Section 2.2.4.3), and NYCEDC shall post such answers on the Website, so as to be available to all respondents, if NYCEDC determines that such answers provide material clarification to the RFP.

7.8.3 Respondents are reminded to check the Website periodically to view updated information and answers to questions posed by other respondents.

7.8.4 While NYCEDC may send Notices, addenda or other information related to this RFP to respondents via e-mail alerts or otherwise in writing, such e-mail alerts and other written materials shall be considered courtesy copies only. In the event any conflict exists between any information set forth on the Website and any Notice, addendum or other information provided to a respondent by NYCEDC in writing via e-mail or otherwise, the information set forth on the Website will govern and be definitive. NYCEDC is not obligated to provide the respondent with any Notices, addendum or other information that appears on the Website in writing, and the fact that NYCEDC may have sent one or more e-mails, Notices, addenda or other written information to a respondent shall not be deemed to imply that NYCEDC has any duty or obligation to continue to do so.

7.9 **City Not a Party**. The City is not a party to this RFP, has made no representation to any prospective respondent and shall have no liability whatsoever in connection with this RFP.

7.10 **Brokerage Fees or Commissions**. The City and NYCEDC shall not be obligated to pay any fee, cost or expense for brokerage commissions or finder's fees with respect to the execution of the Contract. The respondent agrees to pay the commission or other compensation due to any broker or finder in connection with the Contract, and to indemnify and hold harmless the City and NYCEDC from any obligation, liability, cost and/or expense incurred by the City or NYCEDC as a result of any claim for commission or compensation brought by any broker or finder in connection with the Contract.

7.11 **Proposals From Principals.** Only proposals from principals and authorized officers will be considered responsive.

7.12 **Disclaimer**. NYCEDC and the City, and their respective officers, directors, agents, members and employees make no representation or warranty and assume no responsibility for the accuracy of the information set forth in this RFP. Further, NYCEDC and the City do not warrant or make any representations as to the quality, content, accuracy or completeness of the information, text, graphics, links or any other facet of this RFP once it has been downloaded or printed from this or any server, and hereby disclaim any liability for any technical errors or difficulties of any nature that may arise in connection with the Website on which this RFP is posted, or in connection with any other electronic medium utilized by respondents or potential respondents in connection with or otherwise related to the RFP.

7.13 **Protest Procedures**. The procedures set forth in this section shall apply to all protests (collectively, "Protests" and each individually, a "Protest") related to this procurement. NYCEDC will not entertain any Protest that is untimely or fails in any manner to comply fully with the procedures set forth in this section.

7.13.1 Types of Protests. There are three types of procurement Protests:

7.13.1.1 Pre-Proposal Protest: A protest submitted prior to the Submission Deadline to challenge the notice procedures followed by the Corporation;

7.13.1.2 Pre-Award Protest: A protest submitted after the Submission Deadline but before Contract execution; and

7.13.1.3 Post-Award Protest: A protest submitted after the Contract has been executed, but only to the extent that the protest is based on newly discovered information that was not available prior to execution of a Contract.

7.13.2 Submission of Protests/Deadlines. All Protests must be in writing and must be submitted in accordance with the following timeline for the following types of Protests:

7.13.2.1 A Pre-Proposal Protest must be submitted at least two (2) business days prior to the Submission Deadline set forth in Part I, Section 2.2.6.3 of the RFP;

7.13.2.2 A Pre-Award Protest must be submitted five (5) business days from the later of receipt of Notice of the Corporation's contingent award of the Contract and the date proposals are made publicly available; and

7.13.2.3 A Post-Award Protest must be submitted five (5) working days from the date the protesting party knew or should have known the newly discovered evidence that serves as the grounds of its Protest.

A Protest will be considered submitted when the Protest is received by the Corporation.

7.13.3 Contents of Protest: The Protest should include, without limitation, the following information:

7.13.3.1 name, address and telephone number of the protester;

7.13.3.2 appropriate identification of the procurement, including the Contract Number;

7.13.3.3 statement of the basis of the Protest;

7.13.3.4 supporting exhibits and documentary evidence to substantiate the grounds for the Protest; and

7.13.3.5 form of relief requested.

7.13.4 Address for Submission of Protests:

NYCEDC
110 William Street
New York, NY 10038
Attention: Maryann Catalano, Chief Contracting Officer

7.13.5 Method of Submission: By Hand or U.S. Mail

7.13.6 Envelope: The envelope enclosing the Protest must be clearly labeled "PROTEST" and must list the contract number to which the Protest relates.

7.13.7 Additional Information: The Corporation may request that the protestor submit additional information that it may need in order to consider the Protest. Any additional information requested by the Corporation must be submitted within the time period established by the Corporation in order to expedite consideration of the Protest. Failure of the protester to comply with a request for information within the specified time period will result in a resolution of the Protest without consideration of any information subsequently submitted by the protester in an untimely manner.

7.13.8 Determinations. The President or his/her designee has the authority to make a final determination. The Corporation will respond to each substantive issue in the Protest. The Corporation may, in its sole discretion, meet with the protesting respondent and any

affected party to discuss the Protest. The Corporation shall have the right to take such appropriate action as may be in the best interests of the Corporation and the City in light of the determination.

The Corporation's determination shall be final. The respondent shall have been deemed to have received NYCEDC's determination notice no later than five (5) days from the date of mailing or upon delivery, if delivered by hand of NYCEDC's determination.

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HUNTS POINT ENERGY RESILIENCY DESIGN
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PART III
SPECIFIC REQUIREMENTS

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
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PART III
SPECIFIC REQUIREMENTS

1. STRUCTURE AND CONTENT.

In order to be considered responsive, your proposal must be organized and include all of the items as listed below. If Part I, Section 2.2.7 indicates that:

- M/WBE Participation Goals **are not** applicable to this RFP, the proposal must be submitted in **three (3) sealed envelopes**

- M/WBE Participation Goals **are** applicable to this RFP, the proposal must be submitted in **four (4) sealed envelopes**.

The contents of the envelopes must be as follows:

1.1 **Envelope # 1 [Required for All Proposals].** In one sealed envelope, labeled as required by Part I, Section 2.2.6.1.1 place the following:

1.1.1 Respondent's Proposal Certification Form, attached hereto at Exhibit 1.

1.1.2 If applicable, Respondent's Outside Funding Certifications attached hereto at Exhibit 5.

1.1.3 A statement of your approach to the Services that clearly demonstrates your understanding of the Scope of Services and your ability to manage and complete multiple projects in a timely and cost-efficient manner. The proposal must include a detailed statement of your approach and ability to provide the required Services and Work Product including, but not limited to a schedule for completing all aspects of the Services. It is imperative that the proposal includes a list and detailed explanation of the extent of all work or services to be performed by Subcontractors.

1.1.4 Proposals should demonstrate clearly that the respondent is capable of and experienced in providing all of the Services necessary for the complete performance of the Contract.

1.1.5 The proposal should contain a description of the respondent's organization, including a history of the firm, a description of all subsidiaries and affiliates, an organization

chart indicating the level of responsibility of all personnel who are expected to provide Services, and the name and location(s) of business of the respondent. This should be accompanied by, to the extent known, the names and resumes of all individuals and entities that will be performing the Services under the Contract including, without limitation, all personnel, Subcontractors and other entities or individuals performing and/or supervising the Services, and the respondent's proposed staffing schedule. Please include the addresses, phone and fax numbers, e-mail addresses, designated roles, and relevant experience and expertise for the same.

1.1.6 The respondent shall make the following statements and representations as part of its proposal:

1.1.6.1 That the respondent has examined all parts of this RFP, including the Contract Draft and the Scope of Services, and all terms and conditions hereof.

1.1.6.2 That the respondent agrees to obtain all necessary approvals, permits and/or licenses required by law or regulation for the performance of the Services.

1.1.7 The respondent should provide a description of services it has previously provided to governmental and quasi-governmental organizations with similar requirements to those contained herein. Written statements of reference or the names, addresses and telephone numbers of administrators or contract officers, who can explain the respondent's involvement and the scope of services, should be included. Information concerning personnel assignment and contract duration should be described.

1.1.8 If the Scope of Services (Appendix B, Part III of the Contract) permits payment of Allowable Additional Costs, the respondent should provide a list of anticipated Allowable Additional Cost items, excluding costs for these items.

1.1.9 If Respondent is a joint venture, response must include a copy of the joint venture agreement

1.1.10 **Do not include in this portion of your proposal any costs or fees associated with the above items.** Costs and fees should be included in a separate envelope. (See Part III, Section 1.2 below.)

1.1.11 **Do not include in this portion of your proposal your Doing Business Data Form.** This form should be included in a separate envelope. (See Part III, Section 1.3 below.)

1.1.12 **Do not include in this portion of your proposal your M/WBE Forms.** Your M/WBE Forms should be included in a separate envelope. (See Part III, Section 1.4 below.)

1.2 **Envelope #2 [Required for All Proposals]**. In a second sealed envelope labeled as required by Part I, Section 2.2.6.1.2 place complete fee and cost schedules for all Services. All fee and cost schedules should be submitted substantially in the form attached hereto as Exhibit 2

to this RFP. NYCEDC may not consider fee and cost schedules that do not follow the prescribed formats.

1.3 **Envelope #3 [Required for All Proposals]**. In a third sealed envelope labeled as required by Part I, Section 2.2.6.1.3 place a complete and accurate Doing Business Data Form in the form as described in Exhibit 3 to this RFP.

1.4 **Envelope #4 [Proposals Subject to M/WBE Forms Only]**. If Part I, Section 2.2.7 sets forth M/WBE Participation Goals for this Contract or for future tasks, in a fourth separate sealed envelope labeled as required by Part I, Section 2.2.6.1.4 place a completed and signed M/WDBE Subcontractors Participation Plan, ITP See Exhibit 4 for submission forms.

1.5 **Non-compliant Proposals**. In furtherance of and without limiting NYCEDC's rights as set forth in Part II, Section 7.6 of this RFP, non-compliant proposals may, in NYCEDC's sole discretion, be considered "not responsive" and may be rejected by NYCEDC including, without limitation, proposals that are:

1.5.1 not enclosed in separate sealed envelopes as aforesaid;

1.5.2 not properly labeled;

1.5.3 received by a person other than the designated Recipient; and/or

1.5.4 missing any information, certifications, supplemental forms or other documentation required by this RFP or by applicable law.

1.6 **Cover Letter**. You should include a cover letter summarizing key points of your proposal.

2. PRE-PROPOSAL INFORMATION MEETING. If Part I, Section 2.2.5 indicates that a pre-proposal information meeting will be held, you are encouraged to attend in order to receive any additional information that may be distributed at the meeting. You will also be able to obtain answers to any questions you may have about the Services at the meeting. Please confirm your attendance to the Confirmation Contact identified in Part I, Section 2.2.5 indicating who from your office will attend. Except as may otherwise be permitted by Part I, Section 2.2.4.2, no other contact with NYCEDC or the City regarding issues raised by this RFP is permitted.

3. INTERVIEWS. Interviews may be held with any or all of the respondents after the receipt of proposals. Interviews with NYCEDC will be scheduled after its initial review of proposals.

4. SELECTION. NYCEDC will review each respondent's proposal in its totality. The selected respondent, if any, will be a respondent whose proposal is most advantageous to NYCEDC's goals. See Part I, Section 2.2.8 for an explanation of the criteria on which NYCEDC will base a selection.

5. SUBMISSION.

5.1 You must submit the number of sets of your proposal indicated in Part I, Section 2.2.6.2.

5.2 All proposals must be **delivered by hand or express mail or other nationally-known overnight courier**. Proposals received via facsimile or e-mail transmittal, or by regular mail will not be accepted.

5.3 **Proposals are due and must be received by the Recipient at the location designated in Part I, Section 2.2.6.6 no later than the Submission Deadline.** Please be sure to leave adequate time to get through building security. Proposals received after the indicated date and hour and/or at a different location may not be considered.

5.4 NYCEDC reserves the right, in its discretion, from time to time, to postpone the date for submission and opening of proposals. **Respondents are again reminded to check the Website periodically for updated information, which may include a notice of postponement.** Any proposal submitted prior to such notice may be withdrawn without prejudice.

5.5 Please note that you must respond to this RFP in order to be eligible for consideration for the award of the Contract for the Services pursuant to this RFP.

5.6 For more information, please contact the Recipient **in writing** at the Recipient's Mailing Address or at Recipient's E-mail address, all as identified in Part I, Section 2.2.6.

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EXHIBIT 1

TO

REQUEST FOR PROPOSALS

RESPONDENT'S PROPOSAL CERTIFICATION FORM

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
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EXHIBIT 1

TO

REQUEST FOR PROPOSALS

RESPONDENT'S PROPOSAL CERTIFICATION FORM

Submitted by

_____

[Insert Name of Respondent] (The "Respondent")

Respondent, in accordance with and subject to all of the terms and conditions of the Request for Proposals pursuant to which this proposal (the "Proposal") is being submitted, agrees that it will provide in consideration of the price(s) set forth in the Fee and Cost Schedule, all of the Services set forth in the Scope of Services in accordance with the Contract, and to accept in full compensation therefore (including without limitation all overhead, profit, taxes and other charges and expenses applicable thereto), the price(s) stated in the Fee and Cost Schedule. The Fee and Cost Schedule, is simultaneously being delivered to you in a separate sealed envelope and is incorporated herein and made part hereof.

Respondent makes the following statements and representations as part of its Proposal:

(a) That the Respondent has examined all parts of the RFP, including the Contract Draft and the Scope of Services, and all terms and conditions hereof.

(b) That the Respondent agrees to obtain all necessary approvals, permits and/or licenses required by law or regulation of the performance of the Services.

In order to induce NYCEDC to accept this Proposal, Respondent hereby agrees to abide by all of the terms and conditions of the Contract including, without limitation, all representation and warranties set forth therein.

WHERFORE, the Respondent submits this Proposal to NYCEDC.

_____
[INSERT NAME OF RESPONDENT]

Signed by: _____

Printed Name: _____

Title: _____

Respondent's Address: _____

Notice Address (if different from above): _____

Respondent's Telephone Number: _____

Respondent's Fax Number: _____

Respondent's E-mail Address: _____

Respondent's Tax I.D. Number: _____

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EXHIBIT 2

TO

REQUEST FOR PROPOSALS

SAMPLE FEE AND COST SCHEDULE

1. The Respondent shall complete and submit a Fee and Cost Schedule, substantially in the form of the "Sample Fee and Cost Schedule" on the following page.
2. The submitted Fee and Cost Schedule should cover all Services and Tasks described in the RFP and the Contract Draft and shall provide a breakdown of staff costs and, if applicable, Allowable Additional Costs.
3. **PLEASE BE SURE THAT YOU SUBMIT YOUR FEE AND COST SCHEDULE IN A SEPARATE ENVELOPE.**

(See Sample Fee and Cost Schedule on following page)

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Submitted by

_____

[Insert Name of Respondent] (The "Respondent")

Microgrid with Tri-Generation to support the Produce and Meat Market	**Amount per Task**
Task 1: Data Gathering and Analysis	$
Task 2: Technical Surveys	$
Task 3: Detailed Design Development	$
Task 4: Permitting and Regulatory Approvals	$
Task 5 : Implementation Plan	$
Task 6: Contract Documents	$
Task 7: Construction Administration and Construction Observation	$
Subtotal – Tasks 1 through 7	**$**
Allowable Additional Costs	$
Maximum Contract Price (Tasks 1 through 7 and Allowable Additional Costs):	**$**

School Solar and Storage Installation	Amount per Task
Task 1: Data Gathering and Analysis	$
Task 2: Technical Surveys	$
Task 3: Detailed Design Development	$
Task 4: Permitting and Regulatory Approvals	$
Task 5 : Implementation Plan	$
Task 6: Contract Documents	$
Task 7: Construction Administration and Construction Observation	$
Subtotal – Tasks 1 through 7	$
Allowable Additional Costs	$
Maximum Contract Price (Tasks 1 through 7 and Allowable Additional Costs):	**$**

Emergency and Backup Generation	Amount per Task
Task 1: Data Gathering and Analysis	$
Task 2: Technical Surveys	$
Task 3: Detailed Design Development	$
Task 4: Permitting and Regulatory Approvals	$
Task 5 : Implementation Plan	$
Task 6: Contract Documents	$
Task 7: Construction Administration and Construction Observation	$
Subtotal – Tasks 1 through 7	$
Allowable Additional Costs	$
Maximum Contract Price (Tasks 1 through 7 and Allowable Additional Costs):	**$**

The Stakeholder Engagement Task shall be performed concurrently for all projects. Consultant shall provide the cost of performing the entire stakeholder engagement task below.

Total Cost of Stakeholder Engagement for all Projects	
Task 8: Stakeholder Engagement	$

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EXHIBIT 3

TO

REQUEST FOR PROPOSALS

DOING BUSINESS DATA FORM

The Consultant shall complete and submit a Doing Business Data Form which can be found at www.nycedc.com in the following section:

"Resource/Vendor Resources"

If the Consultant cannot access or download these forms, the Corporation may, upon request, send the Consultant the required forms. The text of said section provides as follows:

> Doing Business Accountability Project Forms
>
> Local Law 34 of 2007 (LL 34) requires the creation of a database containing information about entities that do business with the City as defined by the law, and principal officers, owners and senior managers of these entities. This information will be collected on Doing Business Data Forms that are distributed, collected and reviewed by agencies, and forwarded to the Doing Business Accountability Project (DBAP) at Mayor's Office of Contract Servicesfor processing. Collected data will be used to identify entities and people who are subject to LL 34's limitations on campaign contributions in municipal elections.
> If you have any questions or concerns, please contact the Doing Business Accountability Project at 212-788-8104 or DoingBusiness@cityhall.nyc.gov.
>
> Doing Business Form
> Doing Business Form-Real Property
> Q&A General
> Q&A Real Property

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EXHIBIT 4

TO

REQUEST FOR PROPOSALS

M/WBE FORMS

MWBE/DBE Participation Plan

1/8/2019

The purpose of this form is to ensure that appropriate planning and consideration go into the consultant and contractor utilization process, and to serve as documentation of your commitment to attain the level of MWBE/DBE Participation set forth in this plan. The solicitation materials indicate whether MWBE or DBE goals apply for this contract and this form should be filled out accordingly. Please complete the forms and return (1) an Excel copy of the form and (2) an executed PDF to opportunityMWDBE@nycedc.com. Any questions should also be directed to this email address.

I affirm that the following statements are true and accurate:

1. I will make and thoroughly document every good faith effort to meet the MWBE/DBE Participation Goal set forth herein.
2. This MWBE/DBE Participation Plan lists all consultants and contractors that are expected to work on this project as of the date above, whether MWBE/DBE or not.
3. I have verified that firms listed as MWBE/DBE below are certified by the appropriate entity.
4. I have included an **Intent to Perform as Subcontractor Form** for each firm listed below as part of this submission.

x _____ Signature of Authorized Representative/Preparer | _____ Name & Title | _____ Date

NYCEDC Approval :

x _____ Signature of NYCEDC Opportunity M/W/DBE Representative | _____ Name & Title | _____ Date

Cells in orange are filled in automatically

Project Information		Project Calculations	
Contract #		Project Award Amount	**$0.00**
Project Name			
Business Name		Total Amount to Count toward MWBE/DBE Goal	**$0.00**
Email			
Phone		Projected MWBE/DBE Goal Attainment	**0.00%**

Contractor/Consultant Award Information

Contractor/ Consultant	MWBE/DBE? ("Y" or "N")	Award Amount	Services to be Provided	Contracting Party *Please indicate the name of the party subcontracting for the services*	Is Contracting Party MWBE/DBE? ("Y" or "N")	Amount to Count
		$0.00		N/A	N	$0
						$0
						$0
					0	$0
					0	$0

Contractor/ Consultant	MWBE/DBE? ("Y" or "N")	Award Amount	Services to be Provided	Contracting Party *Please indicate the name of the party subcontracting for the services*	Is Contracting Party MWBE/DBE? ("Y" or "N")	Amount to Count
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0

Contractor/ Consultant	MWBE/DBE? ("Y" or "N")	Award Amount	Services to be Provided	Contracting Party *Please indicate the name of the party subcontracting for the services*	Is Contracting Party MWBE/DBE? ("Y" or "N")	Amount to Count
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0

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EXHIBIT 5

TO

REQUEST FOR PROPOSALS

OUTSIDE FUNDING CERTIFICATIONS

REQUIREMENTS REGARDING LOBBYING ACTIVITIES ON FEDERAL AID CONTRACTS

Federal regulations require that any contractor or firm intending to do business with the Federal government, or wishing to participate in any Contract funded with Federal money, disclose to the Federal government any lobbying activities which that Contractor or firm may have undertaken. More specifically, and in addition to disclosing lobbying efforts of any kinds, any prospective contractor or firm who expects to perform work funded with Federal moneys must certify that none of this lobbying activity has been paid for with Federal funds of any kind.

<table>
<tr>
<td>1. Type of Federal Action:

A. contract
B. grant
C. cooperative agreement
D. loan
E. loan guarantee
F. loan insurance</td>
<td>2. Status of Federal Action:

A. bid/offer/application
B. initial award
C. post-award</td>
<td>3. Report Type:

A. initial fling
B. material change
For Material Change Only:
year_____ quarter_____
date of last report_____</td>
</tr>
<tr>
<td colspan="2">4. Name and Address of Reporting Entity.

☐ Prime ☐ Subawardee
Tier _____, if known:

Congressional District, if known:</td>
<td>5. If Reporting Entity in No. 4 is Subawardee,

Enter Name and Address of Prime:

Congressional District, if known:</td>
</tr>
<tr>
<td colspan="2">6. Federal Department/Agency</td>
<td>7. Federal Program Name/Description:

CFDA Number, if applicable:</td>
</tr>
<tr>
<td colspan="2">8. Federal Action Number, if known:</td>
<td>9. Award Amount, if known:

$</td>
</tr>
<tr>
<td colspan="2">10. a. Name and Address of Lobbying Registrant:
(If individual , last name, first name MI):</td>
<td>b. Individuals Performing Services
(including address if different from No. 10a)
(last name, first name, MI)</td>
</tr>
<tr>
<td colspan="2">11. Information requested through this form is authorized by title 31 U.S.C. Section 1352. This disclosure of lobbying activities is material representation of facts upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.</td>
<td>Signature: _____

Print Name: _____

Title: _____

Telephone No: _____

Date: _____</td>
</tr>
</table>

INSTRUCTIONS FOR COMPLETION OF STANDARD FORM LLL DISCLOSURE OF LOBBYING ACTIVITIES.

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material required for each, payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or any employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identity the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action Identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-001".

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/ loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full name of individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title and phone number.

CERTIFICATION OF RESTRICTION ON LOBBYING

I, _____, hereby certify on behalf
(name of authorized official)

of _____ that:
(name of bidder)

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, 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 any 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.

2. 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, the undersigned shall complete and submit Standard Form – LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance is placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making for entering into this transition imposed by Section 1352, title 31, U.S. Code. 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.

Executed this _____ day of _____, 20___

By: _____
(Signature of Authorized Official)

_____
(Signature of Authorized Official)

CERTIFICATION OF A POTENTIAL PRIME CONTRACTOR
(MAJOR THIRD PARTY CONTRACTOR)
REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The Bidder _____, certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or Local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this proposal or bid had one or more public transactions (Federal, State or Local) terminated for cause or default.

5. The Bidder agrees to provide the contracting agency with immediate written notice if, at any time, it learns that its certification was erroneous when submit ted or has become erroneous by reason of changed circumstances. Each Subcontractor or Vendor for the Contractor shall provide the same updated notice to the Contractor and the Contractor shall be solely responsible for collecting, updating and submitting updated information to the contracting agency.

NOTE: If for any reason the Bidder is unable to certify to any of the statements in this certification, the Bidder shall attach an explanation to this certification.

THE BIDDER, _____CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

_____
Signature and Title of Authorized Official

_____
Date

CERTIFICATION OF A POTENTIAL SUBCONTRACTOR/SUPPLIER REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

1. The potential Subcontractor/Supplier, _____ certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2. If for any reason the potential Subcontractor/Supplier, is unable to certify to any of the statements in this certification, it shall attach a explanation to this proposal.

3. THE POTENTIAL SUBCONTRACTOR/SUPPLIER, _____, CERTIFIES OR AFFIRMS THE THRUTHFULNESS AND ACCURACY OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C, SECTIONS 3801 ET. SEQ ARE APPLICABLE THERETO.

4. The Subcontractor/Supplier shall provide to the NYCEDC and the Subcontractor shall provide to the Contractor immediate written notice at any time it learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

_____
Signature and Title of Authorized Official

_____
Date

Contractor Note: Contactor must require all Subcontractor/Suppliers to complete this certification and Contractor shall submit the certifications to the NYCEDC as they are received.

Section 3 Clause

All Section 3 covered contracts must include the following clause **in its entirety:**

A. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted project covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low- income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment practices can see the notice. The notice shall described the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected, but before the contract is executed, and (2) with persons other than those to whom the regulation of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

G. With respect to work performed in connection with Section 3 covered Indian housing assistance, Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of Section 3 and Section 7(b) agree to comply with Section 3 to the maximum extent feasible, but not in derogation of compliance with Section 7(b).[1]

[1] This paragraph (G) is not applicable to the HOME Program; nonetheless, the regulations require that the Section 3 clause be included verbatim in all contracts subject to the requirements of Section 3.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
REQUEST FOR PROPOSALS
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

EXHIBIT 6

TO

REQUEST FOR PROPOSALS

CONTRACT DRAFT

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

DRAFT CONSULTANT CONTRACT

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

PART I
SPECIFIC TERMS AND CONDITIONS

New York City Economic Development Corporation (the "Corporation" or "NYCEDC") and the Consultant identified below, in consideration of the mutual covenants contained in this Contract (as defined below) and other valuable and good consideration, do hereby agree to all of the terms and conditions set forth in (i) these Specific Terms and Conditions (Part I) set forth immediately below, (ii) the General Terms and Conditions (Part II) annexed hereto and made a part hereof and (iii) the Appendices (Part III) annexed hereto and made a part hereof. Capitalized terms shall have the meaning set forth in Appendix A (Definitions) unless otherwise defined in this Contract or the context otherwise requires.

1. The Contract

1.1 **Contract**: These Specific Terms and Conditions (Part I), the General Terms and Conditions (Part II) and the Appendices (Part III)
1.2 **NYCEDC Contract No.** 61110003
1.3 **Contract Date:** Anticipated contract execution date is in July 2019
1.4 **Commencement Date:** Upon notice to proceed
1.5 **Term:** Three (3) Years
1.6 **Maximum Contract Price:**
1.7 **Project:** Hunts Point Energy Resiliency Design
1.8 **Project Site:** 600 Food Center Drive; 550 Food Center Drive; 400 Food Center Drive; Hunts Point Site D; 730 Bryant Avenue, Bronx, NY 10474; 1290 Spofford Avenue, Bronx, NY 10474
1.9 **Allowable Additional Costs:** The Allowable Additional Costs are defined in Appendix B (Scope of Services) and the amount set forth in Appendix C (Payments).
1.10 **Retainage:** Not Applicable
1.11 **Retainage Payment Date:** Not Applicable
1.12 **M/WBE Participation Goal:** 20-30%

2. Parties

2.1 **The Corporation**: New York City Economic Development Corporation, a not-for-profit corporation, organized under the laws of the State of New York.
2.2 **Director**: Phillip Grant, Senior Vice President
2.3 **The Consultant**: , a , having an office at:

ADDRESS: _____

_____

_____

_____

FEDERAL TAX ID#

2.4 **Principal**:
2.5 **Person in Charge:**

3. **Notice Parties and Addresses**

3.1 **Notices to the Corporation:**

New York City Economic Development Corporation
110 William Street
New York, NY 10038
Attn: General Counsel

with a copy to:

New York City Economic Development Corporation
110 William Street
New York, NY 10038
Attn: Phillip Grant, Senior Vice President

3.2 **Notices to the Consultant:**

NAME: _____
ADDRESS: _____

_____

_____
Attn:

4. **Funding Source** The payments to be made to the Consultant by the Corporation pursuant to this Contract will be made from funds identified below and in accordance with the provisions of Appendices I, J and K**.** The Consultant agrees to comply with the provisions of each of such Appendices.

4.1 **Type of Funds:** Disaster Relief Appropriations Act of 2013 (Public Law 113-2), Community Development Block Grant Disaster Recovery ("CDBG-DR") program codified at 42 U.S.C. § 5172
4.2 **Funding Agencies**: U.S. Department of Housing and Urban Development ("HUD")
4.3 **Inspectors**: U.S. Department of Housing and Urban Development ("HUD") or any other inspector as directed or permitted by the Corporation
4.4 **Applicable Requirements**: See Appendix J
4.5 **Applicable Agreements**: See Appendix K

4.6 **Federal Compliance:** The Consultant and all Sub-consultants under this Agreement will be subject to all relevant requirements of the funding statutes cited above and below.

Compliance with US Department of Housing and Urban Development Regulations

A component of this Program may be funded by a Community Development Block Grant Disaster Recovery program grant ("CDBG-DR Grant") administered by the US Department of Housing and Development ("HUD"). The Consultant shall follow all applicable CDBG-DR regulations as specified in the Contract. A component of the CDBG-DR Grant is compliance with Section 3 of the Housing and Urban Development Act of 1968, as amended (12 U.S.C. 1701u).

CDBG-DR grants are reimbursement grants. In order to receive reimbursement, all Program costs that will be reimbursed by CDBG-DR funds must be validated by HUD. As such, all Program costs that will be reimbursed by CDBG-DR funds must be clearly separated from other Program costs.

5. **Special Provisions** The provisions set forth below are hereby added to and made part of, or deleted from this Contract, as indicated. In the event any conflict exists between any of the General Terms and Conditions (Part II) of this Contract and these special provisions, these special provisions shall govern.

5.1 **Liquidated Damages:** As stated in Article 1, Section 1.4.1, the Services to be performed by the Consultant shall at all times be subject to the review, direction and control of the Director, whose decision shall be final and binding upon the Consultant. The Director shall have the right to determine the amount, quality, acceptability and fitness of the Services and her or his approval shall be a condition precedent to the right of the Consultant to receive any compensation under this Contract.

Upon completion of work and as stated in Article 2, Section 2.1.2, Requisitions shall be in a form reasonably acceptable to the Corporation and shall be supported by any appropriate or necessary documentation or other evidence relating to the amounts set forth in the Requisition, as the Corporation may reasonably require including, but not limited to invoices, receipts and vouchers from Subcontractors and suppliers, information related to M/WBEs required under Section 9.6 and, where applicable, the time sheets and/or certified payroll reports of the Consultant's staff and its Principal. Failure to provide such appropriate or necessary documentation or other evidence relating to the amounts set forth in the Requisition, as the Corporation may reasonably require, will result in non-payment.

As stated in Article 2, Section 2.1.4, the Director shall review the Requisitions and the Work Product. If, in her or his judgment, the Services have been satisfactorily performed in accordance with this Contract, the Director will approve the Requisition. If in her or his judgment, the Services have not been satisfactorily performed in accordance with this

Contract, the Director will not approve the Requisition and payment will not be received. All payments to the Consultant will be made in accordance with this Article 2.

In addition, per Article 2, Section 2.2.1, if the Corporation shall have reasonable grounds for believing that: (i) the Consultant will be unable to perform the Services or any Portion thereof fully and satisfactorily in accordance with any Progress Schedule, or (ii) a meritorious claim exists or will exist against the Corporation, the Consultant or the City arising out of the act, omission or negligence of the Consultant or the Consultant's breach of any provision of this Contract, then the Corporation may withhold payment of any amount otherwise due and payable to the Consultant hereunder. Any amount so withheld may be retained by the Corporation for such period as it may deem advisable to protect the Corporation and the City against any loss and may, after Notice to the Consultant, be applied in satisfaction of any claim herein described.

5.2 **CDBG-DR Section 3 Compliance:** Within 60 days of the contract start date, the Consultant must contact the Department of Small Business Services ("SBS") at Section3@nycedc.com to coordinate review of the Consultant's hiring plan for Section 3 compliance. In addition, the Consultant will be required to submit a Section 3 progress report with every request for payment under the Contract.

5.3 **Reporting Requirements:** The Consultant shall report to NYCEDC or the City, on a monthly basis, all information reasonably requested by NYCEDC or the City that is necessary for NYCEDC or the City to comply with any reporting requirements imposed by law or rule, including any requirement that the City maintain a publicly accessible database. In addition, the Consultant agrees to comply with all reporting requirements imposed by law or rule, or as otherwise requested by NYCEDC or the City.

This Contract may be executed in counterparts, all of which counterparts, when taken together, shall be deemed a fully executed instrument.

IN WITNESS WHEREOF, the parties hereto have caused this Contract to be duly executed as of the Contract Date hereinabove written.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION	**CONSULTANT**
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

PART II
GENERAL TERMS AND CONDITIONS

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

PART II
GENERAL TERMS AND CONDITIONS

The Corporation and the Consultant agree as follows:

ARTICLE 1
PERFORMANCE OF SERVICES

1.1 Services. The Corporation hereby retains and engages the Consultant and the Consultant agrees to perform the Services as described in **Appendix B** (Scope of Services), attached hereto.

1.2 Time for Performance of Services/Term/Delays and Force Majeure.

1.2.1 The Consultant shall commence the Services upon or promptly after the Commencement Date, shall complete the Services and each phase of the Services within the time or times stated for Final Completion as set forth in **Appendix B**,, and shall perform in accordance with any directive given and Progress Schedule approved by the Corporation, unless this Contract is earlier terminated pursuant to Article 3 hereof.

1.2.2 This Contract shall be for the Term as set forth in Part I, Section 1.5 unless sooner terminated pursuant to Article 3 hereof.

1.2.3 If the Consultant has been delayed through no fault of the Consultant and as a result of such delay will be unable to complete performance fully and satisfactorily within the time fixed for such Services, the Consultant may be granted an extension of time fixed for performance equal to the period the Consultant was actually and necessarily delayed upon submission of evidence of the causes of the delay, subject to the written approval of the Director in his or her sole discretion. The decision of the Director as to the granting of the extension and its length shall be binding upon the Consultant.

1.2.4 Subject to the Corporation's determination and approval, the Corporation may extend the time or times for performance of the Services where such performance has been substantially obstructed, hindered or delayed by reason of acts of Force Majeure. The Consultant shall have no claim against the Corporation or the City for any loss or damage sustained by the Consultant nor for any extra compensation in the form of an increase in the Maximum Contract Price, or otherwise, through such delay, hindrance, or obstruction.

1.3 Complete Work and Timing and Sequence/Meetings. It is the intent of the parties that the provisions of this Contract shall not be construed to limit the Services, but that the Services shall include all acts necessary to fully and finally complete the work described in

Appendix B. The Consultant shall schedule and perform the Services in a manner so as to permit their completion diligently and expeditiously. The Principal, the Person in Charge, and/or such other Representatives of the Consultant as may be required under the circumstances shall be available to meet with the Director or her or his designee as often as necessary to effectively perform the Services, and as often as may be specified in **Appendix B**.

1.4 Authority of Director/Performance of Services.

1.4.1 The Services to be performed by the Consultant shall always be subject to the review, direction, and control of the Director, whose decision shall be final and binding upon the Consultant. The Director shall have the right to determine the amount, quality, acceptability, and fitness of the Services. The Director's approval shall be a condition precedent to the right of the Consultant to receive any compensation under this Contract. The Director shall act reasonably in exercising her or his authority under this Contract. The Director or any other person or agent duly authorized to act for and on behalf of the Corporation shall not, by virtue of such authority or action, be liable in any manner to the Consultant.

1.4.2 The Consultant shall perform all Services in a prudent and professional manner and in accordance with standards and practices as are customary for such Services in the New York City Metropolitan Statistical Area for similar professionals performing similar Services.

1.5 Changes to the Services.

1.5.1 The Consultant shall not make any changes to the Services without prior written authorization from the Director. Without additional compensation or time extension the Consultant shall revise or correct any Work Product submitted in accordance with this Contract until accepted by both the Director and all agencies whose approval is required by law. Any changes to the performance of the Services or the Work Product which are necessary due to improper performance of the Services, a defect of design, unworkability of details, or other fault or error of the Consultant shall be made by the Consultant without additional compensation or time extension.

1.5.2 The Director may alter the Services at their sole discretion. Should the Consultant believe that the Director's alteration of the Services is beyond the Scope of Services and constitutes Extra Work, the Consultant shall so Notify the Director within three (3) days of such directive. The Director shall determine whether such altered Services are (i) within the Scope of Services; or (ii) Extra Work requiring an amendment to the Scope of Services and the Contract. The Director's determination shall be final, binding, and conclusive.

1.5.3 The Director reserves the right to reduce the Scope of Services under this Contract by Notice to the Consultant specifying the nature and extent of such reduction. The Consultant shall be compensated for all Services satisfactorily performed prior to the reduction, and for the reduced scope of Services satisfactorily performed thereafter. If said reduction results in a credit for the Corporation, such credit shall be immediately due and

owing to Corporation, and the Consultant shall either pay such credit to the Corporation or the Corporation may withhold the credit amount from any future payments by the Corporation to the Consultant, at the exclusive option of the Corporation.

1.6 Equipment.

1.6.1 The Consultant, at its own expense, shall secure all supplies, materials, and equipment required to perform and complete the Services.

1.6.2 The Consultant, at its sole cost and expense, shall bear the risk of loss for any supplies, materials, and equipment used to perform the Services whether such loss arises by reason of fire, theft, vandalism, negligence, or any other cause whatsoever. Consultant, at its sole cost and expense, shall promptly replace or repair all such lost, stolen, or damaged supplies, materials, and equipment.

1.6.3 The Consultant, at its sole cost and expense, shall maintain all supplies, materials and equipment in good working and serviceable order to enable the Consultant to perform the Services in a first-class and professional manner.

1.6.4 The Consultant shall be solely responsible for the means, methods, safety, and protection of all its employees and shall assume all liability for injuries, including death, that may occur to such employees due to the act, omission, negligence, fault, or default of the Consultant.

1.7 Services Subject to City Contract, Indemnification and Third-Party Beneficiary. This Contract is a subcontract under the City Contract. The Consultant acknowledges that it has reviewed the City Contract and agrees to comply with the City Contract with respect to the Services and shall not violate, or through its acts or failure to act cause the Corporation to violate, the City Contract. The Consultant agrees to defend, indemnify, and hold harmless the Corporation from any claim, liability loss, cost, expense (including attorney's fees), or judgment to which the Corporation may be subject because of any such action or failure to act. The City shall be a third-party beneficiary of this Contract and shall have a direct cause of action against the Consultant in the event that any claim be made or any cause of action be brought against the Corporation or City arising from this Contract, or if the Consultant breaches this Contract.

1.8 Acts to be Performed by the Corporation. The Corporation shall perform the following acts in connection with this Contract:

1.8.1 The Corporation shall make available to the Consultant all relevant technical data (subject to the provisions of Part II, Section 5.3 herein) in regard to the Contract which is in the possession of the Corporation.

1.8.2 The Corporation shall designate a Project Manager to serve as a liaison between the Corporation and the Consultant.

ARTICLE 2
COMPENSATION

2.1 Payments.

2.1.1 The Corporation shall pay to the Consultant and the Consultant shall accept such payment as full consideration for the Services and for all expenses of the Consultant in connection therewith, including Subcontractors' Costs and Allowable Additional Costs, an amount not to exceed the Maximum Contract Price, payable as provided for in this Section 2.1 and in Appendix C.

2.1.2 Requisitions shall be in a form reasonably acceptable to the Corporation and shall be supported by any appropriate or necessary documentation or other evidence relating to the amounts set forth in the Requisition. The Corporation may reasonably require the following supporting documentation which includes, but is not limited to, invoices, receipts, and vouchers from Subcontractors and suppliers, information related to M/WBEs required under Section 9.5 and, where applicable, the time sheets and/or certified payroll reports of the Consultant's staff and its Principal.

2.1.3 Each Requisition submitted to the Corporation by the Consultant shall constitute a representation that, except as specifically set forth in the Requisition, as of the date of the Requisition, all representations and warranties made by the Consultant in Article 7 are true, complete, and accurate as if made as of the date of the submission of the Requisition.

2.1.4 The Director shall review the Requisitions and the Work Product. If, in her or his judgment the Services have been satisfactorily performed in accordance with this Contract, the Director will approve the Requisition. All payments to the Consultant will be made in accordance with this Article 2.

2.1.5 Subject to Section 3.5, Final Payment will be due only upon Final Completion.

2.1.6 The Consultant, with the Director's prior approval, may only exceed the Maximum Payment allocated to a particular Portion of the Services if the Consultant by Notice determines that the Maximum Payment initially allocated to the Portion is insufficient to adequately perform the Portion of the Services and if the Consultant demonstrates to the Director a savings with respect to another Portion of the Services which is at least equal to the amount of such excess. However, notwithstanding the above, in no event shall the Corporation pay the Consultant more than the Maximum Contract Price except pursuant to this paragraph 2.1.6.

2.1.7 All Requisitions must be submitted to the Corporation's Accounts Payable Department.

2.2 Miscellaneous Payment Provisions.

2.2.1 In addition to its rights under Section 9.10, if the Corporation shall have reasonable grounds for believing that:

2.2.1.1 the Consultant will be unable to perform the Services or any Portion thereof fully and satisfactorily in accordance with any Progress Schedule, or

2.2.1.2 a meritorious claim exists or will exist against the Corporation, the Consultant or the City arising out of the act, omission or negligence of the Consultant or the Consultant's breach of any provision of this Contract,

then the Corporation may withhold payment of any amount otherwise due and payable to the Consultant hereunder. Any amount so withheld may be retained by the Corporation for such period as it may deem advisable to protect the Corporation and the City against any loss and may, after Notice to the Consultant, be applied in satisfaction of any claim herein described.

2.2.2 The Corporation shall not be deemed to have released the Consultant from any claim or liability, or to have waived any cause of action arising from any breach of this Contract by virtue of making payments to the Consultant.

2.2.3 Upon acceptance by the Consultant of the Final Payment to be paid pursuant to this Contract, the Consultant agrees that it shall be deemed to have fully released the Corporation and the City from any and all claims, demands and causes of action whatsoever which the Consultant has or may have against the Corporation or the City in connection with this Contract and, upon the request of the Corporation, shall execute a release to such effect.

2.2.4 All payments to the Consultant under this Contract shall be subject to all applicable Legal Requirements.

2.3 Electronic Funds Transfers. All payments due under this Contract in excess of $100,000 shall be made by Electronic Funds Transfer ("EFT"). Upon execution of this Contract, and in no event later than its submission of its first Requisition, the Consultant shall complete and submit to the Corporation the "EFT Vendor Payment Enrollment Form" annexed to Appendix C. The Consultant shall update such information to the extent necessary for EFT payments to be made. The Corporation shall not be obligated to make any payment in excess of $100,000 unless such information is provided and shall be entitled to rely solely on the information provided by the Consultant. Payments to the Corporation shall be made by check unless the Corporation Notifies the Consultant to make payments by EFT.

ARTICLE 3
SUSPENSION OR TERMINATION

3.1 Delay, Postponement or Suspension of Work.

3.1.1 The Corporation shall have the right to delay, postpone, or suspend any part or all of the Services immediately or upon a specified date, for a period of not more than ninety (90) days, upon Notice to the Consultant, for any reason deemed by the Corporation to be in its interest. The Consultant and all of its Subcontractors and Representatives shall cease all suspended Services either immediately or as of the date specified in the Notice.

3.1.2 Any such delay, postponement, or suspension shall not give rise to any cause of action for damages against the Corporation or the City, but the Term specified in Part I of this Contract and the Consultant's time for performance of the Services shall be extended for the period of the delay, postponement, or suspension.

3.1.3 In the event of any delays, postponements, or suspensions, the Consultant shall resume the Services upon the date specified in the Notice or upon such other date as the Corporation may thereafter specify by Notice.

3.2 Termination for Convenience. The Corporation shall have the right to terminate the Services, or any Portion thereof, immediately or upon a specified date, upon Notice to the Consultant and for any reason deemed by the Corporation to be in its interest.

3.3 Defaults and Termination for Cause.

3.3.1 Should the Consultant commit an Event of Default, in addition to the Corporation's rights under this Contract, in law, or in equity, the Corporation shall have the right to declare the Consultant in default and terminate this Contract, in whole or in part, for cause, by giving Notice to the Consultant of the termination, the cause of such termination, and the date of such termination.

3.3.2 An Event of Default shall be deemed to have occurred if any of the following events has occurred, each an "Event of Default":

3.3.2.1 The Consultant fails to assign workers, order materials, or enter into subcontracts in a manner sufficient to permit completion of any or all the Services within the time limits of the Progress Schedule or in accordance with any Progress Schedule approved by the Corporation;

3.3.2.2 The Consultant fails to complete any or all of the Services within the time limits provided in this Contract or any Progress Schedule approved by the Corporation;

3.3.2.3 The Consultant violates any material term, covenant, or provision of this Contract;

3.3.2.4 The Consultant fails to comply with any Applicable Requirements or any Applicable Agreements;

3.3.2.5 Any representation or warranty made by the Consultant in Article 7 or in any other Article in this Contract shall prove to be untrue or be breached;

3.3.2.6 The Consultant becomes insolvent, files for or is forced by creditor(s) into bankruptcy, or is adjudged a debtor in possession;

3.3.2.7 The Consultant voluntarily or by operation of law assigns, transfers, conveys, or otherwise disposes of its interest in this Contract or its right to receive funds hereunder without the prior written consent of the Corporation;

3.3.2.8 The Consultant fails to comply with the M/WBE Requirements in Article 9; or

3.3.2.9 The Consultant or any of its officers, directors, partners, members, five (5%) percent shareholders, principals, or other persons substantially involved in its activities, commits any of the acts or omissions specified as the grounds for debarment in the City's *Procurement Policy Board Rules*.

3.4 Effects of Termination for Convenience or for Cause.

3.4.1 The Contract shall terminate the Services as of the termination date set forth in the Notice given pursuant to Section 3.3.1, or immediately if no date is specified to the extent the termination of the Services is stated in the Corporation's Notice.

3.4.2 Upon receipt of a Notice of termination for cause or for convenience, the Consultant shall cease any or all Services, immediately or on the date specified, in accordance with the terms of the Notice.

3.4.3 Termination, whether for convenience or for cause, shall not give rise to any cause of action for damages against the Corporation or the City.

3.4.4 Within ten (10) days after the effective date of termination, the Consultant shall surrender and turn over to the Corporation all Work Product and any other materials related to this Contract requested by the Corporation including, without limitation, all materials, equipment, intellectual property to be delivered as part of the Services, and supplies purchased by the Consultant on behalf of the Corporation in connection with this Contract.

3.5 Payment Upon Termination.

3.5.1 Upon termination with or without cause, the Consultant shall promptly present to the Corporation a verified statement of all costs actually incurred prior to the date of termination, together with all documents in the Consultant's possession related thereto that the Corporation may demand in order to verify such statement of costs including, without limitation, canceled checks, subcontracts, certified and actual payrolls, and paid receipts and bills from Subcontractors. The Corporation will review the statement of costs and review or audit any supporting documentation provided by or in the Consultant's possession. The Corporation will Notify the Consultant of the results of such review or audit and the amount approved for payment.

3.5.2 If the termination was without cause, the Consultant shall receive such equitable compensation for such Services as shall, in the judgment of Director, have been satisfactorily performed by the Consultant up to the date of the termination, such compensation to be fixed by the Corporation after consultation with the Consultant, subject to any rights of audit provided herein. Such payment will be processed by the Corporation after Consultant provides all information and documentation required hereunder. Such payment shall constitute full and Final Payment to the Consultant.

3.5.3 If the termination was for cause, the Consultant shall receive such equitable compensation for such Services as shall, in the judgment of Director, have been satisfactorily

performed by the Consultant up to the date of the termination, such compensation to be fixed by the Corporation, subject to any rights of audit provided herein, where such compensation shall be subject to set-off by the Corporation for any additional expenses the Corporation incurs to complete the Project satisfactorily including, but not limited to, the expenses of engaging another consultant, attorney's fees the Corporation incurs as a result of or arising from such termination for cause, and the costs set forth in Section 9.10(ii). The sum of (i) such additional expenses incurred to the Corporation for the completion of the Project, and (ii) payments made to the Consultant prior to the termination of the Contract shall hereafter be referred to as the "Contract Completion Costs".

3.5.3.1 If the Contract Completion Costs exceed the Maximum Contract Price, Consultant shall pay such difference to the Corporation, as described in Section 3.5.4 below.

3.5.3.2 If the Contract Completion Costs are less than the Maximum Contract Price, provided that the Consultant has provided all information and documentation required by this Section, the Corporation will pay to the Consultant, an amount equal to the lesser of (a) the difference between the Maximum Contract Price and the Contract Completion Costs, or (b) such amount, when added to sums previously paid to Consultant, equitably compensates Consultant for Services satisfactorily performed up to the date of termination. Such payment will be made as further described in Section 3.5.4 below.

3.5.4 If the termination was for cause, the Corporation will, upon full completion of the Project, deliver a written notice to the Consultant advising the Consultant that the Project has been completed and setting forth the Contract Completion Costs. If the Contract Completion Costs exceed the Maximum Contract Price, the Consultant shall promptly pay such difference to the Corporation upon receipt of such notice. If the Contract Completion Costs are less than the Maximum Contract Price, then, subject to (i) the Consultant's providing to the Corporation all information and documentation required by this Section, and (ii) any other applicable provisions of this Contract including, without limitation, Sections 3.5.5 and 3.5.6 hereof, the Corporation will pay the Consultant the amount described in Section 3.5.3(ii). Such payment shall constitute full and Final Payment to the Consultant.

3.5.5 The Corporation need not wait until the completion of the Services to seek the enforcement of its rights against the Consultant if there has been a termination for cause, but no monies shall be due or payable to the Consultant terminated for cause until the Services are completed.

3.5.6 The provisions of this Section 3.5 shall be in addition to any other rights the Corporation may have under this Contract, any Applicable Requirement, any Applicable Agreement, or otherwise, in law or in equity.

3.6 No Release. Termination of this Contract, whether by expiration of its Term or otherwise, shall not release the Consultant from any liability to the Corporation or from the

Consultant's indemnification and other obligations under this Contract, except for those obligations that have been specifically terminated pursuant to this Article of the Contract.

ARTICLE 4
PERSONNEL AND SUBCONTRACTORS

4.1 Personnel.

4.1.1 The Consultant shall at its own expense employ all personnel and retain all Subcontractors as may be required to perform the Services, and shall be solely responsible for their work, compensation, direction, compliance, and conduct during the performance of this Contract. The personnel of the Consultant and any Subcontractor shall cooperate fully with the personnel of the Corporation including, without limitation, the Director, and, in the event any personnel of the Consultant or any Subcontractor fails to cooperate, the Consultant shall relieve them of their duties of performance under this Contract.

4.1.2 The Consultant shall submit to the Director, prior to performance of Services by such personnel, resumes of the Consultant's personnel and those of its Subcontractors' personnel who will perform the Services. The experience and training of such personnel is a material inducement for the Corporation to enter into this Contract and make payment for the Services. The Consultants represent that the resumes of Consultant and its' Subcontractors are materially accurate when submitted. The Consultant and its Subcontractors are expected to use such personnel to perform the Services. If the Consultant or a Subcontractor proposes to substitute any other personnel for those heretofore identified, it shall assign persons with equivalent or better experience and training and shall submit the resumes of such proposed substitute personnel to the Director and obtain the Director's prior approval of the substitution. Notwithstanding anything contained herein to the contrary, all personnel furnished by the Consultant as required under this Contract shall be employees of the Consultant or approved Subcontractors of the Consultant and not employees or subcontractors of the Corporation or the City.

4.2 Subcontractors.

4.2.1 The Consultant shall submit subcontracts for specialized professional services as required for performance of the Services subject to the Director for prior written approval regarding the scope of services, compensation, and the Principal or other member(s) of the Consultant's staff responsible for supervising the performance of the Subcontractor's activities. The Consultant is solely responsible for the Subcontractor's work, acts, and omissions.

4.2.2 The Consultant shall pay all Director-approved Subcontractors for work that has been satisfactorily performed no later than thirty (30) days from the date of Consultant's receipt of payments from the Corporation.

4.2.3 The Consultant is solely responsible for the payments to the Subcontractors. Upon receipt of evidence of Consultant default regarding its payment obligations to its Subcontractors, the Corporation upon three (3) calendar days prior Notice may retain any money due the Consultant pay such Subcontractors directly for labor, materials,

equipment, Services and all other obligations of the Consultant, and may deduct the amount of any such direct payments from any payments or amounts then due or thereafter become due to the Consultant.

4.2.4 The Consultant shall inform all Subcontractors fully of the terms and conditions of this Contract. All subcontracts shall provide that:

4.2.4.1 there is no privity of contract between the Subcontractor and the Corporation or the City;

4.2.4.2 neither the Corporation nor the City will incur any liability by virtue of any act, omission, negligence, or obligation of the Subcontractor or the Consultant;

4.2.4.3 the Subcontractor shall indemnify, defend, and hold harmless the Corporation and the City, their agents, employees, members, directors, officials and officers against any and all claims, judgments, loss, cost, expense (including attorneys' fees), or liabilities to which they may be subject (including, without limitation, any and all claims for injuries to persons (including death) and damage to property) because of any negligence or any fault or default of the Subcontractor, its agents, employees or subcontractors or the breach of the Subcontractor's obligations under the subcontract;

4.2.4.4 the Subcontractor's Requisitions shall conform to the same requirements and include the representations, warranties, and agreements set forth in Sections 2.1.2 and 2.1 3;

4.2.4.5 the "Events of Default" set forth in Section 3.3.2 as grounds for termination for cause shall be "Events of Default" and grounds for termination of the Subcontractor for cause;

4.2.4.6 the subcontract may be assigned without the written consent of the Subcontractor to the City, NYCEDC or any other corporation, agency or instrumentality having authority to accept the assignment; and

4.2.4.7 all work and services performed under the subcontract shall strictly comply with the requirements of this Contract.

If the Consultant fails to include the provisions set forth in this Section 4.2.4 in any subcontract, the Consultant shall indemnify, defend, and hold harmless the Corporation and the City and their Representatives against any and all claims, damages, awards, judgments, liabilities, expenses, fines, penalties, costs, and/or fees incurred by or imposed upon the Corporation and the City and their Representatives, including reasonable fees, as a result of said failure.

4.2.5 The Consultant shall provide the Corporation with a list of all Subcontractors employed for the performance of the Services whose subcontract amount totals $25,000 or more. The Consultant will furnish each such Subcontractor whose Subcontract amount totals less than $100,000 with the Corporation's internal qualification and background

investigation forms. The Consultant will furnish each such subcontractor whose subcontract amount totals $100,000 or more with the Mayor's Office of Contracts Investigations Forms. These forms will be provided by the Corporation to the Consultant. The Consultant shall cause each such Subcontractor to fill out and complete the forms in a timely fashion but in no event later than the commencement of the Services performed by such Subcontractor pursuant to its subcontract.

4.3 Person in Charge. The Consultant has designated a Person-in-Charge who will have primary responsibility and authority to perform and/or supervise and coordinate the performance of the Services. Substitution of said person shall be made only with the prior written approval of the Director. Failure to make such person(s) available to the extent necessary to perform the Services skillfully and promptly shall be a material violation of the terms of this Contract.

ARTICLE 5
DOCUMENTS AND MATERIALS

5.1 Approval. All Work Product to be prepared or furnished by the Consultant pursuant to this Contract or publicizing the work of the Consultant hereunder must be:

5.1.1 approved in writing by the Director before any Work Product or publication as to the work of the Consultant shall be considered accepted and before any distribution;

5.1.2 revised by the Consultant in accordance with the directions of the Director prior to approval; and

5.1.3 prepared so as not to violate any provisions of law including, without limitation, the City Charter and the Administrative Code of the City.

5.2 Work Product.

5.2.1 All Work Product is the exclusive property of the Corporation. The Corporation may use any Work Product prepared by the Consultant in such manner, for such purposes, and as often as the Corporation may deem advisable, in whole, in part or in modified form, in all formats now known or hereafter to become known, without further employment of or additional compensation to the Consultant.

5.2.2 The Consultant shall not use, transmit, display, publish or otherwise license such Work Product without the Corporation's prior written consent.

5.2.3 The Work Product 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 Corporation is the copyright owner thereof and of all aspects, elements and components thereof in which copyright protection might subsist. To the extent that the Work Product does not qualify as a "work-made-for-hire", the Consultant hereby irrevocably transfers, assigns and conveys exclusive copyright ownership in and to the Work Product to the Corporation, free and clear of any liens, claims, or other encumbrances. The Consultant shall retain no copyright or other intellectual property interest in the Work Product.

5.2.4 To the extent that the Work Product does not qualify as a "work-made-for hire", Consultant acknowledges the existence, if any, of its statutory moral rights as those rights are described in 17 U.S.C. § 106A(a), and knowingly executes this Contract on the following terms: (i) this waiver applies to the Work Product and to any promotional materials connected with the Work Product; (ii) the Consultant hereby expressly and forever waives any and all rights under 17 U.S.C. § 106A, and any rights arising under U.S. federal or state law or under the laws of any other country that conveys rights of the same nature as those conveyed by 17 U.S.C. § 106A, or any other type of moral right or *droit moral*.

5.2.5 The Consultant represents and warrants that, except for material which is in the public domain and non-original material that meets the requirements of §5.2.6, the Work Product:

5.2.5.1 shall be wholly original material not published elsewhere;

5.2.5.2 shall not violate any copyright, trademark or other applicable law; and

5.2.5.3 shall not, to the best of Consultant's knowledge, constitute a defamation or invasion of the right of privacy or publicity, or an infringement of any kind, of any rights of any third party.

5.2.6 The Consultant represents and warrants that to the extent that the Work Product incorporates non-original material, the Consultant shall obtain and provide the Corporation with copies of all necessary licenses, permissions, and/or clearances, in writing, for the use of such non-original material under this Contract. Since some licenses for materials may be for a limited duration, the Consultant shall provide and/or specify the following to the Corporation with respect to all non-original materials included in its Work Product:

5.2.6.1 all information as to any durational limitations on use;

5.2.6.2 any requirement that a notice be displayed in connection with display, including the specific owner of the rights to be credited, and any limitation on the use under the Consultant's license; and

5.2.6.3 a statement certified by the Principal verifying the foregoing in the form annexed hereto as Appendix D.

Consultant will update the foregoing information and promptly provide such updates to the Corporation during the Contract Term.

5.2.7 The Consultant acknowledges that the Corporation or the City may, in their sole discretion, register copyright in the Work Product with the U.S. Copyright Office or any other government agency authorized to grant registrations to copyright. The Consultant will cooperate in this effort and agrees to provide any further documentation necessary to accomplish such copyrighting.

5.2.8 The Consultant agrees that the Corporation and the City may use the Consultant's name and the names, biographies, and likenesses of its members, in advertising and promotion related to the Work Product, and in any and all ancillary products related to the Services regardless of the format in which such use occurs.

5.2.9 Prior to acceptance of any Work Product by the Director, upon the Director's request and within a reasonable time following delivery of the Work Product, the Consultant shall submit revised Work Product incorporating any revisions, changes, or alterations reasonably requested by the Director. If the original Work Product or the revised Work Product is not acceptable to the Director, the Corporation shall have the right to use the Work Product, to prepare or finalize the Work Product or to commission a third party to do so without further employment of or compensation to the Consultant.

5.2.10 The Consultant acknowledges that the decision to accept the Work Product for use, incorporation, transmission, display, or publication is within the sole discretion of the Director.

5.2.11 Consultant agrees that it will cooperate in providing any other documentation necessary to effectuate the intent of this Section of the Contract.

5.2.12 The Consultant shall not make any unauthorized use of copyrighted, trademarked, or other protected materials or intellectual property and agrees to defend, indemnify and hold harmless the Corporation and the City and their respective officers, officials, agents, members, directors, and employees against any damage or liability arising out of the Consultant's infringement or unauthorized use of any such material or property.

5.3 Confidential Information.

5.3.1 The Consultant shall hold all Confidential Information provided by the Corporation in the strictest confidence. Consultant agrees to:

5.3.1.1 use the Confidential Information solely for evaluation and the performance of the Services under this Contract;

5.3.1.2 not disclose the Confidential Information outside of its Subcontractors who have agreed in advance in writing to be bound by the terms of this Section 5.3 and its employees and to limit dissemination to only those Subcontractors and employees who have a need to know it in order to accomplish the Services;

5.3.1.3 execute any confidentiality agreements required by any governmental or other entities or individuals which provide any information, records, data, materials, documents, or electronic files to Consultant for use in performance of the Services; and

5.3.1.4 not disclose the Confidential Information for three (3) years following Final Completion.

5.3.2 Consultant represents that it has adequate safeguards and procedures to protect the confidentiality of records and information and to limit dissemination only to authorized employees as necessary for the performance of the Services. All Confidential Information provided to Consultant shall remain the property of the Corporation. The Corporation grants no license to use the Corporation's Confidential Information beyond that required for Consultant to complete the Services in accordance with this Contract.

5.3.3 Consultant agrees that money damages would not be a sufficient remedy in the event of any breach of this Section 5.3 and that, in addition to all other remedies which may be available to the Corporation under this Contract, in law, or in equity, the Corporation shall be entitled to specific performance and injunctive or other equitable relief as a remedy for any such breach. Consultant shall defend, hold harmless, and indemnify the Corporation for any and all claims, losses, expenses and/or damages arising out of breach of this Section 5.3 or unauthorized use of the Confidential Information, including attorneys' fees.

ARTICLE 6
INDEMNIFICATION, CLAIMS AND INSURANCE

6.1 Indemnification of the Corporation and the City.

6.1.1 To the fullest extent permitted by Law, the Consultant shall defend, indemnify, and hold harmless the Corporation and the City, including their officials and employees, against any and all claims (even if the allegations of the claim are without merit), judgments for damages on account of any injuries or death to any person or damage to any property, and any loss, costs, or expenses (including attorneys' fees) to which the Corporation or the City, their officials or employees, may be subject to or which they may suffer or incur allegedly arising out of any of the operations of the Consultant and/or its subcontractors under this Agreement to the extent resulting from any negligent act of commission or omission, any intentional tortious act, and/or the failure to comply with Law or any of the requirements of this Agreement. Insofar as the facts or Law relating to any of the foregoing would preclude the Corporation or the City, their officials or employees from being completely indemnified by the Consultant, the Corporation and the City and their officials and employees shall be partially indemnified by the Consultant to the fullest extent permitted by Law.

6.1.2 Infringement Indemnification. To the fullest extent permitted by Law, the Consultant shall defend, indemnify, and hold harmless the Corporation and the City, including their officials and employees, against any and all claims (even if the allegations of the claim are without merit), judgments for damages, and any loss, costs, or expenses (including attorneys' fees) to which the Corporation or the City or its officials or employees, may be subject to or which they may suffer or incur allegedly arising out of any infringement, violation, or unauthorized use of any copyright, trade secret, trademark or patent or any other property or personal right of any third party by the Consultant and/or its employees, agents, contractors or subcontractors in the performance of this Agreement. To the fullest extent permitted by Law, the Consultant shall defend, indemnify, and hold harmless the Corporation and the City, their officials and employees regardless of whether

or not the alleged infringement, violation, or unauthorized use arises out of compliance with the Agreement's scope of services/scope of work. Insofar as the facts or Law relating to any of the foregoing would preclude the Corporation or the City, their officials and employees from being completely indemnified by the Consultant, the Corporation and the City and their officials and employees shall be partially indemnified by the Consultant to the fullest extent permitted by Law. Such indemnity shall specifically extend to the costs to procure either non-infringing intellectual property or a license to use such intellectual property for which such indemnity is being provided.

6.1.3 Indemnification Obligations Not Limited By Insurance Obligation. The Consultant's obligation to indemnify, defend and hold harmless the Corporation and the City and their officials and employees shall neither be (i) limited in any way by the Consultant's obligations to obtain and maintain insurance under this Agreement, nor (ii) adversely affected by any failure on the part of the Corporation or the City or their officials or employees to avail themselves of the benefits of such insurance.

6.2 Claims or Actions Against the Corporation.

6.2.1 The Consultant shall look solely to the funds appropriated by the Corporation for this Contract for the satisfaction of any claim or cause of action the Consultant may have against the Corporation in connection with this Contract or the failure of the Corporation to perform any of its obligations hereunder. In no event shall the Corporation's aggregate liability, whether in contract, tort (including negligence), strict liability, warranty or any other theory, hereunder in connection herewith or related to the performance of the Services exceed the Maximum Contract Price.

6.2.2 Upon acceptance by the Consultant of the Final Payment to be paid pursuant to this Contract, the Consultant agrees that it shall be deemed to have released the Corporation from any and all claims, causes of action, and liability to the Consultant, its Representatives, successors and assigns, in connection with this Contract or the performance of the Services.

6.2.3 No member, director, employee, servant, officer, agent, or other person authorized to act on behalf of the Corporation shall have any personal liability in connection with this Contract or any failure of the Corporation to perform its obligations hereunder.

6.2.4 No person or entity shall have any right against the Director or any member, director, employee, servant or officer, agent of the City or the Corporation or other person authorized to act on their behalf or any claim against the City or the Corporation by reason of the failure or refusal to withhold money pursuant to Section 2.2.1 hereof.

6.2.5 The Consultant agrees that no cause of action against the Corporation in connection with this Contract or the Services shall lie or be maintained by the Consultant, its successors or assigns unless such action is commenced within six months after (i) the termination of this Contract, or (ii) the accrual of the cause of action, whichever is earlier.

6.2.6 If any claim is made or any action brought relating to this Contract or the Services, whether or not the Consultant is a party, the Consultant shall diligently render to the

Corporation any and all assistance that the Corporation may require of the Consultant, without compensation.

6.2.7 In no event shall the Corporation or the City be liable to the Consultant or its Subcontractors, whether in contract, tort (including negligence), warranty, strict liability or any other legal theory, for loss of anticipated profits or revenue or for any special, indirect, consequential, punitive or exemplary damages, such as, but not limited to, cost of capital, loss of use of resources or personnel, loss of reputation, or opportunity costs.

6.2.8 The provisions of this Section shall not waive, limit or in any way prejudice any other right of the Corporation or the City.

6.3 Insurance.

6.3.1 At all times during the performance of the work or Services in connection with this Contract or for such other time periods as the Corporation may require, the Consultant, at its sole cost and expense, shall purchase and maintain the insurance described in this Section 6.3 and the annexed Appendix E, as may be applicable and as may be required by the Corporation.

6.3.2 Consultant shall purchase and maintain insurance with insurance companies that

6.3.2.1 are acceptable to the Corporation;

6.3.2.2 are rated A-:VII or better by A.M. Best Company; and

6.3.2.3 are licensed to issue such insurance by the New York State Department of Insurance.

6.3.3 The insurance policies purchased and maintained by the Consultant shall:

6.3.3.1 be in form and substance satisfactory to the Corporation;

6.3.3.2 be in the minimum face policy amounts set forth in Appendix E;

6.3.3.3 list all individuals and entities identified in Appendix E as Additional Insureds except in the case of any workers' compensation, automobile liability (unless provided for automatically under ISO Form CA 00 01) and professional liability policies required to be maintained hereunder;

6.3.3.4 include a waiver of the right of subrogation with respect to the Additional Insureds on (1) all policies that provide additional insured coverage to the Additional Insureds and (2) the Workers' Compensation policy; and

6.3.3.5 contain the provisions set forth in Appendix E.

6.3.4 Coverage for the individuals and entities identified in Appendix E as Additional Insureds shall be written into those policies set forth in Section 6.3.3 above as an

endorsement at least as broad as the most recent edition of ISO Form CG 20 26 or its equivalent If applicable, Subcontractors may not use blanket additional insured endorsements to provide coverage to Additional Insureds "by written contract" other than ISO CG 20 38 or its equivalent endorsement which shall not require any contract or agreement between the Additional Insureds and the Subcontractors.

6.3.5 The Consultant shall make and maintain timely premium payments for all policies required hereunder.

6.3.6 The Consultant shall require that each of its Subcontractors, prior to the commencement of their work, purchase and maintain, or be covered by, at no cost or expense to the Corporation or the City, the same types and amounts of insurance and meet all of the same requirements as required of the Consultant as set forth in this Article 6 and Appendix E. The Consultant hereby covenants and warrants that (1) its Subcontractors shall purchase and maintain the policies required by this Section in the amounts and for the periods required by this Section, (2) it shall contractually require its Subcontractors to add the Additional Insureds as set forth in this Article 6 and Appendix E and as specifically outlined in 6.3.4, and (3) it shall review and ensure that its Subcontractors are in compliance with the requirements in this Article 6 and Appendix E and provide the required documentation as needed to the Corporation evidencing such compliance.

6.3.7 Prior to the commencement of the Services the Consultant shall forward to the Corporation's Contract Administration and Procurement Department at least three (3) original certificates of insurance for each policy required for compliance with this Contract and a signed Contractor Insurance Cover Sheet, for itself and its Subcontractors substantially as set forth in Appendix E. The Consultant shall also provide an original certificate of insurance to each of the Additional Insureds with a copy of any endorsements providing coverage to the Additional Insureds as required in this Section 6.3. For such forms that include a place to designate the certificate holder, the certificate holder shall be listed as: New York City Economic Development Corporation, Attn: Contracts, 110 William Street, New York, New York 10038.

6.3.8 As required by N.Y. Workers' Compensation Law §§ 57 and 220(8), the Consultant shall submit proof of workers' compensation insurance, disability benefits insurance, and the payment of family leave benefits (or proof of a legal exemption) to the Corporation in a form acceptable to the New York State Workers' Compensation Board. ACORD forms are not acceptable proof of such insurance. The following forms are acceptable:

6.3.8.1 Form C-105.2, Certificate of Workers' Compensation Insurance;

6.3.8.2 Form U-26.3, State Insurance Fund Certificate of Workers' Compensation Insurance;

6.3.8.3 Form SI-12, Certificate of Workers' Compensation Self-Insurance;

6.3.8.4 Form GSI-105.2, Certificate of Participation in Worker's Compensation Group Self-Insurance;

6.3.8.5 Form DB-120.1, Certificate of Disability Benefits Insurance;

6.3.8.6 Form DB-155, Certificate of Disability Benefits Self-Insurance;

6.3.8.7 Form CE-200 – Affidavit of Exemption;

6.3.8.8 Other forms approved by the New York State Workers' Compensation Board;

6.3.9 The Consultant shall provide the Corporation and the Additional Insureds written confirmation of the renewal of any policy required hereunder no less than five (5) days prior to the expiration of any such policy.

6.3.10 Unless otherwise agreed to in writing by the Corporation, the types of insurance to be purchased and maintained by the Consultant and its Subcontractors are as follows:

6.3.10.1 Workers' Compensation, Disability Benefits, and Employer's Liability Insurance. The Consultant shall purchase and maintain and shall require each of its Subcontractors to purchase and maintain workers' compensation, disability benefits insurance in statutory amounts, and employer's liability insurance in the amounts set forth in Appendix E, for all of its employees engaged in the Services. The failure of the Consultant to comply with this Section 6.3.9(i) shall make this Contract voidable at the option of the Corporation.

6.3.10.2 Commercial General Liability Insurance. The Consultant shall purchase and maintain commercial general liability insurance to protect the Corporation, the City and the Additional Insureds, the Consultant and its Subcontractors against any and all claims for property damage, personal injury and death arising out of the Services performed by the Consultant and its Subcontractors, and any work incidental thereto. The commercial general liability insurance policy must also include products and completed operations coverage, which shall include a provision that coverage will extend for a period equivalent to the statute of repose applicable to the Consultant's work, but shall be at least six (6) years for any Services involving renovation, maintenance, construction, or maintenance, from the date of final completion and acceptance by the Corporation of all of the Services. The certificate of insurance must indicate that such insurance is on a "per occurrence" and per project aggregate basis. The commercial general liability policy shall be in a form at least as broad in coverage as the most recent edition of ISO Form CG 00 01 in effect as of the date hereof and shall not contain any modifications to the severability of interests, contractual liability, and employer's liability coverages included therein. The liability policy(ies) certificate of insurance must indicate cross-liability coverage providing severability of interests so that, except with respect to the limits of insurance, and any rights or duties specifically assigned to the first named insured, coverage will respond as if separate policies were in force for each insured. If at any time the commercial general liability policy should be canceled, terminated, or modified so that the insurance is not in effect as above required, then the Consultant shall suspend

performance of the Services if the Corporation shall so direct. If the Contract is so suspended, no extension of time shall be due on account thereof. If the Contract is not suspended, whether or not because of omission of the Corporation to order suspension, then the Corporation may, at its sole option, obtain insurance affording coverage equal to that required hereunder, the cost of such insurance to be payable by the Consultant to the Corporation.

6.3.10.3 Automobile Liability Insurance. If the Consultant and its employees use any automobiles (whether personal, owned, non-owned rented, and/or hired automobiles) in connection with the work or Services under this Contract, then the Consultant shall purchase and maintain automobile liability insurance covering all automobiles used in connection with the work or Services. Coverage shall be at least as broad as the latest edition of ISO Form CA 00 01. If Consultant and/or its employees only use owned non-commercial personal vehicles for operations under this Agreement, Consultant and/or its employees must purchase and maintain either (1) hired & non-owned automobile liability insurance covering Consultant and its employees or (2) personal automobile insurance covering commercial use of the vehicle.

6.3.10.4 Umbrella/Excess Liability Insurance. If the Consultant purchases or maintains umbrella/excess liability insurance, such insurance should specifically list the Consultant's commercial general liability, automobile liability and employer's liability as primary coverages, to protect the Corporation, the City, the Additional Insureds, the Consultant and its Subcontractors from any and all claims in excess of the underlying policy limits for such primary coverages on a "follow form" basis. The certificate of insurance must indicate that such insurance afforded by this Section 6.3.9(iv) is on a "per occurrence" basis.

6.3.10.5 Professional/Errors & Omissions, with combined Pollution Liability. The Consultant (including, at a minimum, the architect, engineer, interior designer, landscape architect, land surveyor, LEED consultant, environmental monitor, remedial designer, and other parties involved in design and other soft cost activities or requiring a license to practice their profession) shall purchase and maintain professional liability/errors & omissions with combined pollution liability covering the indemnification obligations and Services to be provided under this Contract. The policy shall cover the liability assumed by the Consultant under this Contract arising out of the negligent performance of professional services or caused by an error, omission, or negligent act (including any resulting bodily injury, property damage, and emotional distress) of the Consultant and its Subcontractors or anyone employed (including independent contractors) by the Consultant, including coverage for (i) failure to render services or to perform the function intended (ii) bodily injury, property damage, and remediation expenses arising out of the release of Hazardous Materials into the environment and including the CPL and PLL (as later defined in Appendix E) policy conditions as outlined in Appendix E as applicable. Such policies shall provide coverage for fees, expenses, and defense costs. All Subcontractors of the Consultant providing professional services under this Contract for which professional liability insurance/errors and omissions

insurance is reasonably commercially available shall also maintain such insurance. The policy shall have a professional services definition that encompasses all work contemplated under this Contract, must not have exclusions for faulty workmanship, contractual liability and warranty/guaranty, and should include protective indemnity and rectification/mitigation coverages with the same aforementioned professional services definition throughout. If policy is claims-made, it must meet the requirements of Article 6.3.14. Coverage must be maintained for a period from prior to the start of Services until three (3) years or for the statute of repose applicable to the Consultant's work after the completion of services under this Contract.

6.3.10.6 Employment Practices Liability Insurance. The Consultant shall purchase and maintain employment practices liability insurance covering the indemnification obligations (including defense costs) and Services to be provided under this Contract. Coverage shall include but not necessarily be limited to employment-related perils of: (1) discrimination, (2) wrongful termination, (3) harassment, (4) retaliation, and (5) other specifically enumerated workplace torts, referred to collectively as inappropriate employment conduct or employment practices violations and also include coverage for third party claims brought by non-employees.

6.3.10.7 If applicable, any additional policies as may be described in Appendix E.

6.3.11 As a condition precedent to payment of any amounts owing to the Consultant by the Corporation, the Consultant shall, unless otherwise expressly agreed to in writing by the Corporation, provide to the Corporation the original certificates of insurance and endorsements to policies applicable to the Additional Insureds required under this Contract and shall on demand provide true copies of policies showing compliance with the insurance requirements set forth in this Article 6 and Appendix E.

6.3.12 The policies to be maintained by the Consultant hereunder that are subject to the Additional Insured requirements set forth in Section 6.3.3 (iii) above shall constitute the primary coverage for claims arising out of this Contract, and shall state that insurance, if any, carried by the Corporation, the City or the Additional Insureds will not be called upon to contribute to a loss that would otherwise be paid by the Consultant's insurer. The Consultant shall comply with the provisions of all policies required pursuant to this Contract, and shall give the insurer, the Corporation, the City and the Additional Insureds due and timely Notice of all claims, accidents and losses promptly upon its acquiring knowledge of the same.

6.3.13 The insurance provisions of this Article 6 shall be in addition to any rights that the Corporation, the City and the Additional Insureds may have under any hold harmless and indemnification provisions of this Contract and any other right provided by this Contract or by law. The Consultant shall not violate or permit to be violated any term or condition of the policies.

6.3.14 Claims-made policies will be accepted for the Professional/Errors & Omissions, Privacy Liability/Network Security, and Employment Practices Liability policies subject to a retroactive date prior to the effective date of the Contract. The Consultant shall purchase an extended reporting period coverage of not less than three (3) years or for the statute of repose applicable to the Consultant's work after the completion of services under this Contract effective on cancellation or termination of such policy unless a new policy is secured with a retroactive coverage for full prior acts.

6.3.15 The Commercial General Liability and Umbrella Excess Liability Coverage polices must be endorsed to show that these primary and/or excess policies are to be considered primary and non-contributory. In addition, the Commercial General Liability and Umbrella/Excess Liability Coverage policies must provide that (i) the Additional Insured protection afforded under the Consultant's policies shall be primary and not on an excess or contributing basis with any policies which may be available to the Corporation, and (ii) that the Consultant's policies, primary and excess, must be exhausted before implicating any Corporation policy available.

6.3.16 In order to ensure vertical erosion of liability limits provided by the Consultant under this Contract, the Consultant agrees to permit the Corporation's staff and/or the Corporation's insurance consultants to review the Consultant's liability policy language for all liability policies and to endorse those policies to clarify the hierarchy of policies in the event of a claim.

6.3.17 The limits of coverage for all types of insurance required under Appendix E shall be the greater of (A) the minimum limits set forth in Appendix E or (B) the limits provided to the Consultant and its Subcontractors under all primary, excess and umbrella policies covering operations under this Contract.

6.3.18 There shall be no self-insurance program or self-insured retention with regard to any insurance required under this Article 6 unless approved in writing by the Corporation. Under no circumstances shall Corporation be responsible for the payment of any deductible or self-insured retention (or any other aspect of a self-insurance program). Further, Consultant shall ensure that any such self-insurance program provides Additional Insureds with all rights that would be provided by traditional insurance under this Article 6, including but not limited to the defense and indemnification obligations that insurers are required to undertake in liability policies.

ARTICLE 7
REPRESENTATIONS AND WARRANTIES

The Consultant represents and warrants that:

7.1 The Consultant is duly organized, validly existing, and in good standing under the laws of its jurisdiction of formation, and has all requisite power and authority to authorize, execute, deliver and perform this Contract in accordance with its terms. The Consultant is authorized to do business in the City of New York and the State of New York.

7.2 The authorization, execution and delivery of this Contract, and compliance with the provisions hereof, do not and will not conflict with or constitute a violation of or default under any statute, indenture, mortgage, deed of trust or other agreement or instrument to which the Consultant is bound, or, to the knowledge of the Consultant, any order, rule or regulation of any court or governmental agency or body having jurisdiction over the Consultant or any of its activities or properties.

7.3 The Consultant 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.

7.4 The Consultant 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 Consultant, 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.

7.5 The Consultant has not acquired nor will it acquire any interest of any nature, direct or indirect (including any interest in land in an area related to the Services or any interest in any corporation, partnership, or other entity with any such interest), which would conflict in any manner or degree with the performance of the Services. The Consultant further represents and covenants that in the performance of this Contract no person having any such conflicting interest shall be employed by the Consultant.

7.6 The Consultant is not in arrears to the City upon any debt, contract, or taxes and is not a defaulter, as surety or otherwise, upon any obligation to the City, and has not been declared not responsible, or disqualified, by any agency of the City, nor is there any proceeding pending relating to the responsibility or qualification of the Consultant to receive public contracts. The Consultant represents that it has paid all applicable New York City income, excise and other taxes for all years it has conducted business activities in New York City.

7.7 All questionnaires and/or disclosure forms delivered by the Consultant and its Representatives to the Corporation to date are, to the best of the Consultant's knowledge, true and correct in all material respects; no material change has occurred in the circumstances of the Consultant, or any of its principals or affiliated persons or entities since the respective dates upon which such disclosure forms were executed that would otherwise require disclosure on such forms; and such disclosure forms do not contain any untrue statement of a material fact or omit to state a material fact necessary in order to make any statement contained in such form not misleading.

ARTICLE 8
APPLICABLE LAWS, RULES AND REGULATIONS

8.1 New York Law Governs; New York Courts. The Contract shall be governed by and construed in accordance with the laws of the State of New York. Any and all claims asserted by or against the Corporation arising under this Contract or related hereto shall be heard and determined either in the Federal Courts, located in the City or in the New York State Courts located in the City and County of New York. To affect this agreement and intent, the Consultant agrees as follows:

8.1.1 If the Corporation initiates any action against the Consultant in Federal Court or in New York State Court, service of process may be made on the Consultant in person, wherever the Consultant may be found, or by registered mail addressed to the Consultant at its address as set forth in this Contract, or to such other address as the Consultant shall have provided to the Corporation in writing.

8.1.2 With respect to any action between the Corporation and the Consultant in New York State Court, the Consultant hereby expressly waives and relinquishes any rights it might otherwise have (i) to move to dismiss on grounds of forum non conveniens, and (ii) to move for a change of venue to a New York State Court outside New York County.

8.1.3 With respect to any action between the Corporation and the Consultant in Federal Court located in the City, the Consultant expressly waives and relinquishes any right it might otherwise have to move to transfer the action to a Federal Court outside the City.

8.1.4 If the Consultant commences any action against the Corporation in a court located other than in the City and State of New York, then, upon request of the Corporation, the Consultant 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 pending will not or cannot transfer the action, the Consultant shall consent to dismiss such action without prejudice and may thereafter reinstitute the action in a court of competent jurisdiction in the City.

8.2 Modification Required by Law. The parties agree that each and every provision of federal or state or local law, rule, regulation or order, required to be inserted in this Contract, is deemed by this reference to be so inserted in its correct form, and upon the application of either party, this Contract shall be amended by the express insertion of any such provision not so inserted or so inserted incorrectly so as to comply strictly with the law, without prejudice to the rights of either party.

8.3 Compliance with the Law. The Consultant agrees that all acts to be performed by it in connection with this Contract shall be performed in strict conformity with all Legal Requirements, including without limitation, Applicable Requirements and Applicable Agreements. Failure by the Consultant to abide by such Legal Requirements shall be a material default under this Contract.

8.4 Equal Employment Opportunity/Employment Reports.

8.4.1 The Consultant shall comply with the applicable provisions of the Equal Employment and Affirmative Action Compliance for Non-Construction Contracts Addendum (the "Executive Order No. 50 (1980) Supply and Service Rider" or "E.O. 50") attached hereto as Appendix F and made a part hereof. Appendix F shall be attached to and made a part of any subcontract entered into by the Consultant pursuant to this Contract that exceeds $100,000.

8.4.2 The Consultant covenants that it shall complete and submit and shall require all Subcontractors to complete and submit Employment Reports (as required by E.O. 50) to the Corporation which can be found at www.nycedc.com in the section identified in

Appendix G. If the Consultant cannot access or download these forms, the Corporation may, upon request, send the Consultant the required forms.

8.4.3 The Consultant and any subcontractor that provide any on-site construction activity shall complete and submit the Payroll Report to the Corporation in the form annexed to this Contract as Appendix C.

8.4.4 The Consultant shall give consideration to employing City residents who are economically disadvantaged or are eligible under any applicable Legal Requirements including, without limitation, the Workforce Investment Act of 1998, and who have qualifications and skills commensurate with the requirements for the position available. To the greatest extent feasible, the Consultant shall give opportunities for training and employment to lower income persons in the Project area.

8.4.5 The provisions of this Section 8.4 shall be deemed supplementary to, and not in lieu of, or in substitution for, the applicable provisions of the New York State Labor Law relating to non-discrimination, and other applicable Legal Requirements.

8.5 Minimum Wages. Except for any employees whose prevailing wage is required to be fixed pursuant to Section 220, et seq. and Section 230, et seq. of the New York State Labor Law, which employees shall be paid such prevailing wage, all persons employed by the Consultant or any subcontractor in the manufacture or furnishing of the supplies, materials, or equipment, or the furnishing of work, labor or services, used in the performance of this Contract, shall be paid, without subsequent deduction or rebate unless expressly authorized by law, not less than the minimum hourly rate required by law, unless a higher amount is required pursuant to any other provision of this Contract.

8.6 No Tropical Hardwoods. Tropical hardwoods, as defined in Section 165 of the New York State Finance Law, shall not be used in the performance of this Contract except as expressly permitted by the foregoing provision of law.

8.7 Sales and Use Tax.

8.7.1 The Consultant acknowledges that the Corporation and the City are exempt from sales and use taxes imposed by Article 28 of the New York State Tax Law for purchases of tangible personal property, to the extent that such property is used to alter, maintain or improve, and becomes an integral component part of real property. This exemption does not apply to tools, machinery, equipment or other property leased by the Corporation's contractors and subcontractors or to supplies, materials or other property that are consumed in the construction or for any reason not incorporated into real property.

8.7.2 The Consultant shall inform its Subcontractors of this exemption and shall advise its Subcontractors to exclude sales and use taxes from their bids, as applicable.

8.8 Whistleblowers.

8.8.1 In accordance with Section 12-113 of the New York City Administrative Code (the "Administrative Code"),

8.8.1.1 The Consultant 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 of the Consultant or any of its Subcontractors to (i) the Corporation, (ii) the City's Department of Investigation, (iii) a member of the New York City Council, the City's Public Advocate or the Comptroller, or (iv) the City Chief Procurement Officer, DSBS Chief Contracting Officer ("DSBS ACCO") or DSBS Commissioner.

8.8.1.2 If any of the Consultant's officers or employees believes that s/he or has been the subject of an adverse personnel action in violation of paragraph 8.8.1.1 above, s/he shall be entitled to bring a cause of action against the Consultant 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. An officer or employee described in this paragraph may bring an action in any court of competent jurisdiction for such relief. An officer or employee who brings a cause of action pursuant to this paragraph shall notify the DSBS ACCO or DSBS Commissioner of such action; provided, however, that failure to provide such notice shall not be a jurisdictional defect, and shall not be a defense to an action brought pursuant to this paragraph. This paragraph shall not be deemed to create a right of action against the City, any public agency or other public entity, or the Corporation, nor shall any such public agency, entity or corporation be made a party to an action brought pursuant to this subdivision.

8.8.2 In accordance with Section 6-132 of the Administrative Code, the Consultant shall post a notice in the form annexed hereto at Exhibit L.

8.8.3 For purposes of this Section, "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.

8.9 MacBride Principles. The Consultant stipulates and agrees to comply with the MacBride Principles.

8.10 Iran Divestment Act. The Contractor shall comply with Section 165-a of the New York State Finance Law.

8.11 Paid Sick Leave Law. The Consultant shall comply with Title 20, Chapter 8 of the New York City Administrative Code related to paid sick leave for Consultant's employees.

8.12 Doing Business Data Form Requirements.

8.12.1 Local Law No. 34 of 2007 amended the City's Campaign Finance Law and required the City to establish a database containing the names of any "person" that has "business with the city", as such terms are defined in LL 34. The Consultant shall comply with all requirements of LL 34 applicable to this Contract.

8.12.2 The Consultant shall complete and submit a Doing Business Data Form which can be found at www.nycedc.com. If the Consultant cannot access or download these forms, the Corporation may, upon request, send the Consultant the required forms.

8.12.3 The Consultant's failure to complete and submit a Doing Business Data Form and/or its submission of a form that is not accurate or complete may result in appropriate sanctions.

ARTICLE 9
M/WBE REQUIREMENTS

9.1 M/WBE Program. Local Law No. 129 of 2005 added and Local Law 1 of 2013 amended Section 6-129 of the Administrative Code of the City of New York (hereinafter "Section 6-129"). Section 6-129 establishes a program for participation in City procurement by minority-owned business enterprises ("MBEs") and women-owned business enterprises ("WBEs", together with "MBEs" collectively referred to as "M/WBEs"), certified in accordance with Section 1304 of the City Charter. As stated in the 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. The Corporation endorses these goals and has adopted an M/WBE Program to further participation by MBEs and WBEs in the provision of the Services. All Consultants shall comply with all requirements of the Corporation's M/WBE Program applicable to this Contract.

9.2 Minority and Women -Owned Business Enterprises. M/WBE firms must be certified by DSBS to credit such firms' participation toward attainment of the Participation Goals. Such certification must occur prior to the firms' commencement of work.

9.3 Participation Goal.

9.3.1 The Participation Goal for this Contract is set forth in Part I, Section 1.12. 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 as MBEs or WBEs, and/or by crediting the participation of the Consultant.

9.3.2 The Participation Goal is a material term of the Contract and the Consultant shall be subject to the Participation Goal.

9.3.3 A consultant that is an M/WBE shall be permitted to count its own participation toward fulfillment of the Participation Goal, provided that the value of the Consultant's participation shall be determined by subtracting from the total value of the Contract any amounts that the Consultant pays to direct Subcontractors. The value of an M/WBE Consultant's participation shall be determined by subtracting from the total value of the Contract any amounts that the respondent will pay to direct Subcontractors. If the Consultant is not an M/WBE, it must meet the Participation Goal through the awarding of subcontracts to firms certified with DSBS as MBEs or WBEs.

9.3.4 A Consultant that is a Qualified Joint Venture shall be permitted to count a percentage of its own M/WBE participation toward fulfillment of the Participation Goal. The value of the Qualified Joint Venture's participation shall be determined by first subtracting from the total value of the Contract, any amounts that the Qualified Joint Venture will pay to direct Subcontractors. Thereafter, the M/WBE percentage of the Qualified Joint Venture shall be applied to the remaining value of the Contract to determine the overall Participation Goal.

9.4 M/WBE Narrative /Subcontractors Participation Plan.

9.4.1 The M/WBE Narrative, Subcontractors Participation Plan and applicable forms for this Contract are attached hereto as Appendix H. If this is a retainer, the Consultant shall submit a Subcontractor Participation Plan on a task by task basis as required.

9.4.2 Subcontractors Participation Plan for this Contract is annexed hereto as Appendix H.

9.4.3 In the event that the Corporation does not approve a Subcontractor proposed by the Consultant, the Consultant shall have a reasonable time to propose alternate Subcontractors.

9.5 M/WBE Compliance Reports.

9.5.1 The Consultant shall provide the Corporation with written statements ("M/WBE Compliance Reports"), certified under penalty of perjury, reporting the status of the Consultant's compliance with its M/WBE Subcontractor Participation Plan as set forth in this Section 9.5.

9.5.2 The Consultant shall submit a M/WBE Compliance Report to the Corporation:

9.5.2.1 with each Requisition for payment; and/or

9.5.2.2 on a periodic basis as the Corporation may require.

9.5.3 Each M/WBE Compliance Report shall set forth the following for the period covered by the report:

9.5.3.1 the total amount paid to Subcontractors (including Subcontractors that are not MBEs or WBEs);

9.5.3.2 the names, addresses and contact numbers of each MBE or WBE hired as a Subcontractor pursuant to such plan as well as the dates and amounts paid to each MBE or WBE.

9.5.4 In addition to the foregoing, the Consultant shall submit a final, cumulative M/WBE Compliance Report to the Corporation with its Requisition for Final Payment. The Consultant shall set forth in such final report the information required by Section 9.5.3 in connection with all Services rendered by the Consultant and its Subcontractors during the entire Contract Term.

9.6 Subcontractor Payment Tracking. NYCEDC requires contractors and consultants to track subcontractor award and payment information online through the Compliance Tracking System (CTS). Prime Contractors and Consultants are responsible for entering contact and award information on all subcontractors associated with the project, and ensuring that any direct subcontractors do the same for second-tier subcontractors they are using on the project. When Prime Consultants/Contractors receive payments from NYCEDC, they will receive a system-generated notification prompting them to access CTS and enter information on how much of that payment was retained and the amounts paid to each subcontractor, along with dates of payment. Prime Consultants/Contractors have seven days from receipt of this notification to enter the required information in the CTS. In addition, any changes to subcontractors and award amounts must be tracked in this system.

The compliance tracking system can be accessed by following this link:
https://nycedc.mwdbe.com/

9.7 Change Orders. If the Consultant requests a change order having a value that exceeds ten percent (10%) of the Contract, the Corporation will establish an M/WBE participation goal for the work to be performed pursuant to the change order.

9.8 Good Faith Efforts / Modification of the Consultant's Subcontractors Participation Plan.

9.8.1 Good Faith Efforts. Consultants should document their good faith efforts towards adherence to their Participation Plan and fulfilling the Participation Goal, at reasonable intervals throughout the Contract Term. The Corporation may request written updates and evidence of good faith efforts from the Consultant at reasonable intervals throughout the Contract Term. All written advertisements, notices, and other solicitations referenced herein shall contain, when applicable, the a) name and location of the project, b) bid proposal due date, which shall not be less than thirty (30) days from the date of the first notice, c) scope of work, d) location where the firm can review plans and specifications, e) contact information for questions and assistance, and f) any special requirements. In determining whether the Consultant has made all reasonable, good faith efforts to meet the Participation Goal, the Corporation will consider, along with any other relevant factors, evidence submitted by the Consultant showing that the Consultant has, without limitation, conducted the following:

9.8.1.1 Advertised Opportunities. The Consultant advertised opportunities to participate in the Contract in general circulation media, trade and professional association

publications, small business media, publications of M/WBE organizations, and other local organizations as may be necessary;

9.8.1.2 Direct Outreach. The Consultant shall provide written timely notice to M/WBEs of specific opportunities to participate in the Contract and sent timely written follow-up notices to advise M/WBEs that their interest in the Contract was solicited;

9.8.1.3 ConstructNYC Subcontractor List. The Consultant made efforts to contact interested M/WBEs listed on the Website located at https://www.nycedc.com/opportunities/opportunity-mwdbe .

9.8.1.4 Substitution of Work. The Consultant made efforts to identify portions of the Contract Work that could be substituted for portions originally designated for the participation by M/WBEs in the M/WBE Subcontractors Participation Plan and for which the Consultant claims an inability to retain M/WBEs;

9.8.1.5 Meeting with M/WBEs. The Consultant held meetings with M/WBEs prior to the date their proposals were due, for the purpose of explaining in detail the scope and requirements of the work for which their proposals were solicited;

9.8.1.6 Negotiated with M/WBEs. The Consultant made efforts to negotiate with M/WBEs as relevant to perform specific subcontracts, or acts as suppliers or service providers; and

9.8.1.7 NYCEDC Assistance. The Consultant submitted timely requests for assistance to the Corporation's M/WBE liaison officer and provides the Corporation with a description of how the Corporation's recommendations, which may, amongst other recommendations, include second-tier contracting efforts, were acted upon and an explanation of how action upon such recommendations did not lead to the desired level of participation of M/WBEs;

9.8.2 Modifications. The Consultant may request modification of its Subcontractors Participation Plan after the award of the Contract. The Corporation may grant such request if it determines that the Consultant has established, with appropriate documentary and other evidence, that the Consultant has made all reasonable, good faith efforts to meet the Participation Goal set for the Contract.

9.8.3 The Corporation's M/WBE Director and Chief Contracting Officer will provide written notice to the Consultant of the determination on whether the Consultant has made all reasonable good faith efforts to meet the Participation Goal.

9.9 Compliance Audits. This Contract may be audited by the Corporation, DSBS and the City Comptroller to determine the Consultant's compliance with the requirements of the Corporation's M/WBE Program and the Consultant's M/WBE Subcontractors Participation Plan.

9.10 Enforcement. In the event the Corporation determines that the Consultant or its Subcontractors have violated the requirements of the Corporation's M/WBE Program or the M/WBE Subcontractors Participation Plan including, without limitation, a determination that the

Consultant has made payments to or awarded work to M/WBE Subcontractors in amounts less than the amounts specified in the Consultant's M/WBE Subcontractor Participation Plan (unless the Corporation has permitted the Consultant to modify the Consultant's M/WBE Subcontractors Participation Plan in accordance with Section 9.8), the Corporation may:

9.10.1 terminate the Contract;

9.10.2 assess actual and consequential damages for and/or exercise its right to set off any additional expenses the Corporation incurs to complete the Project satisfactorily in accordance with the Corporation's M/WBE Program and in order to meet the Participation Goal including, without limitation, the actual and administrative costs of:

9.10.2.1 meeting the Participation Goal through additional procurements;

9.10.2.2 payments made to any other consultant retained to complete the Services; and

9.10.2.3 investigation and enforcement; or

9.10.3 assert any other right or remedy it has under the Contract.

9.11 Liquidated Damages for Failure to Fulfill Approved Participation Goals. If the Consultant fails to fulfill its Participation Goals set forth in its Subcontractors Participation Plan or the Participation Goals as modified by the Corporation pursuant to Section 9.8, the Corporation 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 M/WBEs to meet the Participation Goal and the dollar amount the Consultant actually awarded and paid to M/WBEs. In view of the difficulty of accurately ascertaining the loss which the Corporation will suffer by reason of the Consultant's failure to meet the Participation Goals, the foregoing amount is hereby fixed and agreed as the liquidated damages that the Corporation will suffer by reason of such failure, and not as a penalty. The Corporation 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 the liquidated damages suffered by the Corporation, the Consultant shall be liable to pay the difference.

9.12 Statements. Statements made in any instrument submitted to the Corporation in connection with the Corporation's 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.

9.13 Evaluations. The Consultant's record in implementing its M/WBE Subcontractor Participation Plan shall be a factor in the evaluation of its performance.

ARTICLE 10
MISCELLANEOUS

10.1 Consultant as Independent Contractor. Notwithstanding anything contained herein to the contrary including, without limitation, the provisions of Section 5.2 hereof, it is specifically

understood and agreed that in the performance of the terms, covenants and conditions of this Contract, the Consultant and its Representatives shall not be deemed to be acting as agents, servants or employees of the Corporation or the City by virtue of this Contract or by virtue of any approval, permit, license, grant, right, or other authorization given by the City or the Corporation or any of their Representatives in connection with this Contract, but shall be deemed to be independent contractors performing work or professional services for the Corporation, and shall be deemed solely responsible for all acts taken by them pursuant to this Contract.

10.2 Assignment. This Contract is intended to secure the Services of the Consultant or a competent Representative or Representatives of the Consultant approved by the Director. The Consultant shall not assign, convey, subcontract, or transfer this Contract or the Consultant's rights hereunder without the written consent of the Director, which consent shall be manifested by Notice. The Corporation shall have the right to assign, convey, subcontract or transfer this Contract or the Corporation's rights hereunder without the written consent of the Consultant to the City or any other corporation, agency or instrumentality having authority to accept the assignment.

10.3 Right to Inspect. The Corporation, the City Comptroller, the Inspectors and any other individual or entity authorized under any Legal Requirement shall have the right on reasonable Notice to inspect the operations and records of the Consultant and its Subcontractors relating to this Contract.

10.4 Maintenance of Records. In order to facilitate any audit provided herein, the Consultant agrees to maintain accurate, readily auditable records and accounts with supporting documentation in accordance with generally accepted accounting principles of the Services performed by it, its employees, and its Subcontractors under this Contract and of all financial accounts and transactions maintained or undertaken in connection with this Contract, including, but not limited to, time cards and records reflecting the nature of the work performed and time consumed, bank statements, cancelled checks, bills and receipts, Requisitions, and deposit slips, and to make such records available for inspection and audit in the City by the Corporation, the City, the Inspectors and any other individual or entity authorized under any Applicable Statute or Applicable Agreement upon reasonable Notice. Said records shall be maintained for a period of six (6) years after termination of this Contract.

10.5 Modification in Writing. No modification, amendment, waiver or release of any provision of this Contract or of any right, obligation, claim or cause of action arising hereunder shall be valid or binding for any purpose unless in writing and duly executed by the party against whom the same is asserted.

10.6 Captions. The tables of contents and captions of this Contract are for convenience of reference only and in no way define, limit or describe the scope or intent of the Contract or in any way affect this Contract.

10.7 Completeness. This Contract contains all the terms and conditions agreed upon by the parties hereto, and no other agreement, oral or otherwise, regarding the subject matter of this Contract shall be deemed to exist or to bind either of the parties hereto.

10.8 Severability. If any clause, provision or section of this Agreement be ruled invalid by any court of competent jurisdiction, the invalidity of such clause, provision or section shall not affect any of the remaining provisions hereof.

10.9 Notices.

10.9.1 Each Notice, demand, request or other communication in connection with this Contract shall be either: (i) served in person, with delivery of service acknowledged in writing by the party receiving the same; (ii) sent by nationally known overnight delivery service or telefax; or (iii) deposited in the U.S. mails, first class mail, postage prepaid, and addressed to the respective address herein set forth in Part I, Section 3 or to such other address as may be specified by Notice sent in accordance herewith.

10.9.2 Every Notice hereunder shall be deemed to have been given: (i) at the date of receipt by the respective party in the case of personal delivery, overnight delivery or telefax and (ii) five (5) business days after the date of deposit in the first class U.S. mails.

10.10 Non-Waiver. Failure of the Corporation or its Representatives to enforce or otherwise require the performance of any of the terms and conditions of this Contract, at the time or in the manner that said terms and conditions are set forth herein, shall not be deemed a waiver of any such terms or conditions by the Corporation and the same may be selectively enforced or raised as a basis of a claim or cause of action at the option of the Corporation.

10.11 Refusal to Testify.

10.11.1 The Consultant agrees 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 conducted by 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.

10.11.2 If:

10.11.2.1 any person who has been advised that her or his statement, and any information from such statement, will not be used against her or him 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 examine witnesses under oath concerning the award of, or performance under, any transaction, agreement, lease, permit, contract, or license entered into with the City, the State, or any political subdivision or public authority thereof, or the PANYNJ, or the Corporation, or any local development corporation within the City, or any public benefit corporation organized under the laws of the State of New York, or

10.11.2.2 any person refuses to testify for a reason other than the assertion of her or his privilege against self- incrimination in an investigation, audit or inquiry

conducted by a City or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interest in, and is seeking testimony concerning the award of, or performance under, any transaction, agreement, lease, permit, contract, or license entered into with the City, the State, or any political subdivision thereof, or the Corporation, or any local development corporation within the City,

then the commissioner or agency head (each of which is hereinafter referred to as the "Commissioner") whose agency is a party in interest to the transaction, submitted bid, submitted proposal, contract, lease, permit, or license involved in such investigation, audit or inquiry shall convene a hearing, upon not less than five (5) days written notice to the parties involved, to determine if any penalties should attach for the failure of a person to testify.

10.11.3 If any non-governmental party to the hearing requests an adjournment, the Commissioner who convened the hearing or the Corporation may, upon the Commissioner granting the adjournment, suspend any contract, lease, permit, or license pending the final determination pursuant to subsection 10.11.5 below without the City or the Corporation incurring any penalty or damages for delay or otherwise.

10.11.4 The Corporation or the City may impose the following penalties after a final determination by the Commissioner that penalties should attach for the failure of a person to testify:

10.11.4.1 the disqualification for a period not to exceed five (5) years from the date of an adverse determination of 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 the City or the Corporation, as the case may be; and/or

10.11.4.2 the cancellation or termination of any and all such existing City or Corporation 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 the Corporation 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 City or the Corporation, as the case may be.

10.11.5 The Commissioner shall consider and address, in reaching her or his determination, and the Corporation and the Commissioner shall consider and address, in assessing an appropriate penalty, the factors in subparagraphs (i) and (ii) below. The Commissioner and the Corporation may also consider, if relevant and appropriate, the criteria established in subparagraphs (iii) and (iv) below in addition to any other information which may be relevant and appropriate:

10.11.5.1 The entity'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.

10.11.5.2 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.

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

10.11.5.4 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 under subsection 10.11.4 above), provided that the party or entity has given actual notice to the Commissioner upon the acquisition of the interest, or at the hearing called for in subsection 10.11.2(2) above gives notice and proves that such interest was previously acquired. Under either circumstance the party or entity must present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

10.11.6 The term "license" or "permit" as used herein shall be defined as a license, permit, franchise or concession not granted as a matter of right.

10.11.7 The term "entity" as used herein shall mean any firm, partnership, corporation, association, joint venture or person that receives monies, benefits, licenses, leases or permits from or through the City or otherwise transacts business with the City.

10.11.8 The term "member" as used herein shall mean any person associated with another person or entity as a partner, director, officer, principal or employee.

10.11.9 The term "person" as used herein shall mean any natural person doing business alone or associated with another person or entity as a partner, director, officer, principal or employee.

10.12 No Political Activity. The Consultant agrees that there shall be no political activity or any activity to further the election or defeat of any candidate for public, political or party office as a part of or in connection with this Contract, nor shall any of the funds provided under this Contract be used for such purposes.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

PART III
APPENDICES

APPENDIX A

DEFINITIONS

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
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APPENDIX A

DEFINITIONS

The defined terms listed below shall have the following corresponding meanings in the annexed Contract (as defined herein) unless otherwise defined or the context otherwise requires. The singular shall include the plural and vice versa as the context may dictate. The gender used in the annexed Contract shall be deemed to refer to the masculine, feminine, or neuter gender, as the context or the identity of the persons being referred to may require.

Additional Insured	All individuals and entities listed in Appendix E
Allowable Additional Costs	Costs of out-of-pocket expenses which may include the cost of printing, special mailings (such as overnight delivery and messenger services), Services-related long distance telephone and facsimile charges, and any other out-of-pocket expenses, approved in advance by the Director, on a direct cost basis (with no additional provisions or overhead fee). Allowable Additional Costs shall not include travel to and from the Project site, meals, and those costs considered to be overhead such as normal mailing, local telephone and facsimile charges, in-house copying secretarial, clerical and typist time and the purchase of office or graphic supplies.
Applicable Agreements	Various governing agreements related to the Funds, the Project and/or this Contract, including, without limitation, any specific "Applicable Agreements" identified in Part I, and any other governing agreement or MOU with the City, State and/or federal governments, or any agency thereof
Applicable Requirements	Any and all federal, state and local laws, statutes, rules, regulations and orders applicable to this Contract, the Funds or the Project, including, without limitation, any specific "Applicable Requirements" identified in Part I
Borough	The City borough where the Project is located
City	The City of New York
City Contract	The Amended and Restated Contract between the City and the Corporation, dated as of June 30, 2018 and the Amended and Restated Maritime Contract between the City and the

	Corporation, dated as of June 30, 2018, as applicable, as each may be amended, restated and/or revised from time to time
City Comptroller	Comptroller of the City or his or her designee
Commencement Date	The date upon which the Consultant shall commence the Services as stated in Part I, Section 1.4
Comptroller General	The United States Comptroller General
Confidential Information	Any and all information, records, data, materials, documents, electronic files or Work Product provided by NYCEDC and/or the City or any of its agencies to the Consultant except that which (i) shall have otherwise become publicly available through no fault of Consultant or its Representatives; (ii) becomes available to the Consultant on a nonconfidential basis from a source other than NYCEDC, the City or any of its agencies; or (iii) is known by the Consultant prior to its receipt from NYCEDC, the City or any of its agencies without any obligations of confidentiality with respect thereto
Consultant	The entity or person contracted by the Corporation to perform the Services pursuant to this Contract, as identified in Part I, Section 2.3
Consultant's Underlying Intellectual Property	The Consultant's analytical concepts, approaches, methodologies, or formats developed by the Consultant's staff, and to other materials not prepared for delivery to the Corporation and also including any derivatives, improvements, enhancements or extensions of the Consultant's Underlying Intellectual Property conceived, reduced to practice, or developed during the term of this Contract that are not uniquely applicable to the Corporation
Contract	The Contract between the Consultant and the Corporation to which this Appendix A is annexed, as defined in Part I, Section 1.1
Contract Completion Costs	As defined in Section 3.5.3
Contract Date	The date of this Contract, as stated in Part I, Section 1.3
Corporation	New York City Economic Development Corporation, a not-for-profit corporation organized pursuant to laws of the State of New York

CPL	Contractor Pollution Liability Insurance
DBEs	Disadvantaged Business Enterprises
Director	The person set forth in Part I, Section 2.2, or such other person as may be subsequently designated by the Corporation
Disability Benefit	A type of insurance to be purchased and maintained by the Consultant and its Subcontractors, in statutory amounts, for all of its employees engaged in the Services
DCAS	New York City Department of Citywide Administrative Services
DCP	New York City Department of City Planning
DEP	New York City Department of Environmental Protection
Division	Division of Labor Services of DSBS
DOB	New York City Department of Buildings
Doing Business Data Form	The form available at www.nycedc.com to be completed by the Consultant and submitted to the Corporation pursuant to LL 34
DOT	New York City Department of Transportation
DPR	New York City Department of Parks and Recreation
DSBS	New York City Department of Small Business Services
DSNY	New York City Department of Sanitation
Electronic Funds Transfer (EFT)	Any transfer of funds, other than a transaction originated by check, draft or similar paper instrument, that is initiated through an electronic terminal, telephonic instrument or computer or magnetic tape so as to order, instruct or authorized a financial institution to debit or credit an account
E.O. 50	Executive Order No. 50 (1980), as amended or revised from time to time
Employment Report(s)	The reports described in Appendix G and available at www.nycedc.com to be completed and submitted to the Corporation pursuant to Executive Order 50

Event of Default	As described in Part II, Section 3.3.2
Extra Work	A significant alteration to the work or Services that the Consultant has been directed to perform by the Director as described in Part II, Section 1.5.2
FDNY	New York City Fire Department
Federal Courts	United States Federal Courts located in New York City
FHWA	United States Federal Highway Administration
Final Completion	The performance of all Services contemplated in this Contract to the satisfaction of the Director
Final Payment	The last payment by the Corporation to the Consultant under the Contract upon Final Completion or as provided in Part II, Sections 3.5.2 and 3.5.4
Force Majeure	Any of the following acts and events that occur without the negligence or fault, and beyond the reasonable control, of Consultant and that of any of its successors, heirs, assigns, and/or Representatives and of which Consultant has given the Corporation express written notice within three (3) days after the commencement of the alleged cause of the delay, hindrance, or obstruction: governmental preemption in connection with a national emergency, war or act of war, insurrection, riot, act of public enemy, terrorist acts, labor disputes, accidents, mechanical failure and acts of God (including fire, flood or abnormal adverse weather conditions not reasonably anticipatable)
FTA	United States Federal Transit Administration
Funding Agencies	All federal, State or local agencies or entities that are the source of the Funds including, without limitation, any specific "Funding Agencies" identified in Part I

Funds	All funds from the federal, State or local sources to be applied to payments for Services under this Contract including, without limitation, any specific "Funds" identified in Part I
IDA	New York City Industrial Development Agency, a corporate governmental agency constituting a body corporate and politic and a public benefit corporation organized pursuant to Article 18-A of the General Municipal Law of the State of New York
Inspectors	All individuals or entities specifically identified as "Inspectors" in Part I, if any
Insurer	Any insurance company retained by the Consultant pursuant to Part II, Section 6.3.2
Joint Venture	An association, of limited scope and duration, between two or more persons who have entered into an agreement to perform and/or provide services required by a contract, in which each such person contributes property, capital, effort, skill and/or knowledge, and in which each such person is entitled to share in the profits of the venture in reasonable proportion to the economic value of its contribution.
Landmarks Preservation Commission (LPC)	The City of New York Landmarks Preservation Commission
Legal Requirements	All applicable laws, rules, regulations, ordinances, codes and orders of all federal, state and local governmental authorities, agencies, departments or bureaus having jurisdiction over and which affect the work and/or Services under this Contract including, without limitation, all Applicable Agreements and all Applicable Requirements
Local Law 34 (LL 34)	Local Law No. 34 of 2007, as it may be amended or superseded
MacBride Principles	Those principles relating to nondiscrimination in employment and freedom of workplace opportunities that requires employers doing business in Northern Ireland to comply with specific terms set forth in Section 6-115.1 of the City's Administrative Code
Maximum Contract Price	The maximum amount that may be paid for the Services under the Contract, as stated in Part I, Section 1.6

Maximum Payment	The maximum amount payable for each Portion of the Services during a billing period
MBEs	Minority-owned Business Enterprises
M/WBE Compliance Reports	As described in Part II, Section 9.5
M/WBEs	MBEs and WBEs, collectively
M/WBE Subcontractors Participation Plan	As described in Part II, Section 9.5
MOU	Memorandum of Understanding
New York State Courts	Courts of the State of New York in the City and County of New York
Notice	Any written notice, demand, request, instruction, advice, directive or other communication in connection with this Contract to be delivered to a party designated in Part I, Section 3, for the receipt of notice in the manner set forth in Part II, Section 10.9.1
Notice to Proceed	Written Notice from the Corporation to the Consultant to proceed with the Services or any portion thereof
Notify	To give a Notice pursuant to Part II, Section 10.9.1
NYCEDC	The Corporation
NYCTA	New York City Transit Authority
NYPD	New York City Police Department
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOS	New York State Department of State
NYSDOT	New York State Department of Transportation
OMB	New York City Office of Management and Budget
OPRHP	New York State Office of Parks, Recreation and Historic Preservation

PANYNJ	The Port Authority of New York and New Jersey
Participation Goal	The Corporation's goal for M/WBE participation related to the Contract, as defined in Part II, Section 9.3.
Payment Schedule	Schedule listing Maximum Payment for each Portion of the Services, appended to Appendix C when payment for Services or a Portion of the Services is on a Tasks completed basis
Payroll Report	Forms that the Consultant and any Subcontractors that provide any on-site construction activity must complete
Percentage of Completion	An amount equal to the percentage of completion of each Portion of the Services
Person In Charge	As identified in Part I, Section 2.5, the member(s) of the Consultant's professional staff who will have primary responsibility to perform and/or supervise and coordinate the performance of the Services
PLL	Pollution Legal Liability Insurance Policy
Portion	Each portion, task or phase of the Services as described in Appendix B and/or Appendix C
Principal	The Consultant's most senior officer of the Consultant's staff responsible for the performance of Services as identified in Part I, Section 2.4
Progress Reports	Reports which Consultant is obligated to prepare that show the status of the Services in accordance with the Progress Schedule
Progress Schedule	Any schedule issued or approved by the Corporation for the performance of the Services, including, without limitation, Project or Services milestones, deadlines or delivery dates
Project	As identified in Part I, Section 1.7, and described in detail in Appendix B
Project Manager	A person designated by the Corporation to serve as a liaison between the Corporation and the Consultant
Project Site	The location of the Project as identified in Part I, Section 1.8 and described in detail in Appendix B

Public Design Commission ("PDC")	Public Design Commission of the New York City (f/k/a The Art Commission)
Qualified Joint Venture ("QJV")	A Joint Venture between one or more MBEs and/or WBEs and another person, in which the percentage of profit to which the certified firm or firms is entitled for participation in the Contract, as set forth in the joint venture agreement, is at least 25% of the total profit.
RAP	Remedial action plan
Representatives	The employees, agents, servants, officers, directors, members, independent contractors and subcontractors of a person or entity
Requisition	A request for payment, to be submitted by Consultant not more than once per month, setting forth in detail, for the billing period for which partial payment is requested, the amount requested and Services performed during the billing period
Retainage	Any sum withheld from any payment to the Consultant including, without limitation, those set forth in Part II, Sections 1.5.3, 2.2.1 and 4.2.3
Retainage Payment Date	The date by which any Retainage identified in Part I, Section 1.10 will be paid to the Consultant, as identified in Part I, Section 1.11, subject to the provisions of Part II, Article 2 and Part III, Appendix C
Scope of Services	The Services to be provided by the Consultant in connection with this Contract, as set forth in Appendix B
Services	All of the services to be provided to the Corporation by the Consultant pursuant to the Contract, as described in greater detail in Appendix B
SHPO	State Historic Preservation Officer
Specific Terms and Conditions	Part I of this Contract
Fee and Cost Schedule	Schedule listing names of Consultant's staff, hourly rates and estimated number of days to be spent providing Services, appended to Appendix C when payment for Services or a Portion of the Services is on an hourly rate basis
State	State of New York

Subcontractor	Any person or entity including, without limitation, contractors, consultants, subconsultants, vendors and subcontractors of such persons or entities, employed or retained by the Consultant in accordance with the Contract to provide any services, work, materials, equipment or supplies in connection with the Services
Subcontractors' Costs	The compensation payable by the Consultant to any subcontractor(s) of the Consultant pursuant to a contract(s) entered into pursuant to Part II, Section 4.2
Term	The duration of this Contract, as stated in Part I, Section 1.5
USACOE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
UST	Underground storage tanks
WBEs	Women-owned Business Enterprises
Worker's Compensation	A type of insurance to be purchased and maintained by the Consultant and its Subcontractors, in statutory amounts, for all of its employees engaged in the Services
Work-Made-For-Hire	As defined in Section 101 of the United States Copyright Act, 17 U.S.C. § 101
Work Product	All reports, plans, studies, surveys, data, databases, programs, processes, systems, drawings, tracings, blueprints, photographs, computer drawings, schematics, specifications, log books, correspondence, models, studies, permits approvals, designs, deliverables, samples, presentation materials, analyses, punch lists, submissions, filings, applications, schedules, documents and materials, including, without limitation, those related to inspections, tests and test results, in all formats now known or hereinafter known, prepared or furnished by the Consultant pursuant to this Contract, provided however that Work Product shall not include any Consultant's Underlying Intellectual Property

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APPENDIX B

SCOPE OF SERVICES

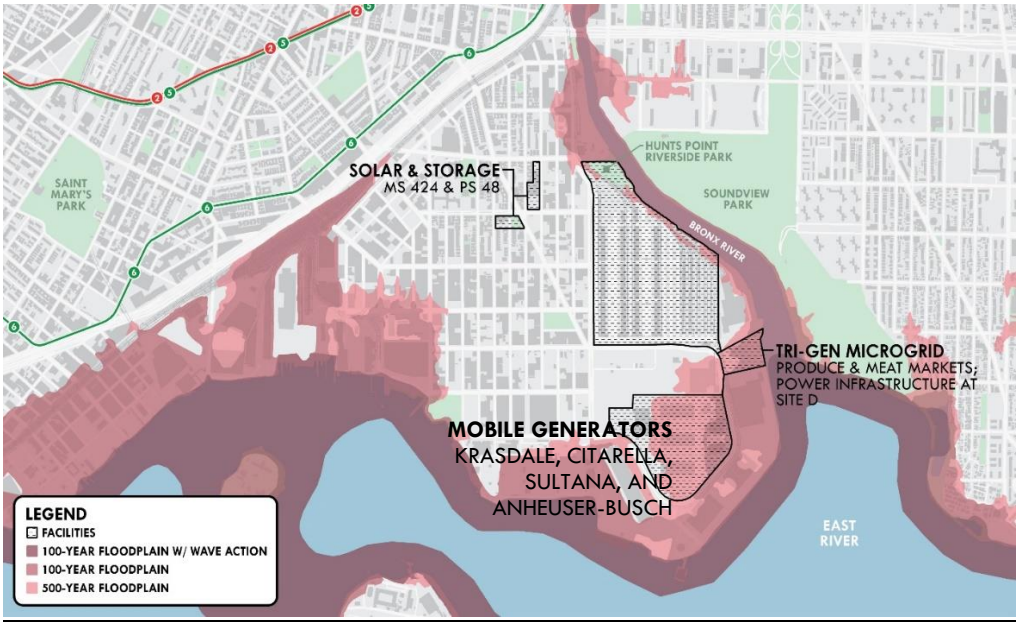
APPENDIX B
SCOPE OF SERVICES

I. INTRODUCTION

Project Structure

The Hunts Point Resilient Energy Project emerged from the U.S. Housing and Urban Development ("HUD") Rebuild by Design competition for proposals to strengthen the resiliency of neighborhoods affected by Hurricane Sandy. Led by a partnership between the New York City Economic Development Corporation ("NYCEDC") and the Mayor's Office of Resiliency. ("MOR"), this project will further advance efforts to make the Hunts Point Peninsula ("Hunts Point" or the "Peninsula") more resilient by providing resilient and sustainable backup power to critical facilities throughout Hunts Point. This scope of services builds on prior analysis and conceptual design from the *Hunts Point Resiliency Project Feasibility Study*, *Hunts Point Lifelines Rebuild by Design proposal, A Stronger More Resilient New York, the Hunts Point Vision Plan, OneNYC: The Plan for a Strong and Just City*, and other community-based and government efforts around resiliency in the peninsula.

The Project is an energy resiliency pilot project to provide reliable, dispatchable, and sustainable power to identified critical facilities on the Peninsula in the event of an emergency. In total, the proposed project shall provide 6.8 megawatts (MW) of new resilient energy generation capacity for the peninsula. Preliminary design documents have been completed for the project and are included as Exhibit 1 to Appendix B ("Exhibit 1"). The purpose of this RFP is to procure a Consultant to perform final design drawings for the three project components as described herein:



Project #1 - School Solar and Storage Installations

- *Resiliency objective and critical load:* Two solar plus storage installations will enable Middle School (MS) 424 and Primary School (PS) 48 to serve as public gathering spaces, shelter, or refuge in emergency situations for a minimum of eight (8) hours. The solar and storage systems shall support the critical loads necessary for the schools to serve as community convening locations, as preliminarily identified in the design basis documents in Exhibit 1.

- *Sustainability objective:* As clean technologies, the solar and storage components will offset the school's electrical consumption from the utility grid with renewable energy. On blue sky days (when the electrical grid is operating under normal conditions), the solar photovoltaic ("PV") systems will supply electricity for the schools. In addition, the ESS can be deployed to reduce the building's peak power demand in order to generate savings, also known as peak shaving.

Project description: The total supported installation is approximately 0.5 MW of solar capacity that will provide electricity to the schools during normal and emergency conditions. Due to the intermittent nature of solar PV, the arrays must be coupled with an energy storage system (ESS) to operate when fully disconnected from the utility grid in islanded mode, while supplying critical building loads. At both schools, the ESS consists of a bank of grid-tied batteries that are capable of charging and discharging energy based on the power requirements of the buildings or the utility grid. For resiliency applications, an ESS can enable other on-site generation technologies, such as solar PV, to provide backup power to critical loads. The ESS will be grid-connected and capable of separately feeding a new critical electrical load panel installed in the existing electrical room of the schools.

At MS 424, the solar PV system will be a 450 kW ballasted system. The system will be equipped with module level power electronics in order to maximize production and minimize operation and maintenance costs. The ESS will be a lithium-ion (Li-ion) battery, containerized solution. The system will be capable of up to 125 kW of power output and will have at least 274 kWh of storage. The ESS will be shipped to site pre-assembled inside an enclosure (container) and set on a foundation.

At PS 48, the solar PV system will be approximately a 72 kW strut and post system. The system will be equipped with module level power electronics in order to maximize production and minimize operation and maintenance costs. The ESS will be a lithium-ion ("Li-ion") battery, containerized solution. The system will be capable of up to 125 kW power output and will have 274 kWh of storage. The ESS will be shipped to site pre-assembled inside an enclosure (container) and lifted into place.

The two school sites are located at: MS 424, 730 Bryant Avenue, Bronx, NY 10474 on Block 2763, Lot 279; and at PS 48, 1290 Spofford Avenue, Bronx, NY 10474 on Block 2766, Lot 1.

Project #2 - Emergency Backup Generation

- *Resiliency objective and critical load:* The resiliency objective of the emergency backup generators is to provide backup power supply to other important citywide food distributors and employers in the FDC. This approach is intended to satisfy specific operational contingency needs at each facility. As such, the prioritization of critical loads to be powered by the generators will be identified on a facility-by-facility basis by operating staff during final design.

- *Sustainability objective:* The mobile generators shall be certified for USEPA Tier IV emission levels, which are the current and cleanest standards (at the time of RFP release) required for off-road diesel engines used in power generation applications.

- *Project description:* This project component consists of four 275 kilowatt (kW) mobile diesel generators, with the installation of provisions to allow the connection of these generators to the electrical systems of the FDC facilities during emergency periods. This fleet of mobile generators provides a total of 1.1 MW of electrical generation for emergency conditions only, and enables immediate energy resiliency with minimal capital construction and costs for facilities that are critical to the city's food supply chain. Depending on need, the generators can be connected to any one of these facilities as an emergency power source. Sultana/Citarella will be provided two generator connections due to the greatest need for emergency power for cooling systems, oven operation, and ventilation equipment. Krasdale and Anheuser Busch will each be provided one generator connection.

  The proposed mobile generators would be located at the following sites:
  a. Citarella/Sultana – 600 Food Center Drive, Bronx, NY 10474 on Block 2781, Lot 500
  b. Anheuser-Busch – 550 Food Center Drive, Bronx, NY 10474 on Block 2781, Lot 520
  c. Krasdale Foods – 400 Food Center Drive, Bronx, NY 10474 on Block 2781, Lot 500.

Project #3 - Tri-Generation system to support the Produce Market and Meat Market

- *Resiliency objective and critical load*: The objective of the tri-generation system is to provide reliable and resilient backup power to the Produce and Meat Markets in the Food Distribution Center ("FDC") for at least three (3) days. The tri-generation system should at minimum power the average electrical load of the entire Produce Market (as to be verified during the data collection task in this scope), and shall maximize the cooling and thermal loads.

- *Sustainability objective:* To improve air quality and achieve sustainability goals of the project, the tri-generation system should be designed to minimize emissions of criteria air contaminants to the neighborhood within reasonable cost. The tri-generation system should utilize best available control technology and maximize system efficiency. The tri-generation system project will also include electric plug-in chargers for refrigerated trucks at the Produce Market, which is critical to reducing local emissions from idling diesel engines.

- *Project description:* The tri-generation system (also known as a combined cooling, heating, and power facility) will consist of two 2.6 MW reciprocating internal combustion natural gas engine generators with heat recovery hot water generators, two 400-ton two-stage absorption chillers, and two 300-ton single stage absorption chillers.

  During normal operations, the tri-generation system will operate year-round and supply electricity to the Con Edison grid that will offset a significant portion of the electrical loads of the Produce and Meat Markets, while exporting hot water to the Meat Market and chilled water to the Produce Market. The chilled water production of the tri-generation system will reduce the Produce Market electrical loads by an average of approximately 1.3 MW. The 1.3 MW of offset electrical capacity will be used to power truck trailer refrigeration units at the Produce Market that will be converted from diesel operation to electric operation. This conversion is an essential part of achieving the overall sustainability objective and should be designed to maximize the number of trailers that can be displaced. On average about 4.2 million British Thermal Units (MMBtu) per hour of 350 degree Fahrenheit hot water will be sent to the Meat Market to offset hot water production used for cleaning, sanitation, and defrosting. The exported hot water will essentially replace the hot water generated by the existing gas boilers at the Meat Market, which will remain in service for back-up hot water supply only.

  In the event of an emergency when the electrical grid is not available, a section of the Con Edison distribution system in Hunts Pont will be isolated from the grid via sectionalizing switches to form a microgrid. The two engine generators of the tri-generation system will supply critical electrical loads at the Produce Market via the microgrid. When operating under emergency conditions, the tri-generation system will also be able to continue export of about 1,100 tons of chilling load to the Produce Market (similar to normal operation). If necessary during emergency operations, the tri-generation system will prioritize the use of hot water for purposes of producing chilled water to the Produce Market and limit the amount of hot water exported to the Meat Market. In this case, the existing gas boilers at the Meat Market will be used to make-up the deficit in hot water to maintain operation of the Meat Market.

  The tri-generation system will be located on Site D at 321-477 Food Center Drive, Bronx, NY 10474 on Block 2781, Lot 500. Site D is currently a 7.2-acre plot of vacant land that was once part of a former Con Ed Manufactured Gas Plant ("MGP"). EDC has contracted with a separate consultant to conduct in-situ remediation of this site, which is scheduled to be complete by Spring 2020. This Consultant will be required to coordinate with NYCEDC and their contract manager and design consultants overseeing site remediation (collectively "Remediation Project Team) as the remediation will change the existing topography of the site. The Produce Market is located at 101 Food Center Drive, Bronx, NY 10474 on Block 2770, Lot 1, and the Meat Market is located at 361 Food Center Drive, Bronx, NY 10474 on Block 2781, Lot 500. Piping systems to connect the chilled water and hot water to the Produce Market and Meat Market, respectively, will be both underground and above ground. At the Produce Market, the chilled water piping will be routed along the roofs of the buildings with branch connections to cooling units for participating tenants.

Background

Regional/Local Importance and Vulnerabilities

Each day, over 22 million people in the region consume food distributed through the FDC. Preventing and minimizing interruptions to the operations of FDC tenants is thus critical to the resiliency of the region's food supply chain. A significant portion of Hunts Point, including a portion of the FDC lies within the FEMA 100- and 500-year floodplains. Sustained interruptions to the operations of FDC tenants are likely to have far-reaching impacts on citizens' ability to access food of both sufficient quantity and quality.

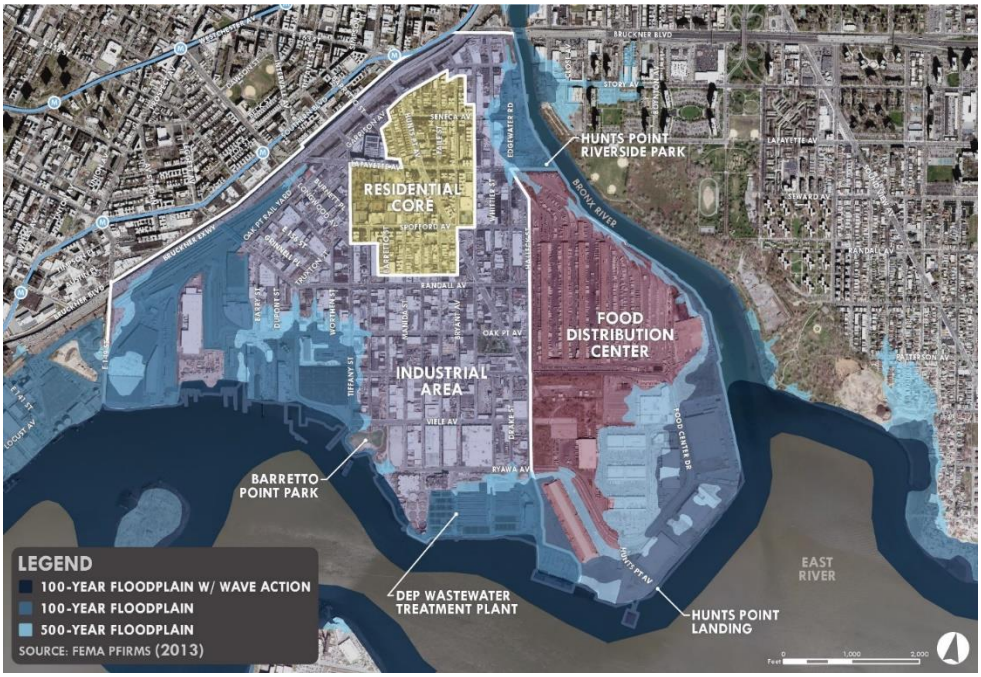
Beyond its critical importance to the region's food supply chain, the FDC is an important employment hub, supporting more than 8,400 direct jobs. Although the peninsula's residential community is situated upland, outside of the floodplain, it is vulnerable to power outages, transportation network failures, and any failures of critical services.

When Hurricane Sandy hit New York City on October 29, 2012, it brought these vulnerabilities into stark relief. As described in *A Stronger, More Resilient New York*, while Sandy's arrival during low-tide at of the Long Island Sound spared Hunts Point from the unprecedented damage seen in other parts of New York City, the storm highlighted the vulnerability of flood waters potentially damaging food supply inventory and infrastructure within the FDC. Further, the storm highlighted the risks of power outages at the FDC, other Hunts Point businesses, and within the residential community, which could be caused by not only storm surge and sea level rise, but also extreme heat events, extreme precipitation events, and system and local energy production and distribution infrastructure failures.

HUD launched the Rebuild by Design Competition in June 2013 to spur new ideas and collaborations for improving coastal area resiliency in the Sandy-affected region. Hunts Point Lifelines was one of six winning proposals, developed by a team of multi-disciplinary professionals who worked closely with local stakeholders over a number of months to develop a resiliency plan for Hunts Point. As described in more detail below, the Hunts Point Resilient Energy builds off of the ideas developed in *Lifelines* to advance a series of energy projects to implementation.

Project Area

C.



Location

Hunts Point is located at the confluence of the Bronx River, the East River and the Long Island Sound. Surrounded by water on three sides, the fourth side is roughly bounded by the Bruckner Expressway and the CSX/Amtrak rail corridor. The Bruckner Expressway connects Hunts Point to Interstate-95 and the New York State thruway (I-87), providing access to the rest of New York City, the Northeast, the Midwest and the farther domestic and international points via the ports of New York and New Jersey.

Hunts Point has an area of approximately 1.65 square miles (~1,050 acres). The upland northwestern portion of the peninsula contains a residential community of approximately 12,500 residents. The eastern portion is occupied by the 329-acre, City-owned Food Distribution Center. Much of the rest of the industrial portion of the peninsula is a diverse mix of food, manufacturing, construction, utility, municipal, auto-related and waste-related uses. The peninsula also includes a Department of Environmental Protection Hunts Point Wastewater Treatment Plant and a diverse mix of food, manufacturing, construction, utility, municipal, auto-related and waste-related uses.

Residential Core

Approximately 12,500 people live within the residential core, 76% of who are below the age of 45. This community has a median household income of less than half that of the city as a whole, with an 18% unemployment rate and 42% of households living below the poverty level.[1] The

[1] 2013 American Community Survey 5-Year Estimates

residential core is home to two schools (MS 424 and PS 48), a Recreation Center, health facilities, the Pio Mendez Houses for the Elderly, and several community-based organizations. Neighborhood residents and community-based organizations are highly engaged in promoting social and environmental justice, local hiring and workforce development efforts.

Hunts Point Food Distribution Center

The City-owned FDC campus is home to the New York City region's primary wholesale markets for produce, meat and fish, which combined occupy 191 of the campus' 329 acres. The FDC sees over 4.5 billion pounds of annual food distribution serving 22 million people in the region.

Five other food distribution facilities comprise the campus: Baldor Specialty Foods, Dairyland/Chef's Warehouse, Anheuser Busch, Sultana, Citarella and Krasdale.

Altogether, the FDC comprises over 115 businesses. The Hunts Point Terminal Produce Market, the Cooperative Meat Market, and the New Fulton Fish Market combined generate more than $3 billion in sales annually.

Hunts Point Terminal Produce Market

Opened in 1967, the Terminal Produce Market occupies 105 acres, and consists of four primary warehouse structures, two adjunct warehouses, and various administrative and maintenance structures, making it the largest produce market in the country. The market is home to 39 merchants ranging from small firms with three employees to large firms with approximately 400 employees for an aggregate total of roughly 3,000 direct employees. The market captures approximately $2 billion in revenue per year, equivalent to approximately 25% of the produce sales within New York City.[2]

Hunts Point Cooperative Meat Market

Opened in 1974, the Cooperative Meat Market occupies roughly 40 acres and consists of six large refrigerated, freezer buildings, including a refrigeration plant and onsite boilers; the total refrigerated space is approximately 1,000,000 square feet. The market is home to over 30 merchants and approximately 2,400 employees and is governed by the U.S. Department of Agriculture, which inspects and supervises the processing facilities daily. The Cooperative Meat Market has nationwide distribution channels and supplies meat and meat products to the tristate area. The Meat Market accounts for 35% of the meat sales within New York City.[3]

The New Fulton Fish Market

Originally opened in 1807, the New Fulton Fish Market relocated to Hunts Point in 2005 from Lower Manhattan, making it the oldest and largest wholesale fish market in the country with over 25 wholesalers employing an estimated 650 employees. The market consists of a 430,000-square foot facility with 19 bays and 8 separate entrances. The market captures an estimated $1 billion in revenue per year and supplies 45% of fish sales within New York City.[4] The Fish

[2] NYCEDC 2016 Five Borough Food Flow study, https://www.nycedc.com/system/files/files/resource/2016_food_supply-resiliency_study_results.pdf
[3] Ibid
[4] Ibid

Market facility is currently managed by NYCEDC on behalf of the Cooperative.

Prior Studies and Efforts

This phase of work to advance final design of the Hunts Point Resilient Energy Project is informed by years of prior studies, stakeholder engagement, and efforts, which are detailed below.

D*Advisory Working Group*

In consultation with local elected officials, community and civic groups and business interests, NYCEDC and MOR convened an Advisory Working Group (the "Working Group" or "AWG") to further develop resiliency priorities and recommendations that build upon the ideas presented in the *Hunts Point Lifelines* proposal and other ongoing resiliency and planning initiatives in Hunts Point. The Interaction Institute for Social Change (IISC) was procured by the City to design and facilitate the working group process.

Over the course of June to September 2015, the AWG convened for five meetings, in addition to two larger public meetings, discussing and working through exercises to better understand Hunts Point's vulnerabilities, develop selection criteria for identifying priority resiliency categories, recommend priority resiliency categories, and recommend principles to be pursued in the implementation of any resiliency projects.

The AWG selected a pilot project to address energy resiliency based on key selection criteria, which included:

- Protecting infrastructure that has city-wide implications (i.e. food supply system, wastewater treatment);
- Addressing critical vulnerabilities for both community and industry;
- Protecting businesses and jobs in the food supply and/or maritime sectors;
- Supporting asset building within the community, where assets include financial holdings, natural resources, social bonds, education, employment skills and access to opportunities; and
- Utilizing sustainable, ecologically-sensitive infrastructure (soft infrastructure over hard infrastructure where possible, renewable energy, etc.).

The AWG also proposed implementation principles to guide the planning, implementation and ongoing operation of the eventual pilot project. The full list of 14 implementation principles can be found in the group's final recommendations document in Exhibit 1. Many of these principles E.are embedded in various ways throughout this RFP document.

The City directly incorporated the AWG recommendations into the 2016-2019 feasibility study RFP (described below), and the results of the conceptual design reflect the implementation principles.

Hunts Point Resiliency Project Feasibility Study (2016-2019)

In July of 2016 Henningson, Durham & Richardson, Architecture and Engineering, P.C. (HDR) began a study to identify and design potential project concepts addressing resilient energy and flood risk protection for technical, regulatory and financial feasibility. As part of the scope of work for the feasibility study HDR was tasked with the following items as they related to the feasibility of resiliency work in Hunts Point:

- Task 0: Ongoing Stakeholder Engagement
  - Task 0.1: Development of Stakeholder Engagement Plan
  - Task 0.2: Perform and Document Stakeholder Engagement
- Task 1: Existing Conditions
  - Task 1.1: Study Area Conditions
  - Task 1.2: Mapping
- Task 2: Risk and Vulnerability Assessment
- Task 3: Identification and Preliminary Evaluation of Project Options
  - Task 3.1: Initial Identification of Project Options
  - Task 3.2: Development of Feasibility Screening Methodology
  - Task 3.3: Feasibility Screening
- Task 4: Feasibility Assessment and Analysis
- Task 5: Preferred Resilient Energy Pilot Project(s)
- Task 6: Conceptual Design and Environmental Review Preparation for the Pilot Project(s)
  - Task 6.1: Conceptual Design
  - Task 6.2: Implementation Plan
  - Task 6.3: Cost/Benefit Analysis
  - Task 6.4: Identify Required Environmental Review
- Task 7: Environmental Review

<u>Feasibility Assessment</u>

The 30+ project options for flood risk reduction and energy resiliency were assessed in Task 4 based on the technical, financial and regulatory feasibility of each project option, and the overall project goals. Screening criteria included but was not limited to operational and special constraints, reliability, ease of implementation, availability of necessary infrastructure, health and natural resource benefits, workforce development benefits, functionality, and cost. Based on these criteria, technologies were narrowed down to five resilient energy project options and five flood risk reduction project options.

The AWG identified two priority issues of resilient energy and flood risk reduction for the $45 million of implementation funding from HUD. The City moved forward with concept design for a resilient energy project because the funding allocation would not support the construction of a flood protection project of independent utility. Continued analysis and study has shown in the event of a major flood, a resulting power outage in Hunts Point would pose a consequential threat to the City's main food supply and distribution center. This factor led to the City's determination, agreed to by HUD, that the resilient energy pilot will serve to mitigate flood risk by protecting the City's food supply following a storm.

Conceptual High-Level Design

As specified by Task 6 of the Feasibility Study, a conceptual high-level conceptual design, environmental assessment, and air permitting will be completed as part of conceptual design for the first phase of a tri-generation system, community solar/storage installation and emergency generators.

The conceptual design assumes that the tri-generation system does not create constraints in the existing Consolidated Edison ("ConEd) Electrical Power System (EPS) in terms of voltage levels, thermal ratings, harmonics or fault level.

Additionally, the conceptual design will assume that the microgrid does not create constraints in the existing ConEd's Electrical Power System (EPS) in terms of voltage levels, thermal ratings, harmonics or fault level. This assumption should be evaluated as part of the detailed design tasks.

The data exchange between the microgrid devices to/from SCADA is expected to use open standard protocols, such as DNP3 or Modbus.

The Consultant shall receive the following deliverables from the *Hunts Point Peninsula Resiliency Evaluation and Pilot Project* regarding the tri-generation system conceptual design upon selection (all included as Exhibit 1):

- Design basis document with project description and site design criteria
- System descriptions
- General arrangement drawings
- Tri-generation system sectionalization concept design
- Process flow and electrical one-line diagrams for interconnection
- Gas interconnection concept drawings
- System performance information
- AACE Class 3 cost estimates
- Completed Final Environmental Assessment (EA), Environmental Review Record (ERR), Request for Release of Funds & Certification (RROF), Pre-Grant Award Environmental Approval Letter, and Authority to use Grand Funds (AUGF)
- Air permit
- Public Design Commission conceptual design review of project

F.

Description of Services

The selected Design Consultant selected will be responsible for advancing the previously completed conceptual high-level design documents to 100% complete design documents, including support of construction administration through project close-out.

The scope of the services to produce 100% design documents may include, but is not limited to:

- Planning and feasibility;
- Economic analysis;
- Environmental planning;
- Design;
- Cost estimating;
- Permitting from relevant agencies;
- Assistance in strategic efforts to develop construction phases;
- Obtaining topographic and utility surveys, civil, electrical and related engineering services;
- Coordination of contract documents; and
- Public engagement services.

The Design Consultant shall coordinate its design services with other consultants which may be procured by NYCEDC. NYCEDC shall procure a Construction Manager ("CM") during the design phase that will oversee the projects. The Design Consultant shall work with the CM in the design process through regularly scheduled meetings. The Design Consultant shall coordinate its Services in conjunction with day-to-day activities and all related work in and around the project site.

The Design Consultant shall coordinate the Services with the CM during pre-construction phases, construction and post-construction including cost estimating and value engineering services and constructability and construction documents review of staging, phasing, and construction plans and specifications. The CM shall provide independent oversight and review of the Design Consultant's Services and will assist NYCEDC in project controls, preparing bid packages and ultimately, managing and overseeing each project during construction. The Project Team shall consist of NYCEDC, the Design Consultant, the CM, MOR, and the Department of Education including relevant PS 48 and MS 424 facility staff, ("DOE") (collectively referred to as the "Project Team"). The Project Team shall review principal programmatic, design and construction
G. decisions.

Project Schedule

The Design Consultant shall produce biddable contract documents to enable construction to begin in
H. 2020, with construction demobilization by March 2022. The total construction period shall not exceed two years.

Project Budget

The total hard costs for the entire capital project is approximately $52 million.

II. GENERAL ADMINISTRATIVE REQUIREMENTS FOR ALL PROJECTS

The Design Consultant shall coordinate the Services with NYCEDC, the Construction Manager, and other relevant agencies and other consultants as outlined below. This will require the Design Consultant to:

a) Attend regular progress meetings with NYCEDC and Project Team members to coordinate phasing and other aspects of the design with NYCEDC's input;

b) Attend various Agency and utility meetings, including the Fire Department of NY ("FDNY"), Department of Buildings ("DOB"), Public Service Commission ("PSC"), ConEd, and other entities as required;

c) Prepare submittal checklists to coordinate the preparation of procurement packages with the Construction Manager and aid in Agency compliance;

d) Develop, comment on and review cost estimates for the projects;

e) Conduct site visits to obtain necessary existing conditions data, inform final design, and gain stakeholder input and buy-in;

f) Prepare monthly progress reports and invoices;

g) Prepare quarterly project progress reports including milestone, status and finance progress reports and any other requested applicable reports as frequently as required and in the form required by NYCEDC for submission to the HUD and the NYC Mayor's Office of Management and Budget ("OMB");

h) Prepare invoice packages in the format required by NYCEDC, including all requested documentation;

i) Implement a quality control plan;

j) Coordinate approvals with appropriate Agencies;

k) Develop construction phasing plans in consultation with NYCEDC, the CM and other consultants;

l) The Design Consultant shall provide continuous liaison with NYCEDC and shall work with NYCEDC to establish, maintain and coordinate all contacts with all relevant agencies, utilities, community organizations, elected officials, and other interested groups that may be identified by the Project Team;

m) The Design Consultant shall initiate and function as coordinator for all meetings required in the performance of the Services or as requested by NYCEDC and shall provide necessary data and presentation materials for these meetings. The Design Consultant shall prepare, coordinate approval of and distribute all reports, meeting minutes, correspondence and related materials to NYCEDC and any other parties as NYCEDC may direct;

n) The detailed design shall meet resiliency objectives, critical loads, and sustainability objectives that allow each critical facility to serve the specified operational needs. If

the detailed design does not achieve the specified level resiliency, the Design Consultant shall, in consultation with and at no additional cost to NYCEDC, modify the Design Development Documents as necessary until the design is acceptable to NYCEDC;

o) The Design Consultant shall obtain and compile all pertinent specifications, standards and constraints mandated for the projects or the Services by any interested Agency. All plans and specifications prepared as part of the Services shall conform to the standards and specifications of any interested Agencies;

p) The Design Consultant shall revise and correct, without additional compensation, any and all profiles, figures, reports and documents including any surveys, project designs, drawings, and specifications until same shall receive final approval by NYCEDC and by all other Agencies whose approval is required. The Design Consultant shall initiate all actions for incremental review of proposed designs, including all follow-up meetings, as required, to expeditiously resolve all questions and concerns and to obtain required approvals. The Design Consultant shall not make any changes in the Scope of Services as outlined herein without prior written authorization from NYCEDC;

q) The Design Consultant shall prepare and make all submissions to NYCEDC and, as directed by NYCEDC, to any other Agency or relevant group;

r) The Design Consultant shall prepare, submit, assemble and reproduce any and all design documents and other work product as required by NYCEDC;

s) The project will involve the preparation of technical surveys and analyses, and detailed final designs. It will also involve design development and a completed set of contract documents, including necessary permits and approvals for improvements to the project sites, or a portion thereof. Specifically for each project, the Design Consultant will be required to complete the following tasks in a sequence approved by NYCEDC:

Task 1: Data Gathering and Analysis
Task 2: Technical Surveys
Task 3: Detailed Design Development
Task 4: Implementation Plan
Task 5: Permitting and Regulatory Approvals
Task 6: Contract Documents
Task 7: Construction Administration and Construction Observation
Task 8: Stakeholder Engagement

The scope of these tasks are defined for each project in Sections II – V.

t) The Design Consultant shall provide cost-estimating services, independent of cost estimates developed by the Construction Manager, as may be directed by NYCEDC.

Independent cost estimates will be required for all change orders. During all stages of the Services, the Design Consultant shall assist NYCEDC and be responsible for obtaining public approvals and design permits as may be required by applicable Agencies.

u) The Design Consultant shall coordinate the programming and designs with adjacent properties and corresponding open spaces with input from NYCEDC; and

The Design Consultant shall fully coordinate with all current and future planning, design and construction projects by the City in Hunts Point such as facility redevelopment, water main projects, street lighting projects, fire and police communication projects, as well as projects of a significant nature by parties other than the City (private utilities, authorities, governmental and non- governmental agencies and abutting property owners) and shall recommend programming alternatives and staging as required.

v) The Design Consultant shall inspect the project sites and assemble all relevant data, including previous studies, plans and surveys.

w) Assemble and review all available reports, prior studies, designs, surveys, maps, and public and private plans, roof warranty information, documents, and other applicable records relative to the projects.

x) The Design Consultant shall identify and notify NYCEDC of any additional information not contained in the existing documentation but that is needed to fully assess existing conditions and capacity of the projects.

y) The Design Consultant shall review all conceptual design basis documents produced in the Feasibility Study in order to validate the design approach and cost estimates.

z) Based on review of conceptual design basis documents, the Design Consultant shall propose strategies for the final design to reduce the project's capital costs and/or improve operational efficiency, while maintaining the resiliency, critical load, and sustainability objectives set forth in this scope of work. The Design Consultant may consider options to add supplemental technologies to the design, such as solar PV, energy storage for electricity or other methods to assist with blackstart capabilities, provided that such all design options can be implemented within the budget, maintain project goals, and positively impact the economic value proposition of the project. The Design Consultant shall be expected to conduct cost-benefit analysis of any additional alternatives proposed.

aa) The Design Consultant shall obtain, become familiar with and incorporate into the final design all applicable design directives, standard details, administrative procedural bulletins and guidelines available from any affected Agency.

bb) The Design Consultant shall identify and notify NYCEDC of any additional

information not contained in the existing documentation but that is needed to fully assess existing conditions and capacity of the projects.

cc) The Design Consultant shall review all conceptual design basis documents produced in the Feasibility Study in order to validate the design approach and cost estimates.

dd) Based on review of conceptual design basis documents, the Design Consultant shall propose strategies for the final design to reduce the project's capital costs and/or improve operational efficiency, while maintaining the resiliency, critical load, and sustainability objectives set forth in this scope of work. The Design Consultant may consider options to add supplemental technologies to the design, such as solar PV, energy storage for electricity or chilled/hot water storage, or other methods to assist with blackstart capabilities, provided that such all design options can be implemented within the budget, maintain project goals, and positively impact the economic value proposition of the project. The Design Consultant shall be expected to conduct cost-benefit analysis of any additional alternatives proposed.

III. SPECIFIC REQUIREMENTS - SCHOOL STORAGE AND SOLAR INSTALLATIONS

A.

Task 1: Data Gathering and Analysis

- The Design Consultant shall meet with the Project Team and relevant stakeholders, which may include ConEd, the PSC, Community Boards, elected officials, the DOE and other Agencies, as directed by NYCEDC.
- The Design Consultant shall analyze the expressed needs and concerns of the parties contacted, and shall address those needs/concerns, which, in the opinion of the Design Consultant and NYCEDC, are pertinent to the projects.
- The Design Consultant shall develop and pursue a recommended course of action and/or strategy to resolve issues pertinent to the project and to achieve project goals.

Specifically, Task 1 of the School Storage and Solar Installations shall be comprised of:

1. Site Inspection

a) The Design Consultant shall visit the sites related to the project, including PS 48 and MS 424 and perform all the inspections necessary to develop the design.

b) The Design Consultant shall provide all necessary building and subsurface investigations, as may be required, within the project site for further developing the design criteria. Elements to be inspected shall include existing structures, conduits and any other elements that affect the design and construction phase of the project. The project site inspection shall consist of the all necessary surveys and site investigations as described in Task 2.

2. Data Collection

Where required, or as directed by NYCEDC, the Design Consultant shall:

a) The Design Consultant shall conduct interviews with personnel of any affected or interested Agencies including DOE, Utilities or other group to obtain relevant data for the projects.

b) The Design Consultant shall collect interval meter data and utility billing rates and costs for all relevant electrical accounts to determine accurate electrical profiles of the relevant facilities. For accounts where interval metering is not currently available, the Consultant shall install interval meters to obtain the interval data.

c) In addition, the Design Consultant shall obtain, become familiar with and incorporate into the final design all applicable design directives, standard details, administrative procedural bulletins and guidelines available from any affected Agency.

d) If deemed necessary by NYCEDC, the Design Consultant shall prepare materials for and meet with the Community Boards, elected officials, adjacent property owners, or interested groups as directed by NYCEDC. The Design Consultant shall present the progress of the projects and take under consideration all initial concerns and ideas expressed about the projects. The Design Consultant shall submit to NYCEDC a summary memorandum documenting the minutes of each meeting and/or presentation. The Design Consultant shall document all attendees of the meetings and may distribute, upon NYCEDC's approval, copies of the meeting minutes to attendees.

B.

3. Conceptual Design Review

Task 2: Technical Surveys

The Design Consultant shall conduct technical surveys, to address any existing issues that may impact project implementation.

1. Topographic Survey

   The Design Consultant shall prepare Topographic Surveys of the project sites ("Topographic Survey"). The Topographic Survey shall be prepared within the following parameters except where commonly accepted industry standards, to be approved by NYCEDC, may apply. The following parameters are to be applied to each Topographic Survey:

   a) The Design Consultant shall submit for approval the names and experience portfolios of all persons and subcontractors proposed for use in connection with the Topographic Survey prior to start of that work.

   b) The Topographic Survey shall be referenced by station and offset to a centerline baseline, which has been established/coordinated/tied into existing borough conditions, navigational considerations, relationship of the datums used in comparison to monument lines, in accordance with current NYCEDC standards. All elevations shall be referenced to established borough benchmarks, or to benchmarks set from established borough benchmarks through the use of independent bench runs. The reference points, including bench runs and all tie-ins to the centerline baseline, shall be clearly documented so that they may be re-established at any time during the course of the work by the Design Consultant, or in the future by any other surveyor.

   c) The Topographic Surveys shall include the full project site.

   d) Datum plane and coordinate system shall be that in use by the Office of the Bronx Borough President for project sites.

   e) The Design Consultant shall submit to NYCEDC original survey notes, summary of survey procedures/instruments employed, survey control data, discussion of survey accuracy, summary or survey control data, survey tie ins, computer digitizer tapes and survey computations, which shall become the property of NYCEDC.

   f) The Design Consultant shall identify and provide NYCEDC with copies of all survey source material.

   g) The Design Consultant shall determine the design flood elevation by accounting for conditions for flooding, storm surge, wave action, and sea level rise based on the 90th percentile projections in the 2050s (per the New York City Panel on Climate Change).

2. Utility Surveys

The Design Consultant shall review existing utility surveys and undertake the additional surveys required to complete the scope of services.

The following scope items have already been completed:

a) Existing conditions review of utility surveys, identifying the location and condition of utilities, easements, and public infrastructure;

b) Detailed base maps (e.g., location of utilities, etc.) for priority areas

Where possible, recent existing surveys may supersede the need for new surveys and/or can be updated or enhanced and drawn compatible so as to create a complete set of Utility Survey drawings at one scale.

If necessary, any new utility Surveys shall be prepared within the framework of the following parameters except where commonly accepted industry standards exist or may apply:

a) The Utility Surveys shall identify and locate all existing surface and subsurface utilities, facilities and systems (both public and private) within the project sites needed to produce a comprehensive final design. The Utility Surveys shall identify, but not be limited to, the identification and location of the following:

b) The Design Consultant shall review all data obtained from the Agencies, Utilities, and others, and shall coordinate/reconcile such data with the Topographic Surveys.

c) The Design Consultant shall reconcile all discrepancies in the location and identification of all subsurface elements between the Topographic Surveys and the utility records.

d) The Design Consultant shall submit to NYCEDC original survey notes, together with all public and private utility drawings, plans and plates, which shall become the property of NYCEDC.

C.

Task 3: Detailed Design Development Documents

The Design Consultant shall synthesize the relevant data from Tasks 1 and 2 into Detailed Design Documents. The Design Consultant shall synthesize the relevant data assembled under all previous tasks into a functional design for the proposed projects, including, but not be limited to the following:

a) In general, the Design Development Documents shall include contract drawings in sufficient detail to allow the interested parties to visualize the intended contract documents.

b) The Design Consultant shall utilize as much information from the previous Tasks to check the design assumptions outlined in the conceptual high-level design documents.

c) As part of the Detailed Design Development the Design Consultant shall make progress submissions as requested by NYCEDC following the general guidelines listed below
    - 50% Final Design Documents
    - 75% Final Design Documents
    - Contract Documents (for bidding and procurement)

d) The Design Consultant shall obtain, and become familiar with, all applicable design directives and standard details that are relevant to completing the Detailed Design Development Task.

e) The Design Consultant shall further develop the plans and details of the conceptual high-level design including but not limited to utility impacts, and site impacts.

f) At 50% Final Design, the Design Consultant shall identify the critical loads and at least two design alternatives for the location of the ESS at PS 48 and MS 424, as well as at least two proposed general arrangement of the rooftop solar arrays at both schools. At least one of the ESS locations at PS 48 shall be ground-mounted; both ESS location alternatives at MS 424 shall be ground-mounted. The proposed ESS locations shall be informed by FDNY and DOB permitting feasibility, structural feasibility, and operational needs of each of the schools. The proposed solar array general arrangements shall be informed by structural feasibility of the rooftop spaces to enable sufficient access to rooftop equipment as needed by school facilities staff. The Design Consultant shall engage NYCEDC, DOE, and school facilities staff in a formal kickoff meeting at 50% Final Design to discuss the design alternatives, account for school operational considerations, and determine a design to advance. The Design Consultant should expect to engage DOE and school facilities staff at 50% design, 75% design, and at the last stage of Contract Documents.

g) The Design Consultant shall provide a revised cost construction estimate at the completion of the 50% and 75% Final Design Documents.

h) The Design Consultant shall submit to NYCEDC for approval the names and experience portfolios of all persons and/or specialists in connection with the Detailed Design Development.

i) The Design Consultant shall consider the particular location, durability, resiliency to coastal storm surge and sea level rise, and the potential for vandalism and maintenance responsibility when preparing any Design Development Documents and any recommendations. The Design Consultant shall coordinate and discuss these concerns as necessary, with NYCEDC and appropriate Agencies.

j) The Design Consultant shall evaluate all comments provided by the Project Team and

all Agencies having jurisdiction over the project and shall incorporate those comments during the Detailed Design Development.

k) The Design Consultant shall submit to NYCEDC and all relevant parties, including the PDC, Landmarks Preservation Committee ("LPC") and the State Historic Preservation Office ("SHPO") if necessary, for review and comment. The Design Consultant shall obtain written sign-offs (e.g., approvals, letters of no objection) from all required Agencies. Upon receipt of approvals, The Design Consultant shall present the Contract Documents

l) The Design Consultant shall obtain written approval of each progress submission from NYCEDC while completing this Task.

m) All drawings shall show the locations of all existing physical features, both surface and subsurface that affect the work.

n) All drawings shall show all essential information, which shall include, but not be limited to, such information as existing elevations, proposed design elevations, block and lot numbers, street address, sections, details, notes and sketches, and any other work necessary to fully describe and define the intended design in accordance with currently applicable NYCEDC standards.

o) The Design Consultant shall maintain current information relating to the estimated costs during the design period and shall inform NYCEDC promptly in writing of any significant changes in such estimated cost due to market conditions or changes in the scope or design of the projects.

p) Given the longstanding history of environmental pollution in Hunts Point, the detailed design shall not have adverse air quality impacts in Hunts Point, as set forth by the City Environmental Quality Review ("CEQR") standards. The detailed design should minimize emissions of criteria air contaminants to the neighborhood within reasonable cost, as justified by a cost-benefit analysis, and maximize emissions displacement through the conversion of diesel trucks. The detailed design must meet Con Edison's Standby Rate Pilot Program (including the City's Air Quality Collaborative) for criteria air contaminants. If the detailed design is found to have significant negative air quality impacts and/or does not meet the criteria air contaminant standards in the Air Quality Collaborative, the Design Consultant shall, in consultation with and at no additional cost to NYCEDC, modify the Design Development Documents as necessary until the design is acceptable to NYCEDC.

q) The Design Consultant shall review the Detailed Design Development Documents with NYCEDC as they are being developed.

r) The Design Consultant shall review and evaluate the comments received from all parties reviewing the progress drawings. Where comments pertain to design being performed under the jurisdiction of other Agencies or other the Design Consultant

shall make all appropriate requested changes to the design or incorporate additional appurtenant work, and/or incorporate completed designs prepared and furnished by the various interested parties, into the Detailed Design Development Documents. Where the requested changes are deemed incompatible with the Final Design by the Design Consultant and NYCEDC the Design Consultant shall meet with the affected stakeholders to discuss and develop alternate solutions until one solution is acceptable to all parties involved.

s) The Design Consultant shall modify and correct, as appropriate, the progress drawings in accordance with the comments received from the interested reviewing parties. The affected portions of the contract drawings shall be resubmitted, as necessary, to the interested parties for review and approval.

t) The Design Consultant shall make presentations of design progress to NYCEDC and, as directed by NYCEDC, to other stakeholders. The Consultant shall incorporate any necessary revisions into the Final Design and cost estimate at the direction of NYCEDC.

Task 4: Implementation Plan

D. The Design Consultant should develop a clear and detailed step-by-step operational manual for the solar and storage at MS 424 and PS 48to use in the event of a larger grid outage. The Operations Manual should specify the procedures, roles, and responsibilities of all relevant parties for normal blue-sky operation, shut-down from normal operation, islanded operation, and restoration from islanded operation.

E. For the solar and storage systems at MS 424 and PS 48, the Operations Manual will require coordination and approval from ConEd, NYCEDC, and DOE staff and school facilities staff from each school.

Task 5: Permitting and Regulatory Approvals

The Design Consultant will be required to prepare permits from the following non-exhaustive list of anticipated agencies:

- FDNY
- DOB
- ConEd
- PDC
- SHPO
- LPC
- Office of Technical Certification and Research (OTCR)
- NYCDOT

Permitting and approvals should be completed at around the 50% design stage. The Design

Consultant project team shall incorporate competent legal expertise with experience in the NYC energy industry to coordinate all required regulatory approvals.

Task 6: Contract Documents

F. The Design Consultant shall prepare contract documents for the purpose of bidding and procurement. Drawings included in the contract documents shall be prepared with necessary construction details, fully dimensioned and with detailed specifications from which prospective bidders can make accurate and reliable estimates of the quantities, quality and character of the labor and materials required to complete the particular bid contract and to install any equipment therein.

The contract documents shall be prepared in such manner and form that will enable NYCEDC and the Construction Manager to award contracts as deemed in the best interests of the construction, schedule and/or budget. The contract documents shall include all final designs, specifications, estimates, and other related documents for each separate contract. The contract documents shall be reasonably coordinated within a given package and with previously issued packages so as to preclude the necessity for design changes, adjustments or change orders. The selected Design Consultant shall synthesize the relevant data assembled under relevant tasks into contract documents, including, but not be limited to the following:

a) After the Design Consultant has acquired required written approvals from appropriate Agencies and Utilities, the Design Consultant shall prepare all required contract documents in a manner and form that enables NYCEDC to award the necessary contract/s for construction. The contract documents shall include final drawings and specifications. The final drawings and specifications shall include, but shall not be limited to, drawings and specifications for all elements for the project including any necessary equipment.

b) The Design Consultant shall participate in a construction review of the project.

c) The Design Consultant shall subsequently prepare a final cost estimate to accompany the Contract Documents, which shall be prepared in a format approved by NYCEDC. In preparing the cost estimate, The Design Consultant shall use the latest unit prices for all standard items.

d) Upon completion of the contract documents and final estimates of cost, the Design Consultant shall submit the contract documents and final estimates to NYCEDC for review and comment. Following NYCEDC's review of the contract documents, the Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project, including PDC. The Design Consultant shall make such changes in the plans and specifications as may be reasonably necessary to obtain such approval or approvals without any additional compensation. The Design Consultant shall also submit the contract documents to any Utility affected by the

project.

e) All final drawings shall bear all required stamps of approval, including the seal and authorized facsimile of the signature of the Design Consultant.

f) The Design Consultant shall prepare a maintenance manual for any amenities that are designed, which will include specifications for materials, installation specifications, resources, and annual maintenance schedules.

g) The Design Consultant shall prepare, submit, assemble and reproduce the documents required for construction of the project to the extent provided below. The contract documents shall include the following: (1) the plan and drawings; (2) the proposal for bids; (3) the specifications; (4) all addenda issued prior to the receipt of bids; (5) the form of construction contract; (6) all provisions required by law to be included in the construction contract, including relevant federal regulations; (7) forms for the notice of award, the bid, performance and payment bonds; (8) the general provisions conditions; and (9) all other supplementary or special provisions or conditions. Items (1), (3) and (4) shall be prepared in the first instance by the Design Consultant. Items (2), (5), (6), (7), (8), and (9) shall be prepared in the first instance by NYCEDC. If requested, the Design Consultant shall review and make recommendations for any special conditions to be included in the contract documents.

h) The Design Consultant acknowledges that multiple submissions may be required for final approval.

i) The Design Consultant shall participate in a constructability review of the project that shall be carried out by NYCEDC or other parties as required.

j) Following NYCEDC's review of the contract documents, The Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project. The Design Consultant shall also submit the contract documents to any Utility with facilities affected by the project.

k) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for negligent errors or omissions caused by the Design Consultant.

G.

l) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for negligent errors or omissions caused by the Design Consultant.

Task 7: Construction Administration and Construction Observation

The Design Consultant shall provide the following services during construction of the project to ascertain that the work performed by the construction contractor(s) conforms to the contract documents. This work shall be performed in conjunction with the Construction Manager.

a) The Design Consultant shall advise and consult with NYCEDC beginning on the Commencement Date and until Final Completion. The Design Consultant may have authority to act on behalf of NYCEDC only to the extent provided in the Contract unless otherwise made by written agreement by NYCEDC and Design Consultant.

b) Upon the award of the construction contracts by NYCEDC, the Design Consultant shall review the contractor's proposed progress schedule to become familiar with the submission dates of shop drawings and samples.

c) The Design Consultant shall visit the project site at intervals appropriate to the stage of construction, or as otherwise agreed by NYCEDC and Design Consultant in writing, to become generally familiar with the progress and quality of the construction work completed and to determine if the construction work is being performed in accordance with the contract documents. However, the Design Consultant shall not be required to make exhaustive or continuous on-site observations or inspections to check the quality or quantity of the construction work. On the basis of on-site observations, the Design Consultant shall keep NYCEDC informed of the observed progress and quality of the construction work, and shall endeavor to guard NYCEDC against observable defects and deficiencies in the construction work.

d) The Design Consultant shall not have control over, or charge of, and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the construction work, since these services are solely the Construction Manager's or the construction contractors' responsibility under the construction contracts. The Design Consultant shall not be responsible for the Construction Manager's or construction contractors' schedules or failure to carry out the construction work in accordance with the contract documents. The Design Consultant shall not control or be responsible for any acts or omissions of the Construction Manager, or the Construction Manager's subcontractors, or their agents or employees, or the construction contractors' or any other persons performing construction work.

e) The Design Consultant shall certify/sign off on all applicable Department of Buildings TR-1 applications that are not otherwise considered Special Inspections. Special Inspection TR-1's and other forms shall be signed off by a Third Party of NYCEDC's choosing.

f) Copies of all significant communications between NYCEDC and Construction

Manager shall be provided to the Design Consultant in a timely manner.

g) Upon consultation with and approval by NYCEDC, the Design Consultant shall have authority to reject construction work that does not conform to the contract documents.

h) The Design Consultant shall have authority to require additional inspection or testing of the construction work in accordance with the contract documents, whether or not such construction work is fabricated, installed or completed, however such additional work must be approved in advance by NYCEDC. However, this authority shall not give rise to a duty or responsibility of the Design Consultant to the Construction Manager, its subcontractors, material and equipment suppliers, their agents or employees or other persons performing the construction work.

i) The Design Consultant shall review and approve or take other appropriate action upon the Construction Manager's submittals such as shop drawings, product data and samples, but only for the limited purpose of checking for conformance with information given and the design intent expressed in the contract documents. The Design Consultant's actions shall be taken with reasonable promptness while allowing sufficient time in the Design Consultant's professional judgment to permit adequate review. The review of shop drawings shall be limited to three (3) submissions under this Scope of Services and will be conducted only after the Construction Manager has coordinated said documents to indicate field conditions, proposed Construction Manager deviations from the contract documents, and other requirements that affect design intent; all submissions shall indicate that the required coordination has been performed. Review of submittals is not conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems designed by the Construction Manager, all of which remain the responsibility of the Construction Manager to the extent required by the contract documents, all of which the Design Consultant shall be entitled to rely upon. The Design Consultant's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Design Consultant, of construction means, methods, techniques, sequences or procedures. The Design Consultant's approval of a specific item shall not indicate approval of an assembly of which the item is a component. When the professional certification of performance characteristics of materials, systems or equipment is required by the contract documents, the Design Consultant shall be entitled to rely upon such certification to establish that the materials, systems or equipment meet the performance criteria required by the Contract documents. NYCEDC shall have the right to review the shop drawings and samples, including any color schedules, prior to acceptance by the Design Consultant.

j) The Design Consultant may recommend minor changes in the construction work

that are consistent with the intent of the contract documents for the purposes of facilitating construction or resolving minor field conditions so that construction may proceed unimpeded.

k) The Design Consultant shall furnish assistance and aid at conferences with involved parties as may be required to resolve design issues during construction. The Design Consultant shall interpret and decide matters concerning the contract documents upon written request by NYCEDC or the Construction Manager. The Design Consultant's written response to such requests shall be made with reasonable promptness and within any time limits agreed upon.

l) Interpretations and decisions of the Design Consultant shall be consistent with the intent reasonably inferable from the contract documents and shall be in writing or in the form of drawings.

m) The Design Consultant is required to attend weekly meetings with NYCEDC and others throughout the duration of the design and construction process.

n) The Construction Manager shall submit to NYCEDC and Design Consultant, a regular list of shop drawings for each contract indicating progress with respect thereto. The information submitted shall consist of names of contractors, names of shop drawings, shop drawing due dates in accordance with approved shop drawing schedule required to be submitted by contractors, dates issued, dates received, dates checked, dates returned for corrections, dates resubmitted by contractors, dates finally approved by the Design Consultant, and any additional information that may be necessary to clearly indicate to NYCEDC the progress of any applicable shop drawings. The Design Consultant shall work to meet the shop-drawing schedule.

o) The Design Consultant shall furnish assistance and aid to the Construction Manager to start and advance the work and shall attend a pre-construction conference and other conferences with involved parties as may be required to resolve design issues during construction.

p) If requested by NYCEDC, the Design Consultant shall issue interpretations and clarifications of the contract documents and if so required, make minor changes in the work in coordination with the Construction Manager.

q) Change orders may be issued only by NYCEDC. The Design Consultant shall make recommendations in connection with change orders as requested by NYCEDC.

r) The Design Consultant shall provide all customary construction contract administration services to NYCEDC to ensure that the work performed by the Construction Manager or the construction contractors conforms to work in general described by the Scope of Services and the intent of the final

contract documents.

s) The Design Consultant shall compile complete sets of accurate shop, working, and record as-built drawings.

t) Upon completion of the project the Design Consultant shall provide:

- Drawings of the final design as prepared for bid shall be provided to NYCEDC.
- The drawings shall contain the name and address of the design firm, the name and address of the procuring agency or organization, the project title and location.
- A complete copy of the project specification shall be provided to NYCEDC. An electronic file of the specification shall be provided in PDF format.
- Included on each as-built/record drawing shall be the name, address and telephone number of the contractor. Those areas that differ from the design drawings shall be highlighted with a "bubble."
- A list of tangible assets produced by the project, their cost, and the year in which each asset was placed into beneficial use; and a maintenance plan covering all the assets.

IV. SPECIFIC REQUIREMENTS – EMERGENCY BACKUP GENERATORS

A.

Task 1: Data Gathering and Analysis

- The Design Consultant shall meet with the Project Team and relevant stakeholders, which may include the FDC facility managers and tenants, ConEd, the PSC, Community Boards, elected officials, and DOE and other Agencies, as directed by NYCEDC.
- The Design Consultant shall analyze the expressed needs and concerns of the parties contacted, and shall address those needs/concerns, which, in the opinion of the Design Consultant and NYCEDC, are pertinent to the projects.
- The Design Consultant shall develop and pursue a recommended course of action and/or strategy to resolve issues pertinent to the project and to achieve project goals.

Specifically, Task 1 shall be comprised of:

1. Site Inspection

a) The Design Consultant shall visit the sites related to the project including 600 Food Center Drive (Sultana and Citarella), 550 Food Center Drive (Anheuser Busch), and 400 Food Center Drive (Krasdale) and perform all the inspections necessary to develop the design.

b) The Design Consultant shall provide all necessary subsurface investigations, as may be required, within the project site for further developing the design criteria. Elements to be inspected shall include existing structures, conduits and any other elements that affect the design and construction phase of the project. The project site inspection shall consist of the all necessary surveys and site investigations as described in Task 2.

2. Data Collection

Where required, or as directed by NYCEDC, the Design Consultant shall:

a) The Design Consultant shall conduct interviews with relevant FDC facility managers and tenants' staff or other group to obtain relevant data for the projects.

b) In addition, the Design Consultant shall obtain, become familiar with and incorporate into the final design all applicable design directives, standard details, administrative procedural bulletins and guidelines available from any affected Agency.

c) The Design Consultant shall identify and notify NYCEDC of any additional information not contained in the existing documentation but that is needed to fully assess existing conditions and capacity of the projects.

d) If deemed necessary by NYCEDC, the Design Consultant shall prepare materials for and meet with the Community Boards, elected officials, adjacent property owners, or interested groups as directed by NYCEDC. The Design Consultant shall present the progress of the projects and take under consideration all initial concerns and ideas expressed about the projects. The Design Consultant shall submit to NYCEDC a summary memorandum documenting the minutes of each meeting and/or presentation. The Design Consultant shall document all attendees of the meetings and may distribute, upon NYCEDC's approval, copies of the meeting minutes to attendees.

B.

3. Conceptual Design Review

Task 2: Technical Surveys

The Design Consultant shall conduct technical surveys, to address any existing issues that may impact project implementation.

1. Topographic Survey

The Design Consultant shall prepare Topographic Surveys of the project sites ("Topographic Survey"). The Topographic Survey shall be prepared within the

following parameters except where commonly accepted industry standards, to be approved by NYCEDC, may apply. The following parameters are to be applied to each Topographic Survey performed for the individual projects:

a) The Design Consultant shall submit for approval the names and experience portfolios of all persons and subcontractors proposed for use in connection with the Topographic Survey prior to start of that work.

b) The Topographic Survey shall be referenced by station and offset to a centerline baseline, which has been established/coordinated/tied into existing borough conditions, navigational considerations, relationship of the datums used in comparison to monument lines, in accordance with current NYCEDC standards. All elevations shall be referenced to established borough benchmarks, or to benchmarks set from established borough benchmarks through the use of independent bench runs. The reference points, including bench runs and all tie-ins to the centerline baseline, shall be clearly documented so that they may be re-established at any time during the course of the work by the Design Consultant, or in the future by any other surveyor.

c) The Topographic Surveys shall include the full project site.

d) Datum plane and coordinate system shall be that in use by the Office of the Bronx Borough President for project sites.

e) The Design Consultant shall submit to NYCEDC original survey notes, summary of survey procedures/instruments employed, survey control data, discussion of survey accuracy, summary or survey control data, survey tie ins, computer digitizer tapes and survey computations, which shall become the property of NYCEDC.

f) The Design Consultant shall identify and provide NYCEDC with copies of all survey source material.

g) The Design Consultant shall determine the design flood elevation by accounting for conditions for flooding, storm surge, wave action, and sea level rise based on the 90th percentile projections in the 2050s (per the New York City Panel on Climate Change).

2. Utility Surveys

The Design Consultant shall review existing utility surveys and undertake the additional surveys required to complete the scope of services.

The following scope items have already been completed:

a) Existing conditions review of utility surveys, identifying the location and condition of

utilities, easements, and public infrastructure;

b) Detailed base maps (e.g., location of utilities, combined sewer overflows ("CSOs", etc.) for priority areas

c) Elevation certificates for relevant FDC buildings identified by NYCEDC

Where possible, recent existing surveys may supersede the need for new surveys and/or can be updated or enhanced and drawn compatible so as to create a complete set of Utility Survey drawings at one scale.

If necessary, any new utility Surveys shall be prepared within the framework of the following parameters except where commonly accepted industry standards exist or may apply:

e) The Utility Surveys shall identify and locate all existing surface and subsurface utilities, facilities and systems (both public and private) within the project sites needed to produce a comprehensive final design. The Utility Surveys shall identify, but not be limited to, the identification and location of the following:

f) The Design Consultant shall review all data obtained from the Agencies, Utilities, and others, and shall coordinate/reconcile such data with the Topographic Surveys.

g) The Design Consultant shall reconcile all discrepancies in the location and identification of all subsurface elements between the Topographic Surveys and the utility records.

h) The Design Consultant shall submit to NYCEDC original survey notes, together with all public and private utility drawings, plans and plates, which shall become the property of NYCEDC.

C.

Task 3: Detailed Design Development Documents

The Design Consultant shall synthesize the relevant data from Tasks 1 and 2 into Detailed Design Documents. The Design Consultant shall synthesize the relevant data assembled under all previous tasks into a functional design for the proposed projects, including, but not be limited to the following:

a) The Design Consultant shall be responsible for finalizing electrical interconnection in coordination with Con Ed and the relevant FDC facilities as part of the detailed design development.

b) In general, the Design Development Documents shall include contract drawings in sufficient detail to allow the interested parties to visualize the intended contract documents.

c) The Design Consultant shall utilize as much information from the previous Tasks to check the design assumptions outlined in the conceptual high-level design documents.

d) As part of the Detailed Design Development the Design Consultant shall make progress submissions as requested by NYCEDC following the general guidelines listed below for the mobile generators):

- 50% Final Design Documents
- 75% Final Design Documents
- Contract Documents (for bidding and procurement)

e) The Design Consultant shall obtain, and become familiar with, all applicable design directives and standard details that are relevant to completing the Detailed Design Development Task.

f) The Design Consultant shall further develop the plans and details of the conceptual high-level design including but not limited to utility impacts, and site impacts.

g) At 50% Final Design of the mobile generators, the Design Consultant shall identify the critical loads that will be handled by the mobile generators at Krasdale, Anheuser Busch, and 600 Food Center Drive (Sultana and Citarella). The Design Consultant shall also identify the proposed location of the transfer switches and any corresponding electrical work needed for design of the mobile generator hook-ups. This work shall be informed by operational needs of NYCEDC, Krasdale, Anheuser Busch, Sultana, and Citarella.

h) The Design Consultant shall provide a revised cost construction estimate at the completion of the 50% and 75% Final Design Documents.

i) The Design Consultant shall submit to NYCEDC for approval the names and experience portfolios of all persons and/or specialists in connection with the Detailed Design Development.

j) The Design Consultant shall consider the particular location, durability, resiliency to coastal storm surge and sea level rise, and the potential for vandalism and maintenance responsibility when preparing any Design Development Documents and any recommendations. The Design Consultant shall coordinate and discuss these concerns as necessary, with NYCEDC and appropriate Agencies.

k) The Design Consultant shall evaluate all comments provided by the Project Team and all Agencies having jurisdiction over the project and shall incorporate those comments during the Detailed Design Development.

l) The Design Consultant shall submit to NYCEDC and all relevant parties, including the PDC, Landmarks Preservation Committee ("LPC") and the State Historic Preservation Office ("SHPO") if necessary, for review and comment. The Design Consultant shall

obtain written sign-offs (e.g., approvals, letters of no objection) from all required Agencies. Upon receipt of approvals, the Design Consultant shall present the Contract Documents

m) The Design Consultant shall obtain written approval of each progress submission from NYCEDC while completing this Task.

n) All drawings shall show the locations of all existing physical features, both surface and subsurface that affect the work.

o) All drawings shall show all essential information, which shall include, but not be limited to, such information as existing elevations, proposed design elevations, block and lot numbers, street address, sections, details, notes and sketches, and any other work necessary to fully describe and define the intended design in accordance with currently applicable NYCEDC standards.

p) The Design Consultant shall maintain current information relating to the estimated cost of the projects during the design period and shall inform NYCEDC promptly in writing of any significant changes in such estimated cost due to market conditions or changes in the scope or design of the projects.

q) As defined in Section I.A. Project Structure, the detailed design shall meet resiliency objectives, critical loads, and sustainability objectives that allow each critical facility to serve the specified operational needs. If the detailed design does not achieve the specified level resiliency, the Design Consultant shall, in consultation with and at no additional cost to NYCEDC, modify the Design Development Documents as necessary until the design is acceptable to NYCEDC.

r) Given the longstanding history of environmental pollution in Hunts Point, the detailed design shall not have adverse air quality impacts in Hunts Point, as set forth by the City Environmental Quality Review ("CEQR") standards. The detailed design should minimize emissions of criteria air contaminants to the neighborhood within reasonable cost, as justified by a cost-benefit analysis, and maximize emissions displacement through the conversion of diesel trucks. The detailed design must meet Con Edison's Standby Rate Pilot Program (including the City's Air Quality Collaborative) for criteria air contaminants. If the detailed design is found to have significant negative air quality impacts and/or does not meet the criteria air contaminant standards in the Air Quality Collaborative, the Design Consultant shall, in consultation with and at no additional cost to NYCEDC, modify the Design Development Documents as necessary until the design is acceptable to NYCEDC.

s) The Design Consultant shall review the Detailed Design Development Documents with NYCEDC as they are being developed.

t) The Design Consultant shall review and evaluate the comments received from all parties reviewing the progress drawings. Where comments pertain to design being

performed under the jurisdiction of other Agencies or other stakeholders (such as the tenants or cooperatives at the FDC), the Design Consultant shall make all appropriate requested changes to the design or incorporate additional appurtenant work, and/or incorporate completed designs prepared and furnished by the various interested parties, into the Detailed Design Development Documents. Where the requested changes are deemed incompatible with the Final Design by the Design Consultant and NYCEDC the Design Consultant shall meet with the affected stakeholders to discuss and develop alternate solutions until one solution is acceptable to all parties involved.

u) The Design Consultant shall modify and correct, as appropriate, the progress drawings in accordance with the comments received from the interested reviewing parties. The affected portions of the contract drawings shall be resubmitted, as necessary, to the interested parties for review and approval.

v) The Design Consultant shall make presentations of design progress to NYCEDC and, as directed by NYCEDC, to other stakeholders. The Consultant shall incorporate any necessary revisions into the Final Design and cost estimate at the direction of NYCEDC.

D. **Task 4: Implementation Plan**

The Design Consultant should develop a clear and detailed step-by-step operational manual for the mobile generators to use in the event of a larger grid outage. The Operations Manual should specify the procedures, roles, and responsibilities of all relevant parties for normal blue-sky operation, shut-down from normal operation, islanded operation, and restoration from islanded operation.

E. **Task 5: Permitting and Regulatory Approvals**

The Design Consultant will be required to prepare permits from the following non-exhaustive list of agencies:

a) The Design Consultant shall obtain approvals as necessary from Con Ed, the Public Service Commission, the Fire Department of New York (FDNY), Department of Buildings, and other entities for repair or removal of existing infrastructure pertinent to the development of the tri-generation system, as well as regulatory approvals to operate the tri-generation system.
b) Permitting and regulatory approvals shall be completed at the 50% design completion mark.
c) The Design Consultant shall maintain regular coordination with Con Ed and New York Public Service Commission (PSC) with regards to the development of each design milestone as well as for all necessary regulatory approvals. Coordination activities may include, for example, petitions to the PSC, regular check-ins on sectionalization and concept design with the Distributed Generation team at ConEd.

The anticipated permits needed are listed in the Exhibit 1.

Permitting and approvals should be completed at around the 50% design stage. The Design Consultant project team shall incorporate competent legal expertise with experience in the NYC energy industry to coordinate potential filings to the PSC.

Task 6: Contract Documents

F. The Design Consultant shall prepare contract documents for the purpose of bidding and procurement. Drawings included in the contract documents shall be prepared with necessary construction details, fully dimensioned and with detailed specifications from which prospective bidders can make accurate and reliable estimates of the quantities, quality and character of the labor and materials required to complete the particular bid contract and to install any equipment therein.

The contract documents shall be prepared in such manner and form that will enable NYCEDC and the Construction Manager to award separate contracts as deemed in the best interests of the construction, schedule and/or budget. The contract documents shall include all final designs, specifications, estimates, and other related documents for each separate contract. The contract documents shall be reasonably coordinated within a given package and with previously issued packages so as to preclude the necessity for design changes, adjustments or change orders. The selected Design Consultant shall synthesize the relevant data assembled under relevant tasks into contract documents, including, but not be limited to the following:

a) After the Design Consultant has acquired required written approvals from appropriate Agencies and Utilities, the Design Consultant shall prepare all required contract documents in a manner and form that enables NYCEDC to award the necessary contract/s for construction. The contract documents shall include final drawings and specifications. The final drawings and specifications shall include, but shall not be limited to, drawings and specifications for all elements for the project including any necessary equipment.

b) The Design Consultant shall participate in a construction review of the project.

c) The Design Consultant shall subsequently prepare a final cost estimate to accompany the Contract Documents, which shall be prepared in a format approved by NYCEDC. In preparing the cost estimate, The Design Consultant shall use the latest unit prices for all standard items.

d) Upon completion of the contract documents and final estimates of cost, the Design Consultant shall submit the contract documents and final estimates to NYCEDC for review and comment. Following NYCEDC's review of the contract documents, the Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project, including PDC. The Design Consultant shall make

such changes in the plans and specifications as may be reasonably necessary to obtain such approval or approvals without any additional compensation. The Design Consultant shall also submit the contract documents to any Utility affected by the project.

e) All final drawings shall bear all required stamps of approval, including the seal and authorized facsimile of the signature of the Design Consultant.

f) The Design Consultant shall prepare a maintenance manual for any amenities that are designed, which will include specifications for materials, installation specifications, resources, and annual maintenance schedules.

g) The Design Consultant shall prepare, submit, assemble and reproduce the documents required for construction of the project to the extent provided below. The contract documents shall include the following: (1) the plan and drawings; (2) the proposal for bids; (3) the specifications; (4) all addenda issued prior to the receipt of bids; (5) the form of construction contract; (6) all provisions required by law to be included in the construction contract, including relevant federal regulations; (7) forms for the notice of award, the bid, performance and payment bonds; (8) the general provisions conditions; and (9) all other supplementary or special provisions or conditions. Items (1), (3) and (4) shall be prepared in the first instance by the Design Consultant. Items (2), (5), (6), (7), (8), and (9) shall be prepared in the first instance by NYCEDC. If requested, the Design Consultant shall review and make recommendations for any special conditions to be included in the contract documents.

h) The Design Consultant acknowledges that multiple submissions may be required for final approval.

i) The Design Consultant shall participate in a constructability review of the project that shall be carried out by NYCEDC or other parties as required.

j) Following NYCEDC's review of the contract documents, The Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project. The Design Consultant shall also submit the contract documents to any Utility with facilities affected by the project.

k) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for
G. negligent errors or omissions caused by the Design Consultant.

l) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for negligent errors or omissions caused by the Design Consultant.

Task 7: Construction Administration and Construction Observation

The Design Consultant shall provide the following services during construction of the project to ascertain that the work performed by the construction contractor(s) conforms to the contract documents. This work shall be performed in conjunction with the Construction Manager.

a) The Design Consultant shall advise and consult with NYCEDC beginning on the Commencement Date and until Final Completion. The Design Consultant may have authority to act on behalf of NYCEDC only to the extent provided in the Contract unless otherwise made by written agreement by NYCEDC and Design Consultant.

b) Upon the award of the construction contracts by NYCEDC, the Design Consultant shall review the contractor's proposed progress schedule to become familiar with the submission dates of shop drawings and samples.

c) The Design Consultant shall visit the project site at intervals appropriate to the stage of construction, or as otherwise agreed by NYCEDC and Design Consultant in writing, to become generally familiar with the progress and quality of the construction work completed and to determine if the construction work is being performed in accordance with the contract documents. However, the Design Consultant shall not be required to make exhaustive or continuous on-site observations or inspections to check the quality or quantity of the construction work. On the basis of on-site observations, the Design Consultant shall keep NYCEDC informed of the observed progress and quality of the construction work, and shall endeavor to guard NYCEDC against observable defects and deficiencies in the construction work.

d) The Design Consultant shall not have control over, or charge of, and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the construction work, since these services are solely the Construction Manager’s or the construction contractors’ responsibility under the construction contracts. The Design Consultant shall not be responsible for the Construction Manager’s or construction contractors’ schedules or failure to carry out the construction work in accordance with the contract documents. The Design Consultant shall not control or be responsible for any acts or omissions of the Construction Manager, or the Construction Manager’s subcontractors, or their agents or employees, or the construction contractors’ or any other persons performing construction work.

e) The Design Consultant shall certify/sign off on all applicable Department of Buildings TR-1 applications that are not otherwise considered Special Inspections. Special Inspection TR-1’s and other forms shall be signed off by a Third Party of NYCEDC’s choosing.

f) Copies of all significant communications between NYCEDC and Construction

Manager shall be provided to the Design Consultant in a timely manner.

g) Upon consultation with and approval by NYCEDC, the Design Consultant shall have authority to reject construction work that does not conform to the contract documents.

h) The Design Consultant shall have authority to require additional inspection or testing of the construction work in accordance with the contract documents, whether or not such construction work is fabricated, installed or completed, however such additional work must be approved in advance by NYCEDC. However, this authority shall not give rise to a duty or responsibility of the Design Consultant to the Construction Manager, its subcontractors, material and equipment suppliers, their agents or employees or other persons performing the construction work.

i) The Design Consultant shall review and approve or take other appropriate action upon the Construction Manager's submittals such as shop drawings, product data and samples, but only for the limited purpose of checking for conformance with information given and the design intent expressed in the contract documents. The Design Consultant's actions shall be taken with reasonable promptness while allowing sufficient time in the Design Consultant's professional judgment to permit adequate review. The review of shop drawings shall be limited to three (3) submissions under this Scope of Services and will be conducted only after the Construction Manager has coordinated said documents to indicate field conditions, proposed Construction Manager deviations from the contract documents, and other requirements that affect design intent; all submissions shall indicate that the required coordination has been performed. Review of submittals is not conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems designed by the Construction Manager, all of which remain the responsibility of the Construction Manager to the extent required by the contract documents, all of which the Design Consultant shall be entitled to rely upon. The Design Consultant's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Design Consultant, of construction means, methods, techniques, sequences or procedures. The Design Consultant's approval of a specific item shall not indicate approval of an assembly of which the item is a component. When the professional certification of performance characteristics of materials, systems or equipment is required by the contract documents, the Design Consultant shall be entitled to rely upon such certification to establish that the materials, systems or equipment meet the performance criteria required by the Contract documents. NYCEDC shall have the right to review the shop drawings and samples, including any color schedules, prior to acceptance by the Design Consultant.

j) The Design Consultant may authorize minor changes in the construction work

that are consistent with the intent of the contract documents for the purposes of facilitating construction or resolving minor field conditions so that construction may proceed unimpeded.

k) The Design Consultant shall furnish assistance and aid at conferences with involved parties as may be required to resolve design issues during construction. The Design Consultant shall interpret and decide matters concerning the contract documents upon written request by NYCEDC or the Construction Manager. The Design Consultant's written response to such requests shall be made with reasonable promptness and within any time limits agreed upon.

l) Interpretations and decisions of the Design Consultant shall be consistent with the intent reasonably inferable from the contract documents and shall be in writing or in the form of drawings. When making such interpretations and initial decisions, The Design Consultant shall not be liable for results of interpretations or decisions so rendered in good faith.

m) The Design Consultant is required to attend weekly meetings with NYCEDC and others throughout the duration of the design and construction process.

n) The Construction Manager shall submit to NYCEDC and Design Consultant, a regular list of shop drawings for each contract indicating progress with respect thereto. The information submitted shall consist of names of contractors, names of shop drawings, shop drawing due dates in accordance with approved shop drawing schedule required to be submitted by contractors, dates issued, dates received, dates checked, dates returned for corrections, dates resubmitted by contractors, dates finally approved by the Design Consultant, and any additional information that may be necessary to clearly indicate to NYCEDC the progress of any applicable shop drawings. The Design Consultant shall work to meet the shop-drawing schedule.

o) The Design Consultant shall furnish assistance and aid to the Construction Manager to start and advance the work and shall attend a pre-construction conference and other conferences with involved parties as may be required to resolve design issues during construction.

p) If requested by NYCEDC, the Design Consultant shall issue interpretations and clarifications of the contract documents and if so required, make minor changes in the work in coordination with the Construction Manager.

q) Change orders may be issued only by NYCEDC. The Design Consultant shall make recommendations in connection with change orders as requested by NYCEDC.

r) The Design Consultant shall provide all customary construction contract

administration services to NYCEDC to ensure that the work performed by the Construction Manager or the construction contractors conforms to work in general described by the Scope of Services and the intent of the final contract documents.

s) The Design Consultant shall compile complete sets of accurate shop, working, and record as-built drawings.

t) Upon completion of the project the Design Consultant shall provide:

- Drawings of the final design as prepared for bid shall be provided to NYCEDC.
- The drawings shall contain the name and address of the design firm, the name and address of the procuring agency or organization, the project title and location.
- A complete copy of the project specification shall be provided to NYCEDC. An electronic file of the specification shall be provided in PDF format.
- Included on each as-built/record drawing shall be the name, address and telephone number of the contractor. Those areas that differ from the design drawings shall be highlighted with a "bubble."
- A list of tangible assets produced by the project, their cost, and the year in which each asset was placed into beneficial use; and a maintenance plan covering all the assets.

u) Provide materials and/or attend one-on-one briefings or meetings that may be required with FDC tenants, elected officials, community groups, or stakeholders as needed.

A. **V. SPECIFIC REQUIREMENTS – TRI-GENERATION SYSTEM TO SUPPORT THE PRODUCE MARKET AND MEAT MARKET**

Task 1: Data Gathering and Analysis

- The Design Consultant shall inspect the project site and assemble all relevant data, including previous studies, plans and surveys.
- The Design Consultant shall meet with the Project Team and relevant stakeholders, which may include the Food Distribution Center facility managers and tenants, ConEd, the PSC, Community Boards, elected officials and other Agencies, as directed by NYCEDC.
- The Design Consultant shall analyze the expressed needs and concerns of the

parties contacted, and shall address those needs/concerns, which, in the opinion of the Design Consultant and NYCEDC, are pertinent to the projects.

- The Design Consultant shall develop and pursue a recommended course of action and/or strategy to resolve issues pertinent to the project and to achieve project goals.

Specifically, Task 1 shall be comprised of:

1. Site Inspection

a) The Design Consultant shall visit the sites related to the project, including the Produce Market, Meat Market and Hunts Point Site D, and perform all the inspections necessary to develop the design.

b) The Design Consultant shall provide all necessary subsurface investigations, as may be required, within the project site for further developing the design criteria. Elements to be inspected shall include existing structures, conduits and any other elements that affect the design and construction phase of the project. The project site inspection shall consist of the all necessary surveys and site investigations as described in Task 2.

2. Data Collection

Where required, or as directed by NYCEDC, the Design Consultant shall:

a) The Design Consultant shall conduct interviews with relevant FDC facility managers and tenants, personnel of any affected or interested Agencies including Produce Market and Meat Market cooperatives and facility staff, Utilities or other group to obtain relevant data for the projects.

b) The Design Consultant shall obtain utility information necessary to design and accurately size the energy systems, including the specific locations that will receive cooling and electric plug-in chargers for refrigerated trucks at the Produce Market. The Design Consultant shall collect interval meter data and utility billing rates and costs for all relevant gas and electrical accounts and boiler usage to determine accurate electrical and hot water load profiles of the relevant facilities. For accounts where interval metering is not currently available, the Consultant shall install interval meters to obtain the interval data.

c) If deemed necessary by NYCEDC, the Design Consultant shall prepare materials for and meet with the Community Boards, elected officials, adjacent property owners, or interested groups as directed by NYCEDC. The Design

Consultant shall present the progress of the projects and take under consideration all initial concerns and ideas expressed about the projects. The Design Consultant shall submit to NYCEDC a summary memorandum documenting the minutes of each meeting and/or presentation. The Design Consultant shall document all attendees of the meetings and may distribute, upon NYCEDC's approval, copies of the meeting minutes to attendees.

3. Conceptual Design Review

Task 2: Technical Surveys

B. The Design Consultant shall conduct technical surveys, in coordination with the brownfield remediation work at Site D, to address any existing issues that may impact project implementation.

1. Topographic Survey

The Design Consultant shall prepare Topographic Surveys of the project sites ("Topographic Survey"). The Topographic Survey shall be prepared within the following parameters except where commonly accepted industry standards, to be approved by NYCEDC, may apply. The following parameters are to be applied to each Topographic Survey performed for the individual projects:

a) The Design Consultant shall submit for approval the names and experience portfolios of all persons and subcontractors proposed for use in connection with the Topographic Survey prior to start of that work.

b) The Topographic Survey shall be referenced by station and offset to a centerline baseline, which has been established/coordinated/tied into existing borough conditions, navigational considerations, relationship of the datums used in comparison to monument lines, in accordance with current NYCEDC standards. All elevations shall be referenced to established borough benchmarks, or to benchmarks set from established borough benchmarks through the use of independent bench runs. The reference points, including bench runs and all tie-ins to the centerline baseline, shall be clearly documented so that they may be re-established at any time during the course of the work by the Design Consultant, or in the future by any other surveyor.

c) The Topographic Surveys shall include the full project site.

d) Datum plane and coordinate system shall be that in use by the Office of the Bronx Borough President for project sites in each respective Borough.

e) The Design Consultant shall submit to NYCEDC original survey notes, summary

of survey procedures/instruments employed, survey control data, discussion of survey accuracy, summary or survey control data, survey tie ins, computer digitizer tapes and survey computations, which shall become the property of NYCEDC.

f) The Design Consultant shall identify and provide NYCEDC with copies of all survey source material.

g) The Design Consultant shall determine the design flood elevation by accounting for conditions for flooding, storm surge, wave action, and sea level rise based on the 90th percentile projections in the 2050s (per the New York City Panel on Climate Change).

2. Utility Surveys

The Design Consultant shall review existing utility surveys and undertake the additional surveys required to complete the scope of services.

The following scope items have already been completed:

a) Existing conditions review of utility surveys, identifying the location and condition of utilities, easements, and public infrastructure;
b) Detailed base maps (e.g., location of utilities, combined sewer overflows ("CSOs", etc.) for priority areas

c) Elevation certificates for relevant FDC buildings identified by NYCEDC

Where possible, recent existing surveys may supersede the need for new surveys and/or can be updated or enhanced and drawn compatible so as to create a complete set of Utility Survey drawings at one scale.

If necessary, any new utility Surveys shall be prepared within the framework of the following parameters except where commonly accepted industry standards exist or may apply:

a) The Utility Surveys shall identify and locate all existing surface and subsurface utilities, facilities and systems (both public and private) within the project sites needed to produce a comprehensive final design. The Utility Surveys shall identify, but not be limited to, the identification and location of the following:

b) The Design Consultant shall review all data obtained from the Agencies, Utilities, and others, and shall coordinate/reconcile such data with the Topographic Surveys.

c) The Design Consultant shall reconcile all discrepancies in the location and identification of all subsurface elements between the Topographic Surveys and the utility records.

d) The Design Consultant shall submit to NYCEDC original survey notes, together with all public and private utility drawings, plans and plates, which shall become the property of NYCEDC.

Task 3: Detailed Design Development Documents

C. The Design Consultant shall synthesize the relevant data from Tasks 1 and 2 into Detailed Design Documents. The Design Consultant shall synthesize the relevant data assembled under all previous tasks into a functional design for the proposed projects, including, but not be limited to the following:

a) The Design Consultant shall be responsible for finalizing electrical and natural gas interconnection in coordination with Con Ed as part of the detailed design development.

b) In consultation with ConEd, the Design Consultant shall finalize the sectionalization plan for the tri-generation system.

c) In general, the Design Development Documents shall include contract drawings in sufficient detail to allow the interested parties to visualize the intended contract documents.

d) The Design Consultant shall utilize as much information from the previous Tasks to check the design assumptions outlined in the conceptual high-level design documents.

e) As part of the Detailed Design Development the Design Consultant shall make progress submissions as requested by NYCEDC following the general guidelines listed below for the tri-generation system.
   - 50% Final Design Documents
   - 75% Final Design Documents
   - Contract Documents (for bidding and procurement)

f) The Design Consultant shall obtain, and become familiar with, all applicable design directives and standard details that are relevant to completing the Detailed Design Development Task.

g) The Design Consultant shall further develop the plans and details of the conceptual high-level design including but not limited to utility impacts, and site impacts.

h) At 50% Final Design of the tri-generation system the Design Consultant shall 1) identify at least two design alternatives for the configuration and specific tenant offtakers of the cooling loop; and 2) identify at least two design

alternatives for the configuration and specific offtakers of electric plug-in chargers for the refrigerated trucks. The configuration and offtakers of cooling and electric plug-ins should both be informed by sustainability, cost efficiency, system efficiency, tenant needs, and future site redevelopment plans. The Design Consultant shall engage NYCEDC and FDC tenants to select a design alternative to advance. The Final Design Documents shall detail the finalized set of offtakers and system configuration of electric, heat, and cooling on blue sky and islanded conditions.

i) The Design Consultant shall provide a revised cost construction estimate at the completion of the 50% and 75% Final Design Documents for each component of the project.

j) The Design Consultant shall submit to NYCEDC for approval the names and experience portfolios of all persons and/or specialists in connection with the Detailed Design Development.

k) The Design Consultant shall consider the particular location, durability, resiliency to coastal storm surge and sea level rise, and the potential for vandalism and maintenance responsibility when preparing any Design Development Documents and any recommendations. The Design Consultant shall coordinate and discuss these concerns as necessary, with NYCEDC and appropriate Agencies.

l) The Design Consultant shall evaluate all comments provided by the Project Team and all Agencies having jurisdiction over the project and shall incorporate those comments during the Detailed Design Development.

m) The Design Consultant shall submit to NYCEDC and all relevant parties, including the PDC, Landmarks Preservation Committee ("LPC") and the State Historic Preservation Office ("SHPO") if necessary, for review and comment. The Design Consultant shall obtain written sign-offs (e.g., approvals, letters of no objection) from all required Agencies. Upon receipt of approvals, The Design Consultant shall present the Contract Documents

n) The Design Consultant shall obtain written approval of each progress submission from NYCEDC while completing this Task.

o) All drawings shall show the locations of all existing physical features, both surface and subsurface that affect the work.

p) All drawings shall show all essential information, which shall include, but not be limited to, such information as existing elevations, proposed design elevations, block and lot numbers, street address, sections, details, notes and sketches, and any other work necessary to fully describe and define the intended design in accordance with currently applicable NYCEDC standards.

q) The Design Consultant shall maintain current information relating to the estimated cost of the projects during the design period and shall inform NYCEDC promptly in writing of any significant changes in such estimated cost due to market conditions or changes in the scope or design of the projects.

r) Given the longstanding history of environmental pollution in Hunts Point, the detailed design shall not have adverse air quality impacts in Hunts Point, as set forth by the City Environmental Quality Review ("CEQR") standards. The detailed design should minimize emissions of criteria air contaminants to the neighborhood within reasonable cost, as justified by a cost-benefit analysis, and maximize emissions displacement through the conversion of diesel trucks. The detailed design must meet Con Edison's Standby Rate Pilot Program (including the City's Air Quality Collaborative) for criteria air contaminants. If the detailed design is found to have significant negative air quality impacts and/or does not meet the criteria air contaminant standards in the Air Quality Collaborative, the Design Consultant shall, in consultation with and at no additional cost to NYCEDC, modify the Design Development Documents as necessary until the design is acceptable to NYCEDC.

s) The Design Consultant shall review the Detailed Design Development Documents with NYCEDC as they are being developed.

t) The Design Consultant shall review and evaluate the comments received from all parties reviewing the progress drawings. Where comments pertain to design being performed under the jurisdiction of other Agencies or other stakeholders (such as the tenants or cooperatives at the FDC), the Design Consultant shall make all appropriate requested changes to the design or incorporate additional appurtenant work, and/or incorporate completed designs prepared and furnished by the various interested parties, into the Detailed Design Development Documents. Where the requested changes are deemed incompatible with the Final Design by the Design Consultant and NYCEDC the Design Consultant shall meet with the affected stakeholders to discuss and develop alternate solutions until one solution is acceptable to all parties involved.

u) The Design Consultant shall modify and correct, as appropriate, the progress drawings in accordance with the comments received from the interested reviewing parties. The affected portions of the contract drawings shall be resubmitted, as necessary, to the interested parties for review and approval.

v) The Design Consultant shall make presentations of design progress to NYCEDC and, as directed by NYCEDC, to other stakeholders. The Consultant shall incorporate any necessary revisions into the Final Design and cost estimate at the direction of NYCEDC.

Task 4: Implementation Plan

The Consultant shall develop an implementation plan that at a minimum considers the following elements:

D.

a) **Business Model**: To ensure financial sustainability and potential expansion of the tri-generation system, the Design Consultant shall develop a business model that ensures the project's long-term financial viability for NYCEDC. The business model should confirm the project economics and include the following components:

   i. Identify appropriate costs of electricity, heating, and cooling to FDC tenants participating in the tri-generation system that are less than or equal to their current rates for cooling, heating, and electricity needs
   ii. Minimize standby charges
   iii. Identify any capital or operating expenses that tenants may need to make in order to connect individual thermal or cooling units to the thermal or cooling loops
   iv. Identify potential expansion strategies regarding integration of storage or demand response/management to improve economic value proposition of the project
   v. Propose heating and electricity tariffs for tenants for both blue-sky and blackout conditions (for instance, the cost for tenants to receive guaranteed backup power up in the event of a larger grid outage)
   vi. Develop a governance/management structure for the tri-generation system that enables NYCEDC (as the project owner) to provide energy to its tenants
   vii. Account for and identify constraints with different funding streams, including HUD CDBG-DR and City Capital

b) **Operations Manual**: The Design Consultant should develop a clear and detailed step-by-step operational manual for the tri-generation system to use in the event of a larger grid outage. The Operations Manual should specify the procedures, roles, and responsibilities of all relevant parties for normal blue-sky operation, shut-down from normal operation, islanded operation, and restoration from islanded operation.

E.

For the tri-generation system and mobile generators, the Operations Manual will require coordination and approval from ConEd, NYCEDC, and FDC tenants. NYCEDC will facilitate discussions to finalize the Operations Manual; the Design Consultant shall be expected to attend and present technical details and/or recommendations in such meetings.

Task 5: Permitting and Regulatory Approvals

The Design Consultant will be required to prepare permits from the following non-exhaustive list of agencies:

d) The Design Consultant shall obtain approvals as necessary from Con Ed, the Public Service Commission, the Fire Department of New York (FDNY), Department of Buildings, and other entities for repair or removal of existing infrastructure pertinent to the development of the tri-generation system, as well as regulatory approvals to operate the tri-generation system.
e) Permitting and regulatory approvals shall be completed at the 50% design completion mark.
f) The Design Consultant shall maintain regular coordination with Con Ed and New York Public Service Commission (PSC) with regards to the development of each design milestone as well as for all necessary regulatory approvals. Coordination activities may include, for example, petitions to the PSC, regular check-ins on sectionalization and concept design with the Distributed Generation team at ConEd.

The following is a non-exhaustive list of anticipated permits:

- NYSDEC State Facility Permit;
- NYCDEP Gas-Powered Engine Permit;
- Qualifying Facility exemption;
- Offset tariff; and
- System efficiency thresholds.

Permitting and approvals should be completed at around the 50% design stage. The Design Consultant project team shall incorporate competent legal expertise with experience in the NYC energy industry to coordinate potential filings to the PSC.

F.

Task 6: Contract Documents

The Design Consultant shall prepare contract documents for the purpose of bidding and procurement. Drawings included in the contract documents shall be prepared with necessary construction details, fully dimensioned and with detailed specifications from which prospective bidders can make accurate and reliable estimates of the quantities, quality and character of the labor and materials required to complete the particular bid contract and to install any equipment therein.

The contract documents shall be prepared in such manner and form that will enable NYCEDC and the Construction Manager to award separate contracts as deemed in the best interests of the construction, schedule and/or budget. The contract documents shall include all final designs, specifications, estimates, and other related documents for each separate contract. The contract documents shall be reasonably coordinated within a given package and with previously issued packages so as to preclude the necessity for design changes, adjustments or change orders. The selected Design Consultant shall synthesize the relevant data assembled under relevant tasks into contract documents, including, but not be limited to the following:

a) After the Design Consultant has acquired required written approvals from appropriate Agencies and Utilities, the Design Consultant shall prepare all

required contract documents in a manner and form that enables NYCEDC to award the necessary contract/s for construction. The contract documents shall include final drawings and specifications. The final drawings and specifications shall include, but shall not be limited to, drawings and specifications for all elements for the project including any necessary equipment.

b) The Design Consultant shall participate in a construction review of the project.

c) The Design Consultant shall subsequently prepare a final cost estimate to accompany the Contract Documents, which shall be prepared in a format approved by NYCEDC. In preparing the cost estimate, The Design Consultant shall use the latest unit prices for all standard items.

d) Upon completion of the contract documents and final estimates of cost, the Design Consultant shall submit the contract documents and final estimates to NYCEDC for review and comment. Following NYCEDC's review of the contract documents, the Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project, including PDC. The Design Consultant shall make such changes in the plans and specifications as may be reasonably necessary to obtain such approval or approvals without any additional compensation. The Design Consultant shall also submit the contract documents to any Utility affected by the project.

e) All final drawings shall bear all required stamps of approval, including the seal and authorized facsimile of the signature of the Design Consultant.

f) The Design Consultant shall prepare a maintenance manual for any amenities that are designed, which will include specifications for materials, installation specifications, resources, and annual maintenance schedules.

g) The Design Consultant shall prepare, submit, assemble and reproduce the documents required for construction of the project to the extent provided below. The contract documents shall include the following: (1) the plan and drawings; (2) the proposal for bids; (3) the specifications; (4) all addenda issued prior to the receipt of bids; (5) the form of construction contract; (6) all provisions required by law to be included in the construction contract, including relevant federal regulations; (7) forms for the notice of award, the bid, performance and payment bonds; (8) the general provisions conditions; and (9) all other supplementary or special provisions or conditions. Items (1), (3) and (4) shall be prepared in the first instance by the Design Consultant. Items (2), (5), (6), (7), (8), and (9) shall be prepared in the first instance by NYCEDC. If requested, the Design Consultant shall review and make recommendations for any special conditions to be included in the contract documents.

h) The Design Consultant acknowledges that multiple submissions may be required for final approval.

i) The Design Consultant shall participate in a constructability review of the project that shall be carried out by NYCEDC or other parties as required.

j) Following NYCEDC's review of the contract documents, The Design Consultant shall make all modifications required by NYCEDC and shall submit the contract documents for approval in writing to those Agencies with jurisdiction over the project. The Design Consultant shall also submit the contract documents to any Utility with facilities affected by the project.

k) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for negligent errors or omissions caused by the Design Consultant.

l) The Design Consultant shall provide, at no additional cost to NYCEDC, professional services to design, document and process corrective measures for negligent errors or omissions caused by the Design Consultant.

Task 7: Construction Administration and Construction Observation

G.

The Design Consultant shall provide the following services during construction of the project to ascertain that the work performed by the construction contractor(s) conforms to the contract documents. This work shall be performed in conjunction with the Construction Manager.

a) The Design Consultant shall advise and consult with NYCEDC beginning on the Commencement Date and until Final Completion. The Design Consultant may have authority to act on behalf of NYCEDC only to the extent provided in the Contract unless otherwise made by written agreement by NYCEDC and Design Consultant.

b) Upon the award of the construction contracts by NYCEDC, the Design Consultant shall review the contractor's proposed progress schedule to become familiar with the submission dates of shop drawings and samples.

c) The Design Consultant shall visit the project site at intervals appropriate to the stage of construction, or as otherwise agreed by NYCEDC and Design Consultant in writing, to become generally familiar with the progress and quality of the construction work completed and to determine if the construction work is being performed in accordance with the contract documents. However, the Design Consultant shall not be required to make exhaustive or continuous on-site observations or inspections to check the quality or quantity of the construction work. On the basis of on-site observations, the Design Consultant shall keep NYCEDC informed of the observed progress and quality of the construction work, and shall endeavor to guard NYCEDC against observable

defects and deficiencies in the construction work.

d) The Design Consultant shall not have control over, or charge of, and shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the construction work, since these services are solely the Construction Manager's or the construction contractors' responsibility under the construction contracts. The Design Consultant shall not be responsible for the Construction Manager's or construction contractors' schedules or failure to carry out the construction work in accordance with the contract documents. The Design Consultant shall not control or be responsible for any acts or omissions of the Construction Manager, or the Construction Manager's subcontractors, or their agents or employees, or the construction contractors' or any other persons performing construction work.

e) The Design Consultant shall certify/sign off on all applicable Department of Buildings TR-1 applications that are not otherwise considered Special Inspections. Special Inspection TR-1's and other forms shall be signed off by a Third Party of NYCEDC's choosing.

f) Copies of all significant communications between NYCEDC and Construction Manager shall be provided to the Design Consultant in a timely manner.

g) Upon consultation with and approval by NYCEDC, the Design Consultant shall have authority to reject construction work that does not conform to the contract documents.

h) The Design Consultant shall have authority to require additional inspection or testing of the construction work in accordance with the contract documents, whether or not such construction work is fabricated, installed or completed, however such additional work must be approved in advance by NYCEDC. However, this authority shall not give rise to a duty or responsibility of the Design Consultant to the Construction Manager, its subcontractors, material and equipment suppliers, their agents or employees or other persons performing the construction work.

i) The Design Consultant shall review and approve or take other appropriate action upon the Construction Manager's submittals such as shop drawings, product data and samples, but only for the limited purpose of checking for conformance with information given and the design intent expressed in the contract documents. The Design Consultant's actions shall be taken with reasonable promptness while allowing sufficient time in the Design Consultant's professional judgment to permit adequate review. The review of shop drawings shall be limited to three (3) submissions under this Scope of Services and will be conducted only after the Construction Manager has coordinated said documents to indicate field conditions, proposed Construction Manager deviations from the contract documents, and other requirements that affect design intent; all

submissions shall indicate that the required coordination has been performed. Review of submittals is not conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems designed by the Construction Manager, all of which remain the responsibility of the Construction Manager to the extent required by the contract documents, all of which the Design Consultant shall be entitled to rely upon. The Design Consultant's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Design Consultant, of construction means, methods, techniques, sequences or procedures. The Design Consultant's approval of a specific item shall not indicate approval of an assembly of which the item is a component. When the professional certification of performance characteristics of materials, systems or equipment is required by the contract documents, the Design Consultant shall be entitled to rely upon such certification to establish that the materials, systems or equipment meet the performance criteria required by the Contract documents. NYCEDC shall have the right to review the shop drawings and samples, including any color schedules, prior to acceptance by the Design Consultant.

j) The Design Consultant may authorize minor changes in the construction work that are consistent with the intent of the contract documents for the purposes of facilitating construction or resolving minor field conditions so that construction may proceed unimpeded.

k) The Design Consultant shall furnish assistance and aid at conferences with involved parties as may be required to resolve design issues during construction. The Design Consultant shall interpret and decide matters concerning the contract documents upon written request by NYCEDC or the Construction Manager. The Design Consultant's written response to such requests shall be made with reasonable promptness and within any time limits agreed upon.

l) Interpretations and decisions of the Design Consultant shall be consistent with the intent reasonably inferable from the contract documents and shall be in writing or in the form of drawings.

m) The Design Consultant is required to attend weekly meetings with NYCEDC and others throughout the duration of the design and construction process.

n) The Construction Manager shall submit to NYCEDC and Design Consultant, a regular list of shop drawings for each contract indicating progress with respect thereto. The information submitted shall consist of names of contractors, names of shop drawings, shop drawing due dates in accordance with approved shop drawing schedule required to be submitted by contractors, dates issued, dates received, dates checked, dates returned for corrections, dates resubmitted by contractors, dates finally approved by the Design Consultant, and any additional information that may be necessary to clearly indicate to NYCEDC the progress

of any applicable shop drawings. The Design Consultant shall work to meet the shop-drawing schedule.

o) The Design Consultant shall furnish assistance and aid to the Construction Manager to start and advance the work and shall attend a pre-construction conference and other conferences with involved parties as may be required to resolve design issues during construction.

p) If requested by NYCEDC, the Design Consultant shall issue interpretations and clarifications of the contract documents and if so required, make minor changes in the work in coordination with the Construction Manager.

q) Change orders may be issued only by NYCEDC. The Design Consultant shall make recommendations in connection with change orders as requested by NYCEDC.

r) The Design Consultant shall provide all customary construction contract administration services to NYCEDC to ensure that the work performed by the Construction Manager or the construction contractors conforms to work in general described by the Scope of Services and the intent of the final contract documents.

s) The Design Consultant shall compile complete sets of accurate shop, working, and record as-built drawings.

t) Upon completion of the project the Design Consultant shall provide:

- Drawings of the final design as prepared for bid shall be provided to NYCEDC.
- The drawings shall contain the name and address of the design firm, the name and address of the procuring agency or organization, the project title and location.
- A complete copy of the project specification shall be provided to NYCEDC. An electronic file of the specification shall be provided in PDF format.
- Included on each as-built/record drawing shall be the name, address and telephone number of the contractor. Those areas that differ from the design drawings shall be highlighted with a "bubble."
- A list of tangible assets produced by the project, their cost, and the year in which each asset was placed into beneficial use; and a maintenance plan covering all the assets.

VI. STAKEHOLDER ENGAGEMENT TASK

Task 8: Stakeholder Engagement

The stakeholder engagement activities that make up Task 8 are required across all sub-projects. The Consultant shall be expected to discuss all sub-projects during public engagement activities, such as AWG meetings, public meetings, or briefings with elected officials or other stakeholders. The specific engagement activities are detailed below.

a. The Consultant will lead a robust stakeholder engagement process in consultation with NYCEDC. The Consultant shall perform coordinated stakeholder engagement concurrently for all components of the Hunts Point Resiliency Project, as well as site-specific engagement as relevant to each of the three (3) components that make up this project. The engagement approach should incorporate strategies for disseminating information to stakeholders and the incorporation of stakeholder input and feedback through ongoing two-way communication.

b. Stakeholder engagement will include report backs throughout the study process to stakeholders potentially including the AWG or a similar group established for this next phase of work, and to the broader community. The timing, frequency and structure of the report backs should be considered such that they serve for the Consultant to disseminate information to stakeholders and to engage in two-way communication, soliciting stakeholder feedback and incorporating that feedback into subsequent study tasks, phases, and findings.

c. The Consultant will communicate with stakeholders in a clear and comprehensible way, at a minimum, technical concepts related to the resilient energy projects, technical concepts related to climate change and energy outage impacts, financial trade-offs and feasibility, regulatory processes, and project milestones.

d. The Consultant will coordinate extensively with the Project Team and CM during all phases of design to engage relevant stakeholders, such as the AWG, Community Board, elected officials, and Food Distribution Center tenants, facility managers, and businesses.

e. The Consultant will coordinate the design so that the project complements any work to be performed in the future as advised by NYCEDC and shall take into account both short-term and long-term planning and goals in the design.

f. The Consultant will coordinate at key milestones with DOE, MOR, ConEd, PSC, and regulatory agencies.

g. The Consultant will prepare materials and be present at community engagement meetings, including but not limited to three (3) AWG project update meetings and three (3) public meetings.

h. The Consultant will provide materials and/or attend one-on-one briefings or

meetings that may be required with tenants, elected officials, community groups, or stakeholders as needed.

EXHIBIT 1 TO APPENDIX B

HUNTS POINT RESILIENCY – DESIGN BASIS DOCUMENTS

PART 1: GENERAL REQUIREMENTS

1 Introduction

The New York City Economic Development Corporation (EDC), in partnership with the Mayor's Office of Recovery and Resiliency (ORR) is overseeing the implementation of the Hunts Point Resiliency Pilot Project.

In June 2014, U.S. Department of Housing and Urban Development (HUD) announced Community Development Block Grant-Disaster Relief (CDBG-DR) funding awards for the implementation of selected Rebuild by Design (RBD) proposals. HUD granted the City a $20 million award for the Hunts Point Lifelines RBD proposal to advance “continued robust planning and study related to the future of the food market and a small pilot/demonstration project (to be selected by the City).” In the April 2015 amendment to the City’s CDBG-DR Action Plan, the City supplemented the original RBD award with the allocation of an additional $25 million of CDBG-DR funds for a total investment of $45 million. In 2018, EDC added an additional $26 million in City capital program funding for a total investment of $71 million to implement the Pilot Project.[1]

ORR and EDC executed a Subrecipient Agreement on May 26, 2016 to administer the CDBG-DR funding for the project and to implement the Pilot Project per the schedule requirements associated with the CDBG-DR funds. As required, the City proposes to spend all CDBG-DR dollars by March 2022.

This Design Basis Document (DBD) for the Hunts Point Resiliency Pilot Project (Pilot Project) and additional project components establishes design criteria for ongoing detailed engineering and equipment procurement. For clarity herein, all contents and requirements of this DBD will apply to both the Pilot Project and additional project components.

1.1 Overview

The following project components to be implemented on the Hunts Point peninsula are the subject of this DBD:

- Microgrid with tri-generation to support the Hunts Point Terminal Produce Market (Produce Market) and Hunts Point Cooperative Meat Market (Meat Market).
- Mobile diesel generators for backup power supply to businesses.
- Solar photovoltaic (PV) and battery energy storage systems (ESS) for select community facilities.

[1] The dollar value of the total investment is included in this DBD to describe budgetary constraints for the Pilot Project, and was applied to the project benefit cost analysis. However, this total investment is not commensurate with the Pilot Project described herein.

This document is intended to convey a conceptual design of the proposed resilient energy systems and provide a basis for further detailed design and engineering. The criteria presented as well as the performance characteristics, equipment, and facility arrangement concepts are expected to be utilized as a basis of equipment procurement and for further development of detailed technical specifications.

The Pilot Project will provide reliable, dispatchable, and sustainable energy to vulnerable, critical facilities within the Hunts Point Food Distribution Center (FDC) and community. This Pilot Project installation is also configured to support the potential future development of a more extensive microgrid for sustaining the energy demands of the Hunts Point area.

1.2 Goals and Objectives

The Pilot Project was formulated to achieve the following principal objectives for Hunts Point:

- Address critical vulnerabilities for both community and industry.
- Protect important city-wide infrastructure during emergencies such as a major flood or power outage.
- Protect existing and future industrial businesses and jobs.
- Support the community's social, economic, and environmental assets.
- Use sustainable, ecologically sensitive infrastructure.

The Pilot Project was further developed and evaluated according to the following energy resiliency considerations to meet the requirements of the CDBG-DR funding award,[2] as well as the goals and objectives of OneNYC, and the Hunts Point Resiliency Advisory Working Group's (AWG) Implementation Principles:

- Resiliency: applicability to vulnerable, critical facilities; dispatchable; reliable for a minimum of three days; independent utility.
- Sustainability: emissions, efficiency, fuel sources.
- Community benefits: workforce opportunity, scalability, potential to leverage other funds.
- Constructability: suitable space, required infrastructure, permitting.
- Implementability: schedule, cost to construct, cost for energy delivered.

1.3 Document Organization

This DBD is separated into several Parts to represent the design basis of each generating asset of the Pilot Project. This Part 1, General Requirements, presents the general design

[2] Additional information about CDBG-DR funding and the process undertaken to identify the Pilot Project is described in the *City of New York Action Plan Amendments 1-15, Effective August 22, 2015* at the link below: http://www.nyc.gov/html/cdbg/downloads/pdf/cdbg_dr_action_plan_incorporating_amendments_1_13_and_15.pdf

basis criteria and design standards that apply to all of the components of the Pilot Project. The specific requirements for each of the major engineering disciplines (mechanical, electrical, instrumentation and controls, and civil/structural) are addressed to establish the design standards and materials/components selection criteria that will apply to each component of the Pilot Project.

The remaining Parts define the overall design criteria for the generating assets of the Pilot Project, including the performance characteristics, sizing criteria for major equipment, levels of redundancy, and facility arrangement concepts. Each Part is organized to present the design basis of each generating or storage asset with a similar sequence of topics, and includes various appendices applicable to the individual project components.

2 Project Description

2.1 Overview

The Pilot Project, plus additional project components outlined herein, provides a package of energy resilient generation and storage technologies selected to achieve the overall project objectives. In total, all project components will provide a total 9.58 MW of new resilient energy generation and storage capacity for the Hunts Point peninsula, with 7.08 MW to be implemented as the Pilot Project. While each project component has independent utility, all components of the Pilot Project are intended to act simultaneously during emergency conditions to provide reliable and dispatchable energy for the Hunts Point peninsula. Project components that will also operate during “blue sky” conditions will provide sustainable energy solutions to the Hunts Point peninsula. In addition, the design of the Pilot Project allows for additional generation technologies to be implemented in the future to further enhance sustainability and resiliency in Hunts Point.

Table 1-1 shows a summary of the equipment to be installed and the design capacity of the generating assets at each installation.

2.2 Project Components

Microgrid with Tri-Generation to Support the Produce Market and Meat Market – A tri-generation facility consisting of two nominal 2.60 MW, natural gas fired engine generators, two heat recovery hot water generators, heat absorption and electric chillers, and associated balance of facility equipment will be provided to supply electricity and chilled water to the Produce Market and hot water to the Meat Market. This tri-generation system will be expected to operate during normal conditions and will be able to separate from the grid and operate as a microgrid during emergency conditions to maintain electrical service to the Produce Market while continuing export of chilled water and hot water.

Table 1-1.Vulnerable, Critical Facilities and Proposed Energy Generation

Vulnerable, Critical Facility	Generation Type	Thermal Capacity	Nominal Capacity (MW)

Produce Market	Natural Gas Engine Generators*		5.20
Produce Market	Chilled Water via Absorption Chillers*	1,300 tons	
Meat Market	Hot Water via Engine Generator Heat Recovery*	4.2 MMBtu/hr	
PS 48	Rooftop Solar PV		0.07
	Battery Energy Storage		0.13
MS 424	Rooftop Solar PV		0.45
	Battery Energy Storage		0.13
Businesses	Four Emergency Backup Generators		1.10

*Generated as part of tri-generation facility to be located at Site D.

The tri-generation facility will be designed to comply with the air quality and air pollutant emissions criteria, consistent with the City's participation in the standby rates pilot program and in conjunction with the Air Quality Collaborative. It will also be designed to allow the project and its customers to take service under Con Edison's Multi-Party Offset Tariff (General Rule 20.2.1(B)(8) in the electric tariff).[3]

Community Facility Solar/Storage Installations – To provide sustainable and resilient power to two primary community facilities, the Pilot Project will include the installation of rooftop solar PV generation and battery ESS for both the Middle School (MS) 424 and Primary School (PS) 48. Both of these installations will supply power to the schools during normal operating conditions as well as emergency conditions. The total supported installation is approximately 450 kW of solar capacity at MS 424 and 72 kW of solar capacity at PS 48. Each facility will be served by a 125 kW battery storage system sized to supply up to eight hours of energy for facility critical loads. The total installed solar PV and battery ESS capacity will be approximately 0.77 MW. This level of power will enable the facilities to provide community shelter, refuge, or gathering spaces in emergency situations.

Mobile Diesel Backup Generators – To provide resilient power supply to other important city-wide food distributors and employers in the Food Distribution Center, the Pilot Project includes the purchase of four 275 kW mobile diesel generators with the modification of the existing electrical systems at three facilities to allow the connection of these generators during emergency periods. This fleet of mobile generators enables immediate energy

[3] Consolidated Edison Company of New York, Inc.; Schedule for Electricity Service; General Rules, Regulations, Terms and Conditions under Which Electric Service Will Be Supplied, Applicable to and Made a Part of All Agreements for Electric Service (General Rules). https://www.coned.com/_external/cerates/documents/elecPSC10/GR1-23.pdf

resiliency with minimal capital construction and costs for additional facilities that are critical to the City's food supply.

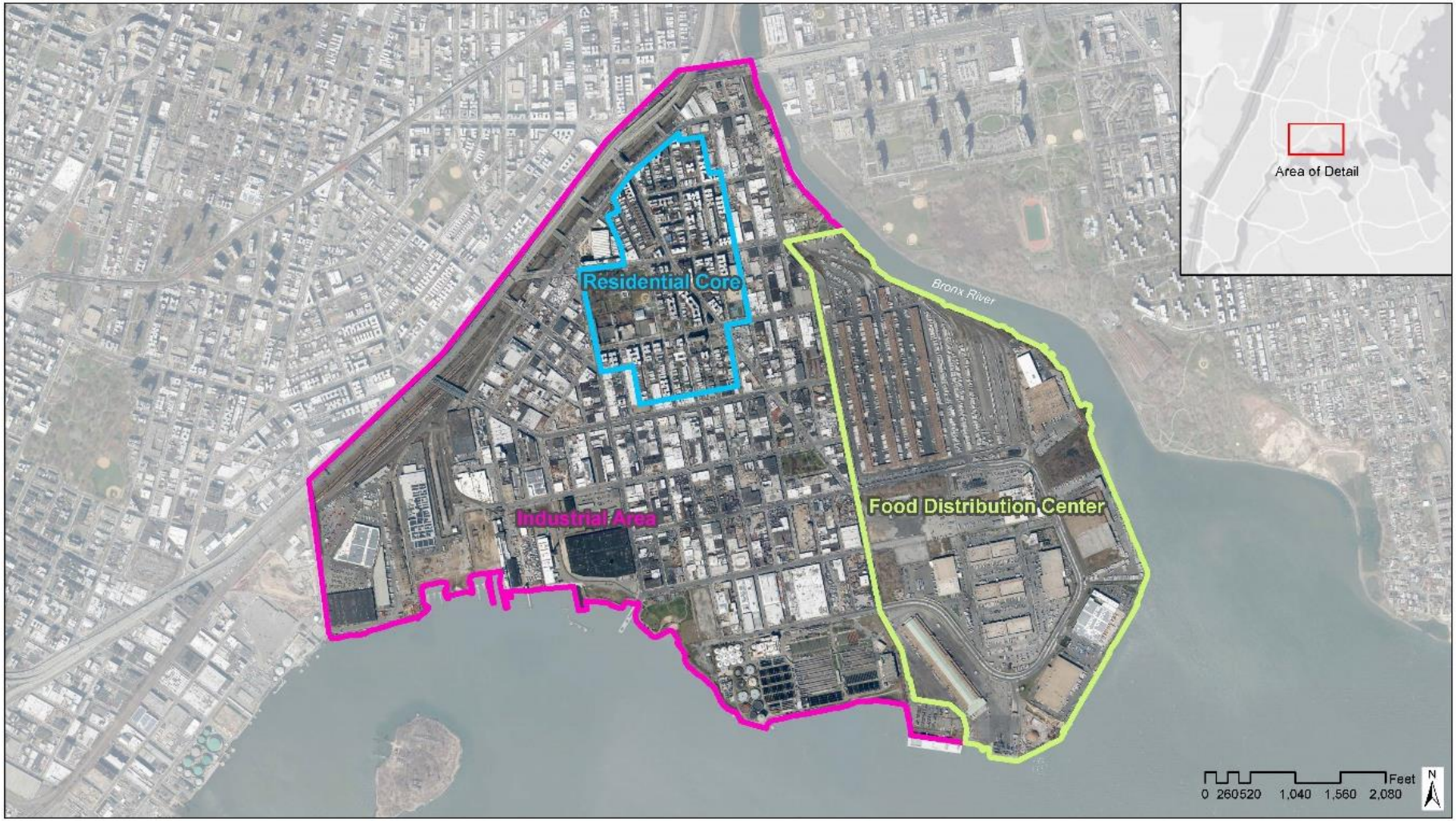
The mobile backup diesel generators will be stored off-site and will be operated on a monthly basis as a periodic test of readiness to ensure equipment availability and operability. As such, this equipment is expected to be tested monthly with up to 12 starts per year (off-site) plus emergency operation (on-site at FDC). The monthly test interval is a generally accepted practice across many industries for ensuring the availability of Project Locations

The project components will be located on several properties within Hunts Point, a neighborhood that lies on a peninsula in the southeast area of the Bronx, New York. Hunts Point lies wholly within Bronx Community Board 2. The area is comprised of industrial and residential areas on the west side of the peninsula with the FDC on the east side as depicted in Figure 1-1.

The FDC is composed of the following major markets and businesses:

- Hunts Point Terminal Produce Market
- Dairyland Chef's Warehouse
- Baldor
- Krasdale
- Hunts Point Cooperative (Meat) Market

Figure 1-1. Hunts Point Project Area



- Sultana Citarella
- Anheuser-Busch.

As previously noted, solar PV and battery ESS installations will be completed at two existing schools within the residential core including:

- MS 424
- PS 48

Specific locations within the FDC and residential core were identified as vulnerable, critical facilities within Hunts Point based on a multi-threat risk assessment completed as part of the development of the Pilot Project (Figure 1-2).

The project components developed to reduce the vulnerabilities of specific critical facilities to coastal storm surge, sea level rise, heat waves, and power outages are illustrated in Figure 1-3. The tri-generation facility will be located on a parcel of land identified as Site D and connected directly to the Produce Market and Meat Market for normal operations. The microgrid to support the Produce Market during emergency conditions will be fed from the tri-generation facility at Site D.

2.3 Project Benefit Cost Analysis

The economic evaluation of the Pilot Project utilizes a Benefit-Cost Analysis (BCA) technique. In the BCA, both the direct monetary costs of the project and also other societal benefits to the community are considered. The analysis period for the BCA is 20 years, which represents the average useful life of the equipment to be installed.

The BCA completed in August 2018[4] demonstrated positive outcomes associated with the Pilot Project, including a $27.2 million net present value (with a discount rate of seven percent), 1.29 benefit-cost ratio (BCR), and an internal rate of return of 13.6 percent.

3 Design Criteria

The following section outlines primary site and design criteria to be utilized as a basis of the Pilot Project design. The categories of design criteria presented are:

- Resiliency
- Sustainability
- Safety
- Regulatory
- Meteorological Data
- Structural Design Criteria
- Water Sourcing

[4] Reference TBD pending posting of the HUD Action Plan Amendment and Benefit-Cost Analysis.

Figure 1-2. Vulnerable, Critical Facilities in Hunts Point

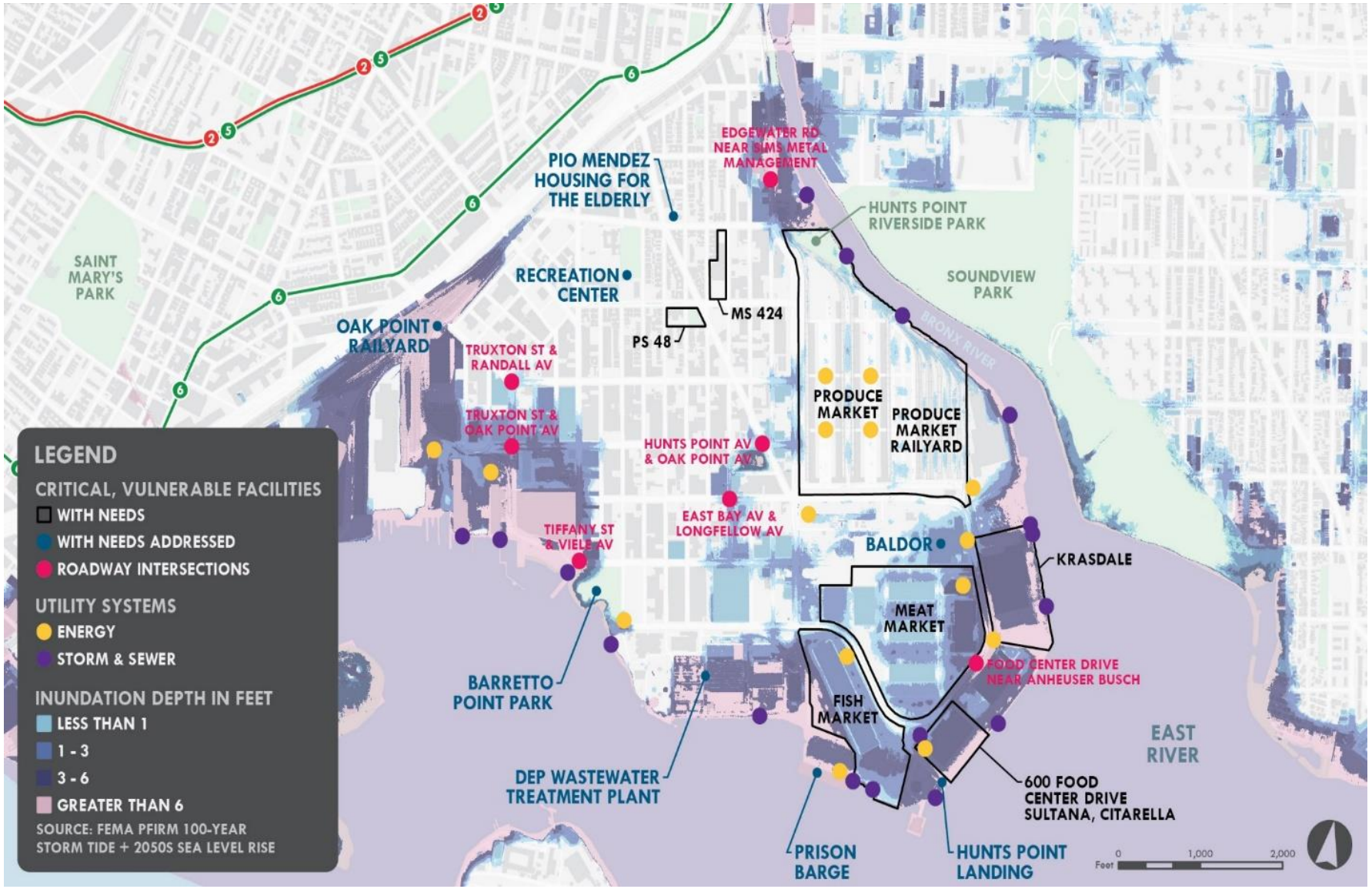


Figure 1-3. Proposed Project Locations and Components

- Wastewater
- Stormwater Discharge
- Fuel Sourcing
- Noise Limits.

3.1 Resiliency

The City of New York is committed to developing and implementing resilience performance standards for all infrastructure projects, including the Hunts Point Energy Resiliency Pilot Project.

The City looks to the best available science and promising practices in resiliency to inform the development of these performance standards, and utilizes performance standards to measure resiliency within a project. These following factors will be considered in the final design of the Pilot Project:

- Robustness: ability to absorb and withstand stressors and shocks.
- Redundancy: additional channels to enable maintenance of the core functionality in an event of disturbance or system failure.
- Resourcefulness: ability to adapt and respond in a flexible manner during stressors and shocks.
- Response: ability to mobilize quickly in the face of stressors and shocks.
- Recovery: ability to regain functionality after stressors and shocks.

3.1.1 Energy

With respect to energy supply, the Pilot Project is intended to provide a resilient energy resource for the Hunts Point peninsula in the event of an outage. The factors considered in the selection and design of a resilient solution include the following:

- The solution must be applicable to vulnerable, critical facilities that would otherwise be at risk of energy supply outages. The solution will address risks associated with business continuity, personal safety and security, food supply chain compliance, and protection of inventory, amongst other factors. Specific food supply chain and storage requirements will be identified in the appropriate Parts of this DBD.
- The solution must be dispatchable. This requires that the project be able to be deployed and functional under any emergency and at any time of day to provide energy supply continuity. As part of this, the solution will be able to supply the critical energy needs for the defined businesses and facilities, continuously, for a minimum of three days.
- The solution must have independent utility, meaning that the project must be able to be constructed, operate and provide value independent of other projects or systems. In other words, the project must be functional as a single and complete project.

- The solution must utilize proven and reliable technology that is commercially in operation and have a historical ability to provide reliable service when called upon and given the critical loads of vulnerable, critical facilities.

To provide some context regarding electrical power supply to the Hunts Point area, risks of failure on the electric grid supplying Hunts Point could be caused by issues with power generation facilities in the region (e.g., equipment failures), high demand due to extreme heat, and also extreme weather or flooding events that cause power outages. Another failure mode for generation and supply would be if there is a regional curtailment of natural gas, which would impact multiple generating units.

In general, the power supply infrastructure to the Hunts Point area is reported to be very reliable. Based upon the historical performance of the Bronx Electric Operations Service Area Network Distribution System, the 5-year averages from 2011 through 2015 for the System Average Interruption Frequency Index (SAIFI)[5] and Customer Average Interruption Duration Index (CAIDI)[6] are 16.6 and 6.41, respectively. While these values are slightly higher than the Public Service Commission's standards of 15 and 3.25 hours, threats due to the failure of this network system can generally be considered as a low likelihood. Based on these values, the likelihood of a power interruption is 0.017 events per year per customer, with an average length of an outage (not due to severe weather) being approximately 6.4 hours.

For Hunts Point during the years of 2012 through 2016, Con Edison provided SAIFI ratings ranging from 0.006 to 0.014 events per year per customer and CAIDI ratings ranging from 5.1 to 12.9 hours with averages of 0.011 and 7.000, respectively. Additionally, Con Edison indicated that the power supply availability to Hunts Point was 99.999 percent. They also indicated that there have been no outages involving 250 or more customers in the Hunts Point area in the past 5 years.

Looking forward with respect to future climate conditions and related vulnerabilities, the Pilot Project is designed to limit reliance on service from the electrical grid to satisfy the resiliency objectives of HUD, the City, and AWG. As such, the Project will provide an added layer of redundancy to the Con Edison grid.

3.1.2 Flood Risk Reduction

In April of 2018 the City of New York released the Climate Resiliency Design Guidelines (Version 2.0). While these guidelines are currently voluntary, the City believes it is important to uphold the best practice standards outlined in the design guidelines for this cornerstone resiliency project. The guidelines identify three possible threats, which final design should attempt to protect against: increasing heat, increasing precipitation, and increased flooding from sea level rise. The final design of this Pilot Project and additional project components will, not only comply with all codes and standards identified below and including Appendix G, Flood Resistant Construction, of the New York City Building Code but will also consider these guidelines to construct new structures and technologies that will be able to withstand the effects of future climate conditions.

[5] SAIFI is expressed as the number of interruptions per year per 1,000 customers.

[6] CAIDI is the average length of the interruption experienced by a customer who loses service.

A key consideration offered by the guidelines involves calculating design flood elevations (DFEs) to protect against coastal storm surge with future sea level rise. To assist designers with these calculations, the City published an interactive flood mapping tool, which identifies coastal hazard areas. Following the City's guidance, new construction in coastal hazard areas should implement flood risk reduction measures to prevent damage or operational disruptions from coastal flooding at Pilot Project facilities with freeboard and sea level rise also considered.

Flood risk reduction measures that are incorporated into the Pilot Project are summarized as follows (see Table 1-2 for references to DFE):

- Locate service connections above the DFE.
- Place high priority electrical equipment above the DFE.
- Design the building and infrastructure to lie entirely above the DFE.
- Design and select electrical equipment and switchgear that will be installed underground or within the floodplain to either operate safely in a submerged condition or to be storm-hardened.

The component-specific flood resiliency provisions are also addressed in each section of this DBD.

3.2 Sustainability

The Pilot Project will utilize sustainable project solutions considering the following key criteria:

- Energy efficiency, with the objective to maximize the conversion of input fuel or renewable energy resources to useful electric and thermal energy for the facilities supported.
- Minimization of project emissions through implementation of renewable energy resources, emissions control devices, and facilitation of the conversion of fossil-fuel powered mobile refrigeration equipment to electricity. The objective of this project is to provide no net increase in air emissions in the Hunts Point area.
- Optimization of renewable energy usage and power supply continuity via the implementation of battery ESS.
- Optimization of local material sourcing and benefits to natural resources.

Sustainability measures that are incorporated into the Pilot Project are summarized as follows:

- Implement a tri-generation facility design with a high thermal efficiency to attain the needed electrical generation and maximize use and export of thermal energy.
- Use of renewable energy generation and energy storage technologies, where feasible, to achieve project goals and objectives.

Table 1-2. Site Elevations and Design Flood Elevations

Site	Existing Grade Elevation[1]	Working Floor Elevation[1]	Proposed Energy Technology	Technology Useful Life (Years)	Calculated End of Useful Life (COD of 2022)	Applicable "End of Useful Life" Period per Guidelines	Base Flood Elevation (BFE) FEMA 1% PFIRM[1, 2, 3]	Design Flood Elevation (DFE) with Freeboard and Sea Level Rise per Guidelines	Calculated DFE[1, 4]
Krasdale	9.5	14.3	Mobile diesel backup generator	30	2052	2040-2069	15.0	FEMA 1% (PFIRM) + 40"	**18.3**
Anheuser-Busch	10.0	14.3	Mobile diesel backup generator	30	2052	2040-2069	15.0	FEMA 1% (PFIRM) + 40"	**18.3**
Sultana / Citarella	10.0	14.3	Mobile diesel backup generator	30	2052	2040-2069	15.0	FEMA 1% (PFIRM) + 40"	**18.3**
MS424 (3)	43.7	43.7	Solar PV	30	Outside FEMA 0.2% Annual Chance Flood Hazard or 500-year Floodplain[2]				
			Battery storage	10					
PS48 (3)	58.8	58.8	Solar PV	30	Outside FEMA 0.2% Annual Chance Flood Hazard or 500-year Floodplain[2]				
			Battery storage	10					
Site D	13.0-18.0	NA	Tri-generation facility	30	2052	2040-2069	14.0	FEMA 1% (PFIRM) + 40"	**17.3**
Meat Market (3)	11.6	15.3	Connections to outlet of existing boilers for hot water supply	30	2052	2040-2069	14.0	FEMA 1% (PFIRM) + 40"	**17.3**
Produce Market	16.2	21.1	Electrical power supply and chilled water supply to select tenants	30	Outside FEMA 0.2% Annual Chance Flood Hazard or 500-year Floodplain[2]				

[1] In feet NAVD88.
[2] Sources: FEMA PFIRM, 2015; NYC Flood Hazard Mapper, 2018.
[3] Highest BFE for site shown; actual area of site where project component to be constructed may be at a 1-foot lower BFE.
[4] Calculation of DFEs do not account for assessments of wave action, overtopping, vessel, or debris impacts associated with a structure to be constructed at these sites.

- Offset and, where possible, reduce existing emissions with new, clean energy generation technologies.
- Install emissions controls for reduction of criteria air contaminants (CACs) emissions.

Controlling and avoiding adverse air quality impacts from emissions is of particular importance during the design of new projects in the Hunts Point area. Due to significant air quality emissions from trucking and other industrial sources, Hunts Point residents face asthma rates twice as high as New York City as a whole. Respiratory illness has led to 2.8 times more emergency room visits attributable to asthma from poor air quality in Hunts Point compared to the rest of the City.[7]

Air quality assessments will be performed throughout the development of the Pilot Project to determine the potential impacts of the Pilot Project when operational. A screening level analysis was performed during project planning stages using the latest EPA-issued AERMOD atmospheric dispersion model available. The results demonstrated that the tri-generation facility—the most significant energy generation technology proposed due to its size and operation during normal and emergency conditions—would offset existing emissions at the Meat Market and Produce Market.

The Pilot Project is anticipated to slightly improve the general air quality in the Hunts Point area during normal conditions, and would not represent a net increase in local air quality impacts. This screening level analysis was one of the key determinants for the Pilot Project to advance to conceptual design, which will include additional air quality impact assessments as part of environmental review and air permitting.

3.3 Safety Requirements

The facilities involved in this project will be designed in accordance with all applicable federal, state, and local laws. This will include all applicable safety criteria for new construction in the U.S. and the State of New York. Facilities will be designed with a focus on safety during construction and also during regular operation. Along with relevant codes and standards outlined in Section 4.0 below, these facilities will be designed based on industry best practices. Following is a list of specific agencies with safety standards, which will be applicable to this project:

- Occupational Safety and Health Administration (OSHA)
- New York State Division of Safety and Health (DOSH)
- New York City Department of Buildings (DOB)
- New York City Office of Technical Certification and Research (OTCR)
- National Fire Protection Agency (NFPA)
- Fire Department of New York (FDNY).

[7] Mayor's Office of Recovery and Resiliency. The City of New York Proposed Substantial Action Plan Amendment 18. September 14, 2018.

3.4 Regulatory

Implementation of the Pilot Project will involve federal, state, and local permits and authorizations. Permits and authorizations cannot be obtained until the project design is further advanced. Coordination with federal, state, and city agencies that are potentially involved in the environmental review and regulatory permitting processes have already begun. Further coordination will continue with the detailed design of the project to ensure that all required permits and authorizations will be obtained prior to groundbreaking.

The current matrix of expected permits and approvals is included in Appendix 1A.

3.5 Meteorological Data (Ambient Conditions)

For establishing equipment ratings, performance requirements, and heating, ventilation, and air conditioning (HVAC) design, site ambient conditions for the project are based on 2017 American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Handbook – Fundamentals data for New York / La Guardia, NY, USA. Site ambient and design conditions are summarized below.

Barometric Pressure: 14.69 psia

Annual Average and Extreme Dry Bulb Temperatures:

Highest recorded temperature	106.2 F
Annual mean temperature	56.2 F
Lowest recorded temperature	-4.1 F

Facility Design Condition:

Pilot Project design is based on the one percent summer design condition as given by the ASHRAE data with adjustments based on projections for dry bulb temperature changes in the City's Climate Resiliency Design Guidelines. The ASHRAE condition defines a temperature that is only exceeded by one percent of all recorded hourly temperatures. For purposes of design, the high estimate (90^{th} percentile) change in projected dry bulb temperature from the City's Climate Resiliency Guidelines was used to establish the design dry bulb condition:

ASHRAE Dry Bulb	89.6 F
Change in Projected Temperature	+7 F
Design Dry Bulb	96.6 F
Design Mean Coincident Wet Bulb	72.5 F
Design Relative Humidity	44.23 percent

For heating design, the 99.6 percent winter design day parameters will be used which represent an outdoor temperature that is exceeded for over 99.6 percent of all hours in a year, based on a 30 year average. For ventilation design, the 0.4 percent summer design day parameters will be used which represents an outdoor temperature that is only exceeded 0.4 percent of all hours in a year. For air conditioning design, the 1.0 percent summer design day parameters will be used. These conditions are outlined as follows.

Ventilation Design Conditions:

0.4 Percent Summer Dry Bulb	92.5 F
Mean Coincident Wet Bulb	73.9 F

Heating Design Conditions:

99.6 Percent Heating Dry Bulb	14.3 F

Air Conditioning Design Conditions:

One Percent Summer Dry Bulb	89.6 F
Mean Coincident Wet Bulb	2.5 F

Site Precipitation Data:

Annual Average Total	42.10 inches
10-Year, 24-Hour Storm	5.15 inches
25-Year, 24-Hour Storm	6.31 inches
100-Year, 24-Hour Storm	8.09 inches

Wind:

Prevalent wind direction is from the South in July with an average wind speed of 10.6 mph. On an annual average, the prevailing wind direction is from the West. Additional wind rose data can be found in Appendix 1B.

3.6 Structural Design Criteria

The Pilot Project and additional project components will be constructed in accordance with the New York City Building Code (BC) 2014 and other relevant codes as specified in the BC considering the criteria below.

Snow Loads:

BC 2014, Section 1608 and Chapter 7 of ASCE 7, utilizing the inputs below:
Minimum Ground Snow Load = 25 psf
Importance Factor = 1.1

Ice Loads:

Chapter 10 of ASCE 7-16, utilizing the inputs below:
Nominal Ice Thickness = 0.75 inches
Importance Factor = 1.25

Wind Loads:

BC 2014, Section 1609, utilizing the inputs below:
3 Second Gust = 98 miles/hour
Exposure Category = C
Importance Factor = 1.25

Seismic Loads:

BC 2014, Section 1613 and ASCE 7 utilizing the inputs below:
Site (soil) Class = E
Design Spectral Acceleration at Short Periods, SDS = 0.448g

Design Spectral Acceleration at 1 second period, SD1 = 0.168g
Importance Factor = 1.25

Frost Penetration:

Foundation walls, piers, and other permanent supports will be protected from frost by extending not less than 24 inches below finish grade. Piping will have a minimum depth of 48 inches below finish grade to the top of the pipe.

3.7 Water Sourcing

Where required, potable water will be supplied from the City potable water system as required for each site location. Any new connections to the City's system will be coordinated with and submitted to the New York City Department of Environmental Protection (DEP) for approval. It is expected that water uses will vary by site, but will include and not be limited to general washdown, cooling system fill and makeup, process water (hot water and chilled water) makeup, emergency eyewash or shower use, fire protection, solar panel cleaning, and sanitary facility use.

3.8 Wastewater and Stormwater Discharge

The City sanitary sewer tie-in for disposal of process wastewater is located along Food Center Drive. Stormwater will be tied into the existing City stormwater system, which also runs along Food Center Drive. The need for new site connections versus utilization of existing systems and tie-ins will vary by site as further defined in the applicable Parts of this DBD. All new connections to either the sanitary sewer or stormwater systems will be coordinated with and submitted to DEP for approval.

3.9 Fuel Sourcing

Gas supply will be from Con Edison and supplied at a minimum pressure of 15 psig at the main supply line running along Food Center Drive. The maximum line pressure is expected to be approximately 99 psig. The gas supply will be tapped from the existing pipeline off of East Bay Avenue/Food Center Drive by Con Edison where it will terminate at the site-specific gas system interfaces as further defined in Part 2 and Part 3 of this DBD. The proposed natural gas tie-in locations are identified in Figure 1-4 below. The natural gas assumed in the development of the conceptual designs has a higher heating value of 22,020 Btu/lb and a composition as shown in Table 1-3. This analysis is a representation of a generic natural gas fuel source that is used for purposes of conceptual design. The properties of natural gas to be utilized by the tri-generation facility are not expected to deviate significantly from this analysis.

Figure 1-4. Natural Gas Tie-In Locations

Table 1-3. Natural Gas Composition

Constituent	Percent by Volume
Methane (CH_4)	87.00
Ethane (C_2H_6)	8.46
Nitrogen (N_2)	3.65
Hydrogen (H_2)	0.36
Carbon Dioxide (CO_2)	0.34
Carbon Monoxide (CO)	0.09
Oxygen (O_2)	0.07
Ethylene (C_2H_6)	0.03

3.10 Noise Limits

The Pilot Project will be designed to meet all requirements of the New York City Zoning Resolution and the New York City Noise Control Code. Additional noise modeling may be required to determine the final equipment noise design parameters as well as any additional required noise control measures. The New York City Zoning Resolution and the New York City Noise Control Code requirements are summarized in Table 1-4 and Table 1-5. With the exception of the Pilot Project components for the schools and the chilled water piping for the Produce Market, the Pilot Project facilities will be located within the M3-1 Zoning District, as depicted in the Zoning Map included in Appendix 1C.

Table 1-4. New York City Zoning Resolution Noise Requirements for Manufacturing Districts

Octave Band, Frequency (Hz)	M1 District (dB)	M2 District (dB)	M3 District (dB)
20 to 75	79	79	80
75 to 150	74	75	75
150 to 300	66	68	70
300 to 600	59	62	64
600 to 1200	53	56	58
1200 to 2400	47	51	53
2400 to 4800	41	47	49
Above 4800	39	44	46

Source: City of New York Performance Standards for Manufacturing Districts Section 42-213.

Table 1-5. New York City Noise Control Code Noise Requirements for Receiving Properties

Octave Band, Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured Within a Receiving Property as Specified Below	
	Residential receiving property for mixed-use building and residential building (as measured within any room of the residential portion of the building with windows open, if possible)	Commercial receiving property (as measured within any room contain offices within the building with windows open, if possible)
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

Based on interpretations of the noise regulations, the noise requirements for receiving properties apply only when there is a change in zone district classification between the receiving properties. For all of the component locations of the Pilot Project with significant noise sources, the only location where there is a change in classification (to M1-1) is the northern border of Site D where the tri-generation facility will be located. Pursuant to Section 42-213 of the New York City Zoning Resolution, and understanding that the tri-generation facility will qualify under Use Group 18, the sound pressure levels resulting for any activity will not exceed the limits identified in Table 1-4 for the M3 District at any point on or beyond the lot line. These values equate to an approximate A-weighted noise level of 65 dBA at the site boundary.

For the project components located at MS 424 and PS 48, each installation must comply with the octave band noise requirements outlined in Table 1-5.

All equipment will be designed for a near-field noise emitting criterion of no more than 85 dBA maximum at three feet from the equipment (in a free field) with limited exceptions. This will be done to comply with occupational noise hazard guidelines set forth in OSHA Standard 1910.95. Where practical, acoustical insulation and enclosures will be used as required for equipment that would otherwise exceed this criterion.

Certain equipment noise may exceed the near-field noise criterion, even with noise control measures, particularly within enclosures or rooms. In this case, signs indicating that hearing protection is required will be posted. The fuel gas emergency safety valves will be equipped with discharge silencers.

3.11 Battery Sizing

All battery ESS systems proposed will be designed to supply facility-specific critical loads for a minimum duration of eight hours. This duration was determined to provide resiliency benefits while balancing battery size and costs. Specific sizing criteria will be identified within the applicable parts of this DBD.

3.12 Major Equipment Redundancy

Equipment shall be furnished and installed such that the failure of any one piece of equipment shall not render the entire system inoperable. This will be applicable for all generation assets considered as a part of this Pilot Project, both fuel burning and renewable. To facilitate this requirement, systems necessary for operation of the assets will be designed with n+1 redundancy. At a minimum, the equipment and systems described below will be configured with appropriate redundancy.

Equipment Service Pumps - All pumps integral to the operation of the equipment shall be installed in either a 2x100 percent or a 3x50 percent configuration. This includes but is not limited to, fuel pumps, lube oil pumps, coolant pumps, chilled water pumps, hot water pumps, and cooling water pumps.

Emissions Control Equipment - Blowers and pumps for all selective catalytic reduction (SCR) systems used for nitrogen oxide (NOx) emissions control shall be redundant. Redundancy of emission control equipment shall be considered to prevent a case where the unit would be forced out of service for failure to comply with emissions regulations.

Electrical Switchgear - All switchgear shall be the double ended type. Furthermore, switchgear and associated breakers shall be designed with 10 percent spare capacity to prevent overloading. Switchgear shall be designed with space for 20 percent spare breaker cubicles.

Control Systems - To maximize availability, the design of the control system will incorporate functional and geographic distribution of controllers and inputs/outputs (I/O) to the greatest extent possible to minimize the impact of failures. Single failures within each functional area will not result in a reduction of system availability. This philosophy will also extend to power supplies for each area.

The instrumentation and control system will be structured to reflect the redundancy provisions of the systems and equipment so that no single fault within the control system can cause the failure of the duty systems or equipment and at the same time cause the standby systems and equipment to be unavailable.

Redundant communication pathways will be applied.

Monitoring Equipment - Protection equipment and instrumentation will be provided with an appropriate level of redundancy to secure personnel safety, economic protection of the systems and equipment, environmental protection, and a low probability of loss of

generation. In particular, no single failure within the protection system will lead to inadvertent operation of the protection system or cause the loss of the protection function.

Protection and interlock systems with redundant transmitters and multipoint measurement will be furnished where required to meet the following criteria:

- No single fault shall cause the complete failure of any system.
- All parameters that may directly cause a load reduction of greater than 50 percent shall have measurement point redundancy (2 out of 3, de-energize to trip).
- If in-service equipment fails, standby equipment shall start automatically, without any system interference, wherever practical.

Black Start – Generation assets will be provided with black-start capability to facilitate usage during total grid failure events.

4 Codes and Standards

The design of the Pilot Project will be in accordance with the applicable local, state, and federal codes and standards listed below (as well as any additional applicable codes and standards not listed) in effect during final design. Additional codes and standards applicable to a particular system will be defined in the component-specific sections of this DBD. Throughout this document, when reference is made to Codes and Standards, it will mean the regulations and guidance that are specifically listed in this section as further supplemented in other sections of this DBD.

New York City Codes and Standards:

2014 New York City Fire Code

2011 New York City Electrical Code

2014 New York City Construction Codes, including

- General Administrative Provisions
- New York City Building Code
- New York City Energy Conservation Code
- New York City Fuel Gas Code
- New York City Mechanical Code
- New York City Plumbing Code

New York City Zoning Resolution

New York City Noise Control Code

2018 Climate Resiliency Design Guidelines

New York Occupational Safety and Health Act (OSHA)

National Codes and Standards:

ACI 318 Building Code Requirements for Reinforced Concrete – Ultimate Strength Design Method

Acoustical Society of America (ASA)

- S1.13, American National Standard Measurement of Sound Pressure Levels in Air
- S12.9/Part 3, American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound — Part 3: Short-term Measurements with an Observer Present

Air-Conditioning & Refrigeration Institute (ARI)

Air Movement and Control Association (AMCA)

American Concrete Institute (ACI)

American Gas Association (AGA)

- Z21.20, Automatic Gas Ignition Systems and Components

American Gear Manufacturers Association (AGMA)

American Institute of Steel Construction (AISC)

American Iron and Steel Institute (AISI)

American National Standards Institute (ANSI)

American Petroleum Institute (API)

- Standard 670, Non-contacting Vibration and Axial Position Monitoring Systems

American Society of Civil Engineers (ASCE)

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

American Society of Mechanical Engineers (ASME), including but not limited to:

- Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels
- B31.1, Pressure Piping, Power Code

American Society for Testing Materials (ASTM)

American Water Works Association (AWWA)

American Welding Society (AWS)

Anti-Friction Bearings Manufacturers Association (AFBMA)

ASCE 7 Minimum Design Loads for Buildings and Other Structures

Code of Standard Practice for Steel Buildings and Bridges

Compressed Gas Association (CGA)

Concrete Reinforcing Steel Institute (CRSI)

European Norm (EN)

- 779, Particulate air filters for general ventilation - Determination of the filtration performance
- 1822-1, High efficiency air filters

FM Global (FM)

Forced-Circulation Air-Cooling and Air-Heating Coils (ARI Standard 410)

Heat Exchange Institute (HEI)

Hydraulic Institute Standards for Design and Testing of Pumps (HIS)

Institute of Electrical & Electronics Engineers (IEEE)

International Society of Automation (ISA)

Insulated Cable Engineers Association (ICEA)

International Code Council (ICC)

International Building Code (IBC)

International Organization for Standardization (ISO)

- 1940-1, Mechanical vibration - Balance quality requirements for rotors in a constant (rigid) state - Part 1: Specification and verification of balance tolerances
- 9001, Quality Systems
- 11204, Acoustics - Noise emitted by machinery and equipment
- 3746, Acoustics - Determination of sound power levels using sound pressure

Load & Resistance Factor Design, AISC Manual of Steel Construction, 13th Edition

M9 Concrete Pressure Pipe

M11 Steel Pipe Manual

M45 Fiberglass Pipe Design

Manufacturer's Standardization Society of the Valve and Fitting Industry (MSS)

National Association of Architectural Metals Manufacturers (NAAMM)

National Association for Corrosion Engineers (NACE)

National Electrical Manufacturers Association (NEMA)

National Electrical Safety Code (NESC)

National Fire Protection Association (NFPA), including but not limited to:

- 1 Fire Code
- 10 Standard for Portable Fire Extinguishers
- 11 Standard for Low-, Medium- and High-Expansion Foam
- 12 Standard on Carbon Dioxide Extinguishing Systems

- 13 Standard for the Installation of Sprinkler Systems
- 14 Standard for the Installation of Standpipe and Hose Systems
- 15 Standard for Water Spray Fixed Systems for Fire Protection
- 16 Standard for the Installation of Foam-water Sprinkler and Foam-Water Spray Systems
- 20 Standard for the Installation of Stationary Pumps for Fire Protection
- 22 Standard for Water Tanks for Private Fire Protection
- 24 Standard for the Installation of Private Fire Service Mains and their Appurtenances
- 25 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- 30 Flammable and Combustible Liquids Code
- 37 Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
- 54 National Fuel Gas Code
- 56 Standard for Fire and Explosion Prevention during Cleaning and Purging of Flammable Gas Piping Systems
- 69 Standard on Explosion Prevention Systems
- 70 National Electrical Code
- 72 National Fire Alarm and Signaling Code
- 75 Standard for the Protection of Electronic Computer/Data Processing Equipment
- 80 Standard for Fire Doors and Fire Windows
- 85 Boiler and Combustion Systems Hazards Code
- 101 Life Safety Code
- 110 Standard for Emergency and Standby Power Systems
- 111 Standard on Stored Electrical Energy Emergency and Standby Power Systems
- 214 Water Cooling Towers
- 220 Standard on Types of Building Construction
- 241 Standard for Safeguarding Construction, Alteration, and Demolition Operations
- 400 Hazardous Materials Code
- 750 Standard on Water Mist Fire Protection Systems
- 780 Standard for the Installation of Lightning Protection Systems

- 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
- 2001 Standard on Clean Agent Fire Extinguishing Systems

National Roofing Contractor's Association (NRCA)

National Standard Plumbing Code (NSPC)

Occupational Safety and Health Act (OSHA)

Pipe Fabrication Institute (PFI)

Plumbing and Drainage Institute (PDI)

Prestressed Concrete Institute (PCI)

Research Council on Structural Connections

Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

Society for Protective Coating (SSPC)

- SSPC, Painting Manual Volume 1, “Good Painting Practice”
- SP-1, Surface Preparation SP-1

Specification for Structural Steel Buildings – Allowable Strength Design

Specification for Structural Joints Using ASTM A325 or A490 Bolts

Structural Welding Code D1.1

Steel Structures Painting Council (SSPC)

Temperature Measurement Thermocouples (ANSI MC96.1)

Tubular Exchanger Manufacturers Association (TEMA)

Underwriters Laboratories (UL)

- 2085, Protected Aboveground Tanks for Flammable and Combustible Liquids
- 142, Standard for Safety Steel Aboveground Tanks for Flammable and Combustible Liquids
- 810 , Standard for Capacitors
- 2200 , Standard for Stationary Engine Generator Assemblies
- U.S. Code of Federal Regulations (CFR)
- 29 CFR 1910, Occupational Safety & Health Administration
- 40 CFR 60, Subparts IIII (test methodology dictated by cylinder displacement) and JJJJ

U.S. Environmental Protection Agency (EPA)

- Method 1: Sample and Velocity Traverse for Stationary Sources
- Method 1A: Sample and Velocity Traverses for Stationary Source with Small Stacks or Ducts

- Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate
- Method 3A: Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources
- Method 5 : Determination of Particulate Matter Emissions from Stationary Sources
- Method 7E: Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- Method 10 : Determination of Carbon Monoxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)
- Method 18: Measurement of Gaseous Organic Compound Emissions by Gas Chromatography
- Method 25A: Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer
- Method 201A: Determination of PM10 and PM2.5 Emissions from Stationary Sources
- Method 202: Dry Impinger Method for Determining Condensable Particulate Matter Emissions from Stationary Sources
- Method 320: Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy

5 Overall Project Schedule

A high-level project execution schedule is presented for each component of the Pilot Project plus additional project components in the respective parts of this DBD. The duration of the activities in these schedules reflects the expected lead time for fabrication of major equipment, the expected duration of detailed design, and construction based on experience from similar projects. The overall target for completion of all construction work associated with the Pilot Project is March 2022, which is coincident with the requirements of the HUD-sourced funding, which must be completely spent and closed out by November 2022. Therefore, all of the project schedules are based on achieving a commercial operation date (COD) of March 2022 as directed by OMB.

The overall construction duration for all components of the Pilot Project should not exceed two years total to minimize disruptions and impacts from construction activities on residents, community facilities, and businesses within Hunts Point. Therefore, construction of all project components that are part of the Pilot Project will start no earlier than March 2020 to encompass all construction within the two-year window.

6 Overall Project Costs

Estimated project capital costs for all components of the Pilot Project as well as the additional project components described in this DBD were provided to EDC. These American Association of Cost Engineers (AACE) Class 3 cost estimates were developed

based on budgetary major equipment pricing from equipment suppliers, union labor rates specific to New York City, equipment quantities, commodity takeoffs, and reference data from similar projects. The project costs developed, to date, also included contractor direct and indirect costs, contractor and Owner contingencies, general and administrative costs and fees, project insurances, and Owner's costs. These costs represented an estimated installed cost for a March 2022 COD, and included an allowance for Owner's costs estimated at 10 percent of the installed cost.

PART 1 APPENDICES

1A: Permits and Approvals Matrix

1B: Wind Rose Data

1C: NYC Zoning Map 6C

APPENDIX 1A

- Permits and Approvals Matrix

Appendix 1A: Potential Permits for Proposed Project Components

For the Hunts Point Resiliency Pilot Project and additional project components, the matrix below summarizes the potential permits that may be required for proposed technologies. Pre-application meetings and agency coordination is recommended early in conceptual design, final design, and construction stages to confirm permitting requirements and related approval schedules.

Proposed Technology/Project Component	Regulatory Approval Type	Permit/Approval	Application Review Period	Criteria
Simple Cycle Combustion Turbine at Site D (Microgrid with Tri- Generation to support the Produce Market and Meat Market)	Public Utility Regulations	Con Ed/New York Standard Interconnect Requirements (NY SIR) leading to Coordinated Electric System Interconnection Review (CESIR)	9-12 months	Proposed interconnections with required additional review through the CESIR due to substantial Con Ed modifications.
	Air Permits/Registrations, Petroleum Tank Registrations	NYSDEC State Facility Air Permit (Subpart 201-5)/ Subpart 201-4: Minor Facility Registrations	13-15 months	Less than "major" facilities. Emergency power generating stationary internal combustion engine greater than 500 hours per year. Stationary or portable (non-coal or wood) combustion installations greater than 10 million Btu/hr; stationary or portable internal combustion engines greater than 50 HP; gas turbines greater than 10 million Btu per hour.
		NYSDEC Petroleum Bulk Storage (PBS) Program Approvals	4-6 months	Program approval for 1,100 gallon tanks or PBS Registration - Petroleum tanks larger than 110 gallons.
		NYCDEP Air Pollution Registration (Engines, Generators, Turbines)	12 months	Criteria applied to determine if registration is required: • Emergency and portable generators that are 40 KW or greater • Emergency and portable engines that are 50 HP or greater • Stationary turbines or other combustion sources that are 350,000 Btu/hr or greater but less than 4.2 million Btu/hr input • Stationary engines that are 50 HP or greater but less than 600 HP output • Stationary generators that are 40 kW or greater but less than 450 kW.
		NYCDEP Air Pollution Work Permit/Certificate to Operate (Engines, Generators, Turbines)	6 months	Criteria applied to determine if permit is required: • Stationary engines that are 600 HP or greater • Stationary generators that are 450 kW or greater Stationary turbines or other combustions sources that are 4.2 million Btu/hr input or greater.
	Water, Wetlands and Coastal Zone Permits/Approvals	NYSDEC Discharge Elimination System (SPDES) General Permit for Stormwater Discharge from Construction Activities (GP-0-15-002)	3 months	Soil disturbances ≥ 1 acre or < 1 acre where NYSDEC has determined that a SPDES permit is required for stormwater discharges based on water quality requirements; NYCDEP should be consulted on process as a result of regulatory and procedural changes implemented to comply with the City's Municipal Separate Storm Sewer System (MS4) Permit, effective August 1, 2015.

		NYSDOS Coastal Consistency Assessment Review	6months	NYS Coastal Management Program consistency review for developments within a mapped coastal zone boundary.
		NYCDCP Waterfront Revitalization Program (WRP) Consistency Assessment Review	6 months	NYS Coastal Management Program consistency review for developments within a mapped coastal zone boundary.
	Building and Fire Code Compliance	NYCDOB Building Permit	6-12 months	New construction or modification of buildings within New York City.
		NYCDOB Electrical Permit (Form ED-16A)	6-12 months	New construction or modification of buildings within New York City.
		NYCDOB Electrical Permit (Form ED-16A)	12-24 months	Required for any type of electrical work.
		FDNY high pressure gas permit Application	6-12 months	High pressure in excess of 15 psi or compressing over 6 psi
	Transportation and Public Right-of-way Approvals	NYSDOT Highway Work Permit	6 months	Work within a NYSDOT highway

	NYSDOT Special Hauling Permit/ Divisible Load Overweight Permit	2-4 months	Permits related to transportation of oversized loads on NYSDOT roads.
	NYSDOT Revocable Consent	Varies if issues were identified during public hearing	Required to construct and maintain certain structures on, over or under the inalienable property of the City (that is, the streets and sidewalks). Typically associated with transmission lines.
	NYCDOT Maintenance and Protection of Traffic Plan (MPT) Approval	3 months	Required for City street and sidewalk closures; diversions of traffic and pedestrians.
Environmental/Land Use/Zoning Related Approvals	HUD NEPA Review (24 CFR 58)/NEPA (40 CFR Parts 1500-1508)	9-12 month process for Environmental Assessment (EA)	Projects using federal funds, requiring a federal administrative action and/or federal permits must prepare a NEPA document. Categorical Exclusion (CE) does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An EA will be completed following conceptual design.
	CEQR (6 NYCRR 617.14(b))	9-12 month process for Environmental Assessment (EA)	Projects sponsored by City agency, using City funds and/or requiring City permits must prepare a CEQR document. Type II does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An Environmental Assessments (EA) including all appropriate forms will be completed following conceptual design. As part of CEQR documentation, consultation letters must be sent to NYC Landmarks Preservation Commission, NY Natural Heritage Program, State Historic Preservation Office, and US Fish and Wildlife Service.
Other Permits/Approvals	NYCDEP Site Connection Proposals	3-6 months	Applications for potable water supply and wastewater and storm sewer connections as part of new development or redevelopment on a site.
	NYCPDC Project Design Review	3 months	Capital funded projects that are visible beyond property lines must be reviewed and approved by the PDC.

		Natural Gas Companies Approvals (Iroquois)	Varies based on crossing agreement negotiations	Access to natural gas pipelines and/or utility lines crossing natural gas pipelines or within natural gas pipeline rights of way.
		Railroad Companies Approvals (CSX)	Varies based on crossing agreement negotiations	Utility poles and/or wires within railroad rights of way; NextEra Energy Transmission New York, Inc. (NEETNY) may also be required to obtain work permits and easements for the crossings of railroads.
		Utility Companies Approvals (Con Ed, NYCDEP)	Varies based on crossing agreement negotiations	Crossing of existing utility lines including electric and water.
Mobile Diesel Generators (Emergency Backup Generation for Businesses)	Public Utility Regulations	Con Ed Review and Inspection	Varies	Generators will not require NY SIR applications but will require inspection by the utility (Con Ed).
	Air Permits/Registrations, Petroleum Tank Registrations	NYCDEP Air Pollution Registration (Engines, Generators, Turbines)	12 months	Criteria applied to determine if registration is required: • Emergency and portable generators that are 40 KW or greater • Emergency and portable engines that are 50 HP or greater • Stationary turbines or other combustion sources that are 350,000 Btu/hr or greater but less than 4.2 million Btu/hr input • Stationary engines that are 50 HP or greater but less than 600 HP output Stationary generators that are 40 kW or greater but less than 450 kW.
	Water, Wetlands and Coastal Zone Permits/Approvals	NYSDOS Coastal Consistency Assessment Review	6 months	NYS Coastal Management Program consistency review for developments within a mapped coastal zone boundary.

		NYCDCP Waterfront Revitalization Program (WRP) Consistency Assessment Review	6 months	NYC WRP consistency review for developments within a mapped coastal zone boundary.
	Building and Fire Code Compliance	NYCDOB Building Permit	6-12 months	New construction or modification of buildings within New York City.
		NYCDOB Electrical Permit (Form ED- 16A)	12-24 months	Required for any type of electrical work.
		FDNY High pressure gas permit application		High pressure in excess of 15 psi or compressing over 6 psi.
	Transportation and Public Right-of-way Approvals	NYSDOT Highway Work Permit	6 months	Work within a NYSDOT highway.
		NYSDOT Special Hauling Permit/ Divisible Load Overweight Permit	2-4 months	Permits related to transportation of oversized loads on NYSDOT roads.

		NYSDOT Revocable Consent	Varies if issues were identified during public hearing.	Required to construct and maintain certain structures on, over or under the inalienable property of the City (that is, the streets and sidewalks). Typically associated with transmission lines.
		NYCDOT Maintenance and Protection of Traffic Plan (MPT) Approval	6 months	Required for City street and sidewalk closures; diversions of traffic and pedestrians.
	Environmental/Land Use/Zoning Related Approvals	HUD NEPA Review (24 CFR 58)/NEPA (40 CFR Parts 1500-1508)	9-12 month process for Environmental Assessment (EA)	Projects using federal funds, requiring a federal administrative action and/or federal permits must prepare a NEPA document. Categorical Exclusion (CE) does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An Environmental Assessments (EA) will be completed following conceptual design.
		CEQR (6 NYCRR 617.14(b))	9-12 month process for Environmental Assessment (EA)	Projects sponsored by City agency, using City funds and/or requiring City permits must prepare a CEQR document. Type II does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An Environmental Assessments (EA) including all appropriate forms will be completed following conceptual design. As part of CEQR documentation, consultation letters must be sent to NYC Landmarks Preservation Commission, NY Natural Heritage Program, State Historic Preservation Office, and US Fish and Wildlife Service.
Solar PV (Community Facility Solar at PS 48 and MS 424)	Public Utility Regulations	Con Ed/New York Standard Interconnect Requirements (NY SIR) leading to Coordinated Electric System Interconnection Review (CESIR)	1-2 months	For system interconnection, expedited entry is possible for systems under 50kW and allowable up to 300MW for inverter-based systems. Submit as a single hybrid system request for both ESS and solar.
	New York City Building Code Compliance and FDNY Coordination and Approvals	NYCDOB Building Permit	6-12 months	New construction or modification of buildings within New York City, DOB Rule 50-01.

	NYCDOB Electrical Permit (Form ED- 16A)	12-24 months	Required for any type of electrical work.
	Chapter 5 Section 504 & 512.	6-12 months	NYC Fire Code; It is recommended that project developers initiate FDNY review once designs are approximately 80% complete.
Transportation and Public Right-of-way Approvals	NYSDOT Highway Work Permit	6 months	Work within a NYSDOT highway.
	NYSDOT Special Hauling Permit/ Divisible Load Overweight Permit	2-4 months	Permits related to transportation of oversized loads on NYSDOT roads.
	NYSDOT Revocable Consent	Varies if issues were identified during public hearing.	Required to construct and maintain certain structures on, over or under the inalienable property of the City (that is, the streets and sidewalks). Typically associated with transmission lines.
	NYCDOT Maintenance and Protection of Traffic Plan (MPT) approval	Concurrent with other reviews	Required for City street and sidewalk closures; diversions of traffic and pedestrians.

	Environmental/Land Use/Zoning Related Approvals	HUD NEPA Review (24 CFR 58)/NEPA (40 CFR Parts 1500-1508)	9-12 month process for Environmental Assessment (EA)	Projects using federal funds, requiring a federal administrative action and/or federal permits must prepare a NEPA document. Categorical Exclusion (CE) does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An Environmental Assessments (EA) will be completed following conceptual design.
		CEQR (6 NYCRR 617.14(b))	9-12 month process for Environmental Assessment (EA)	Projects sponsored by City agency, using City funds and/or requiring City permits must prepare a CEQR document. Type II does not apply. Based on air quality screening analysis during project development, an Environmental Impact Statement (EIS) is not needed. An Environmental Assessments (EA) including all appropriate forms will be completed following conceptual design. As part of CEQR documentation, consultation letters must be sent to NYC Landmarks Preservation Commission, NY Natural Heritage Program, State Historic Preservation Office, and US Fish and Wildlife Service.
		NYCDEP Asbestos Abatement Compliance through Asbestos Reporting and Tracking System (ARTS)	6 months	NYC has a code requirement that buildings must be inspected for asbestos in the areas construction work will take place. In order to receive a construction permit, the DOB requires a form approved by the DEP stating this took place unless exemption is selected on the PW1 permit application for DOB. If building was constructed per plans approved on or after April 1, 1987, project is exempt from asbestos inspections and fees.
	Other permits/approvals	NYCPDC Project Design Review	3 months	Capital funded projects that visible beyond property lines must be reviewed and approved by the PDC.

APPENDIX 1B

- Wind Rose Data

WIND ROSE PLOT

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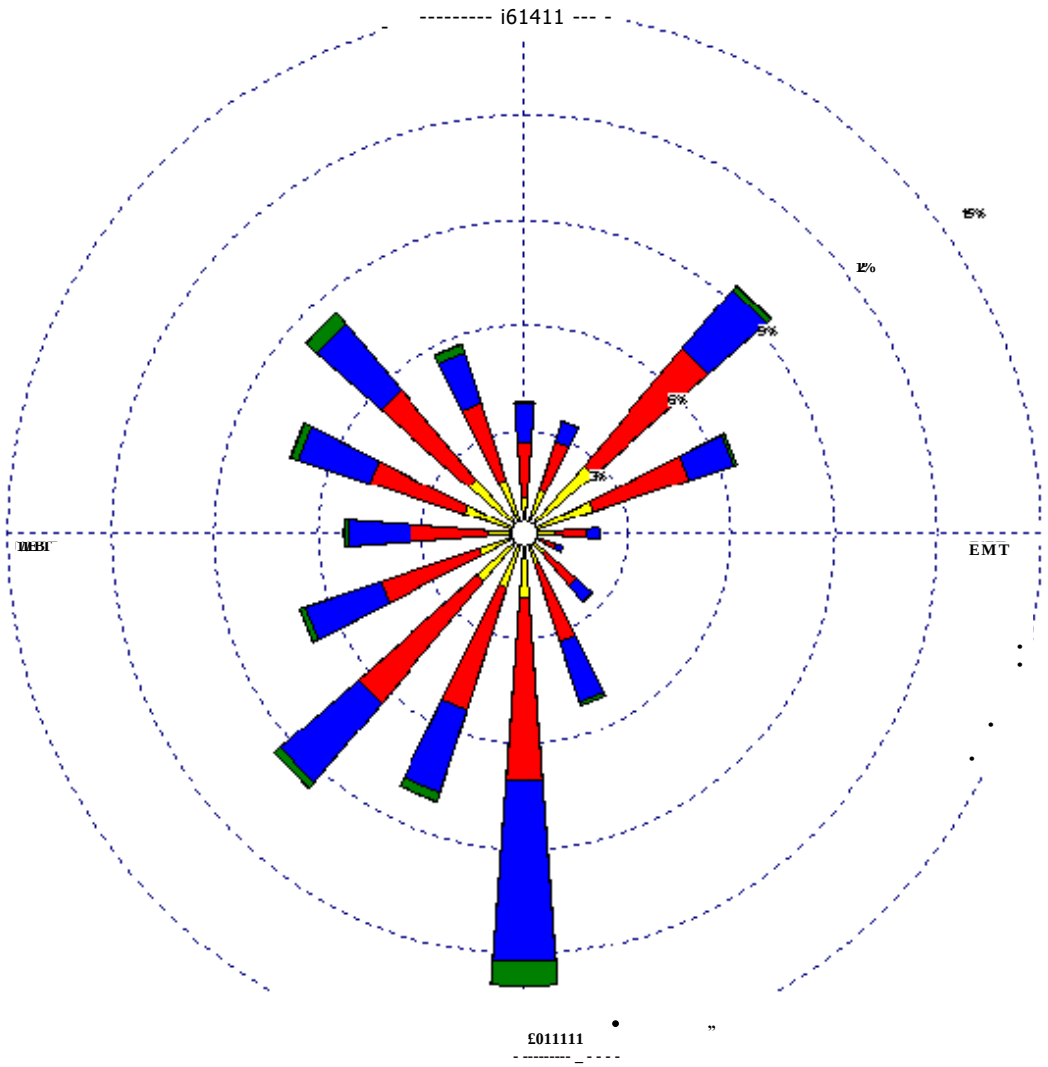

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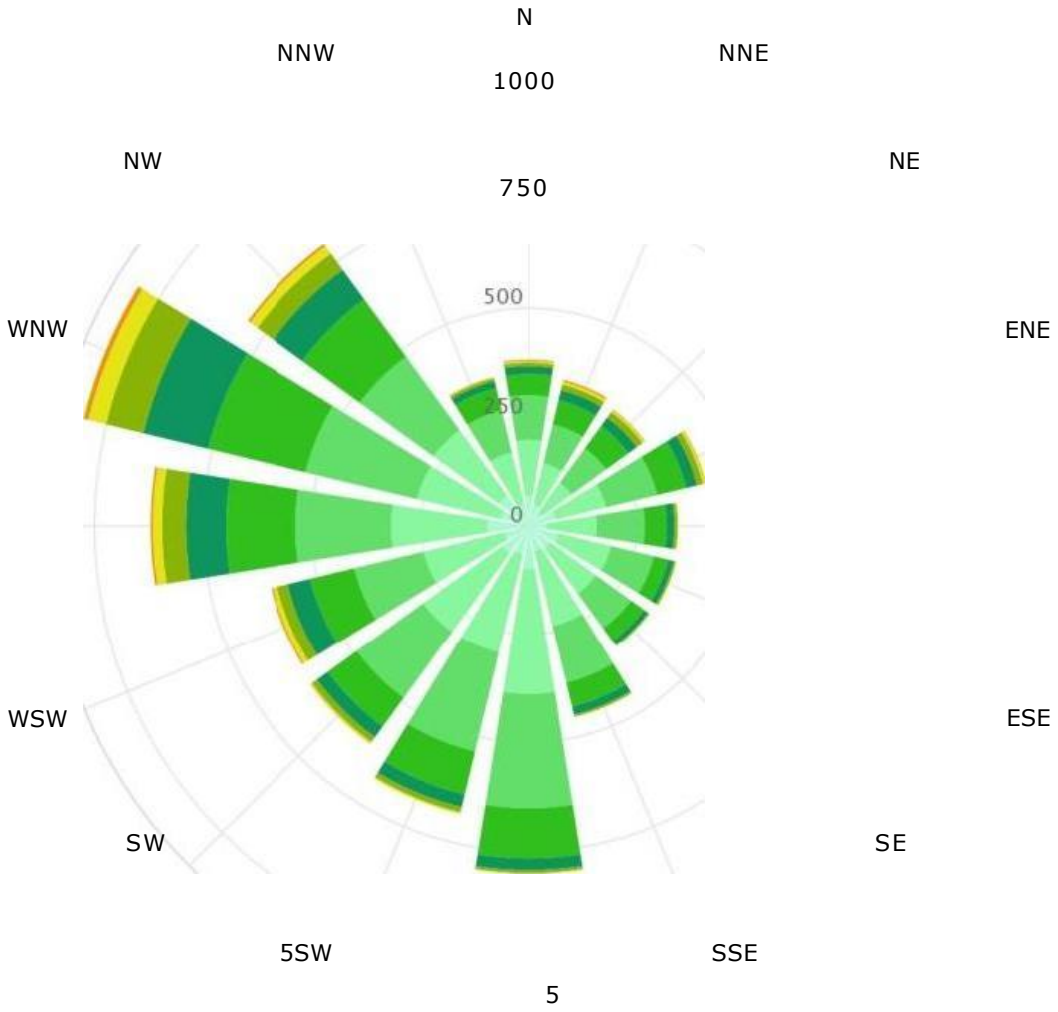
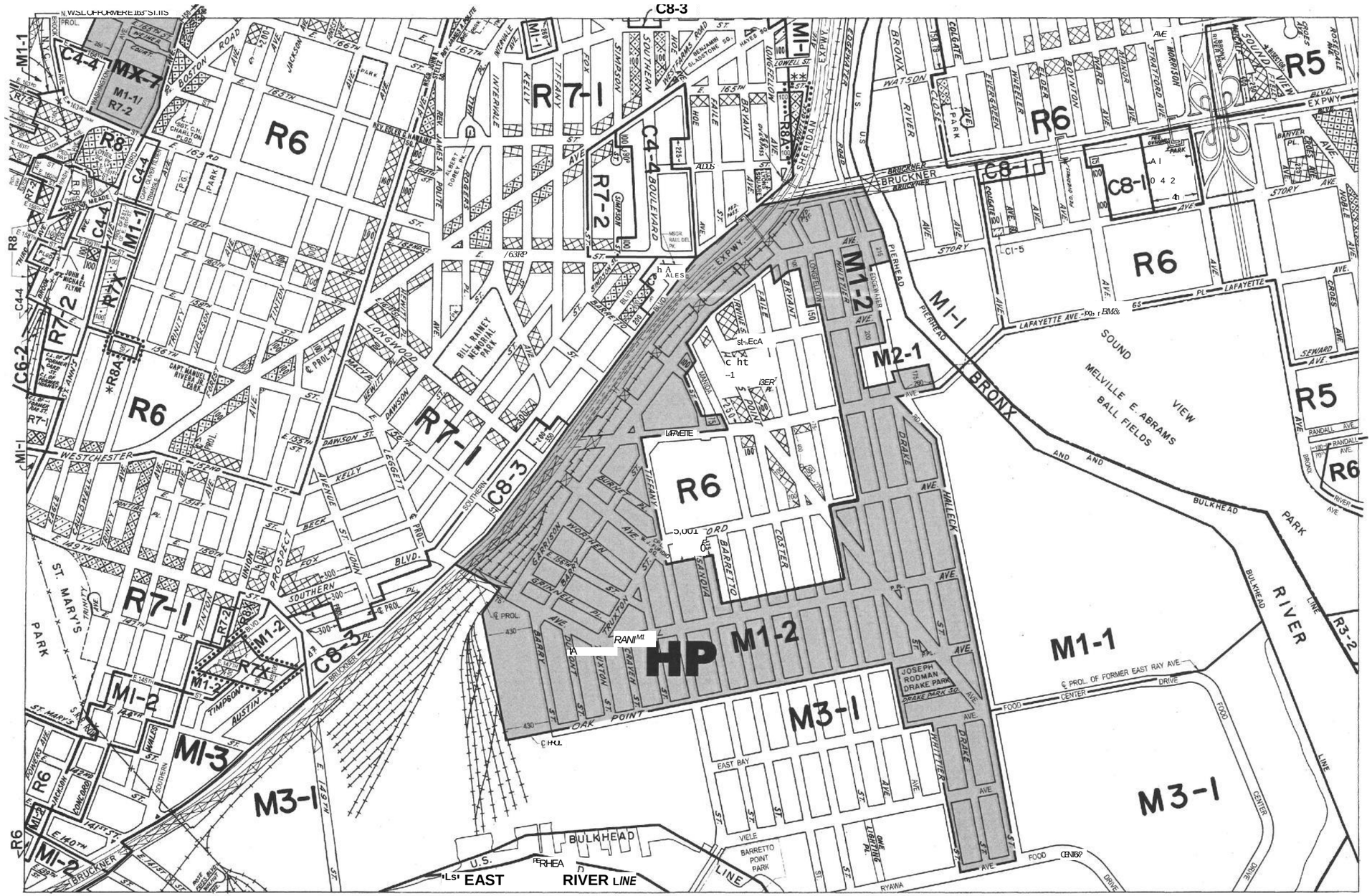


Annual Wind Rose Data

APPENDIX 1C

- NYC Zoning Map 6c



C1-1 C1-2 C1-3 C1-4 C1-5 C2-1 F/T/AL C2-2 C2-3 KIT/A C2-4 C2-5 IXXXXI

NOTE: Where no dimensions far zoning district boundaries appear on the zoning maps, such dimensions are determined in Article **VII,** Chapter 6 (Location of District Boundaries) of the Zoning Resolution.

ZONING MAP

THE NEW YORK CITY PLANNING COMMISSION

Major Zoning Classifications:

The numher(s) and/or letter(s) that follows a- R, C or M District des:gration indicates use, busk crd other controls as deathbed in toe text of the Zoning Resolution.

R — RESIDENTAL DISTRICT

C — COMMERCIAL DISTRICT

• M — MANUFACTURING DISTRIC–

SPECIA1 DIS¯R¯CT

Ice :etter(s) within the shaded area designates the special purpose district as described in the text of the Zoning Resolution.

ARE,(S) REZONED

Effective Date(s) of Rezoning:

** 07-20-2017	C	170087	ZVIX
*05-24-2017	C	1701⁴0	LVX
10-27-2016	C	150251	ZMX

Special Requirements:

For a list of lots subject to CEOR environmental requirements, see APPENDIX C.

For a list of lots subject to "D" restrictive dec*3rotft)ns, see APPENDIX D.

For Inclusioncry Housing designated areas and Mandatory Inclusioncry Housing areas on this map, see APPEND!X F.

MAP KEY 0

3b	3d	4b
6a	**6c**	7a
6b	6d	7b

NO za 0) .1

NOTE: Zoning information as shown on this map is subject to change. For the most up-to-date zoning information for this map, visit the Zoning section of the Department of City Planning website: **www.nyc.govlplanning** or contact the Zoning Information Desk at (212) 720-3291

PART 2 – MICROGRID WITH TRI-GENERATION

1 Overview

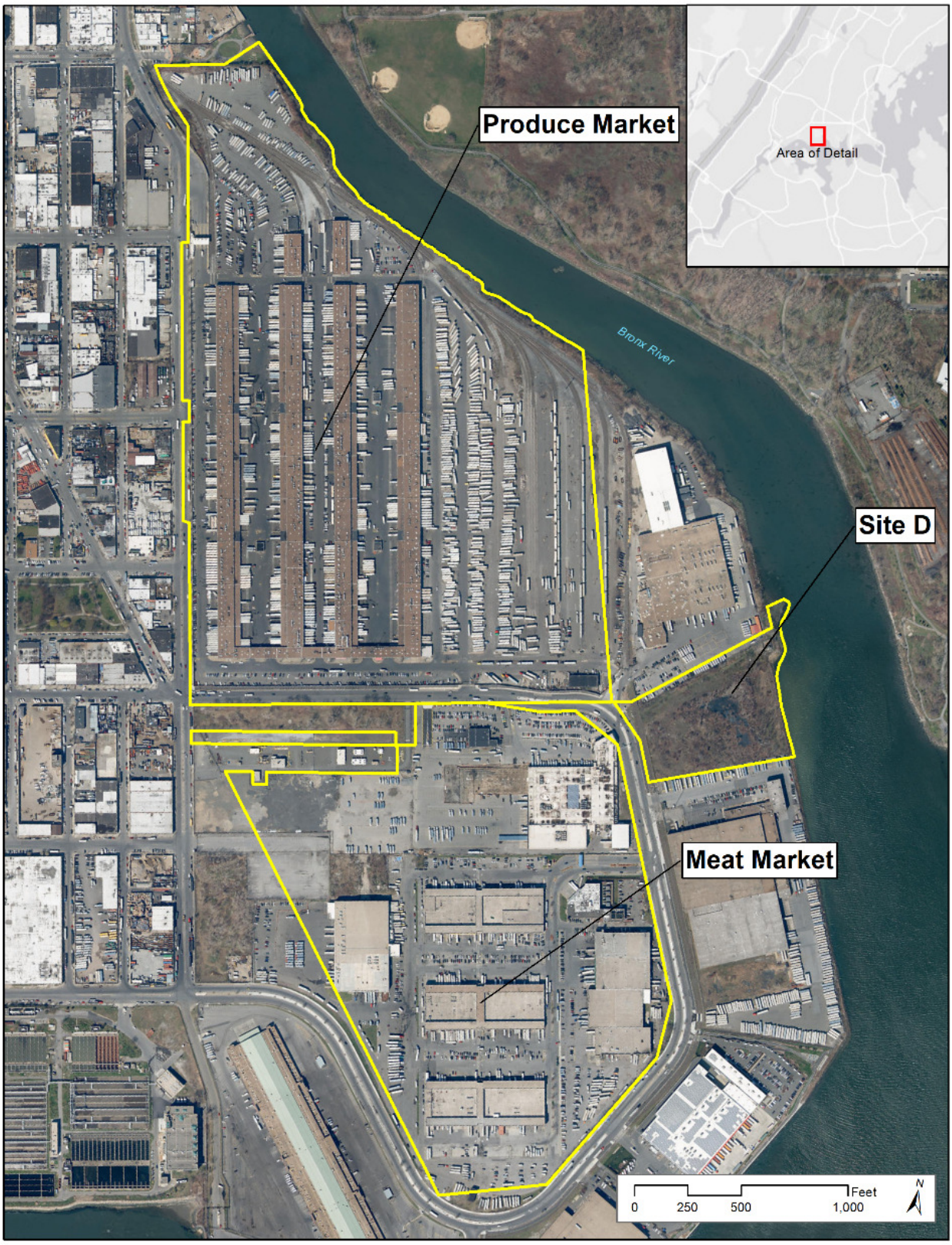
As described in Part 1 of this DBD, the Pilot Project is intended to provide reliable, dispatchable, and sustainable energy to vulnerable, critical facilities within the FDC and community during normal and emergency conditions. As part of the Pilot Project, a microgrid with a tri-generation facility will be provided in support of sustainable, thermal energy supply to the Meat Market and chilled water supply to the Produce Market. Waste heat from natural gas engine generators will be recovered and utilized to produce hot water for export to the Meat Market and chilled water for export to the Produce Market. During normal operating conditions, the tri-generation facility to be located at Site D will support operating loads at the Produce Market by providing electrical power generation through Con Edison's grid network. During emergency conditions, the facility will provide resilient electrical power generation directly to the Produce Market through a microgrid for continued market operation. The project locations are shown in Figure 2-1.

The tri-generation facility will utilize two, nominal 2.6 MW natural gas engine generators for electric power generation. Heat will be recovered from both the high temperature exhaust stream and low temperature engine cooling water stream of the engines. The exhaust stream will be used to produce high temperature hot water at 350°F and low temperature hot water will be produced from the engine jacket water, intercooler, and lube oil cooling streams at 200°F. The hot water stream will be exported to the Meat Market to offset gas fired hot water generation at this facility.

The remainder of the high temperature hot water not exported to the Meat Market and the low temperature hot water recovered from the engine cooling water loop will be used to drive absorption chillers to produce chilled water. Absorption chilling equipment will be located within the tri-generation facility. The chilled water produced will be exported to the Produce Market to offset some produce storage area refrigeration loads and to allow electrical power supply capacity for the conversion and connection of existing diesel powered trailer refrigeration units (TRUs).

Upon loss of Con Edison power, the tri-generation facility will provide back-up electrical generation to the Produce Market through an isolated ("islanded") portion of the Con Edison distribution system that forms the microgrid. Modifications to the existing Con Edison infrastructure will be required to interconnect the tri-generation facility. The tri-generation facility will have the ability to start without power from the Con Edison grid (black start) and to serve the connected loads. With the exception of major generation equipment, the tri-generation facility will be installed with internal redundancy provisions to support high system reliability during both normal and islanded operation.

Figure 2-1. Project Locations



Major equipment for the tri-generation facility will be located within a newly erected building located on a vacant parcel east of both markets and referred to as Site D. The facility will use natural gas fuel that will be supplied via a low pressure natural gas pipeline adjacent to Site D. Gas compressors will be required when the gas pipeline pressures are insufficient to satisfy the fuel gas pressure requirements of the natural gas engine generators. This situation may occur during periods of high system demand for natural gas, during periods of gas supply system maintenance, or other periods in which the natural gas supply is curtailed. Connections from the tri-generation facility at Site D to each of the markets as proposed by the Pilot Project are illustrated in Figure 2-2.

The tri-generation facility will be designed with controls for air emissions and noise during operations. The general arrangement of the facility at Site D will allow for potential expansions of the facility building for an additional natural gas engine generator with associated heat recovery and absorption chilling equipment.

2 Project Specific Design Criteria

2.1 Meteorological Data (Ambient Conditions)

Refer to Part 1, Section 3.5 for site ambient conditions.

2.2 Flood Risk Reduction

The existing grade elevation of Site D where the tri-generation facility will be located ranges from 13 feet to 18 feet based upon the North American Vertical Datum of 1988 (NAVD88). Prior to construction of the tri-generation facility, Site D will undergo restoration work to remediate hazardous materials currently existing on the site. Currently, the proposed site remedy is expected to elevate a portion of Site D, depending on the extent of remediation required. The final grade of Site D will be raised to a DFE of 17.33 feet NAVD88 or greater based on the City's Climate Resiliency Design Guidelines (Version 2.0) released in April 2018. For more information on site elevations and DFEs, see Part 1, Section 3.1.2.

New underground electrical ducts and manholes may flood in the future. Cable and splices located in new underground installations will be suitable for submerged operation.

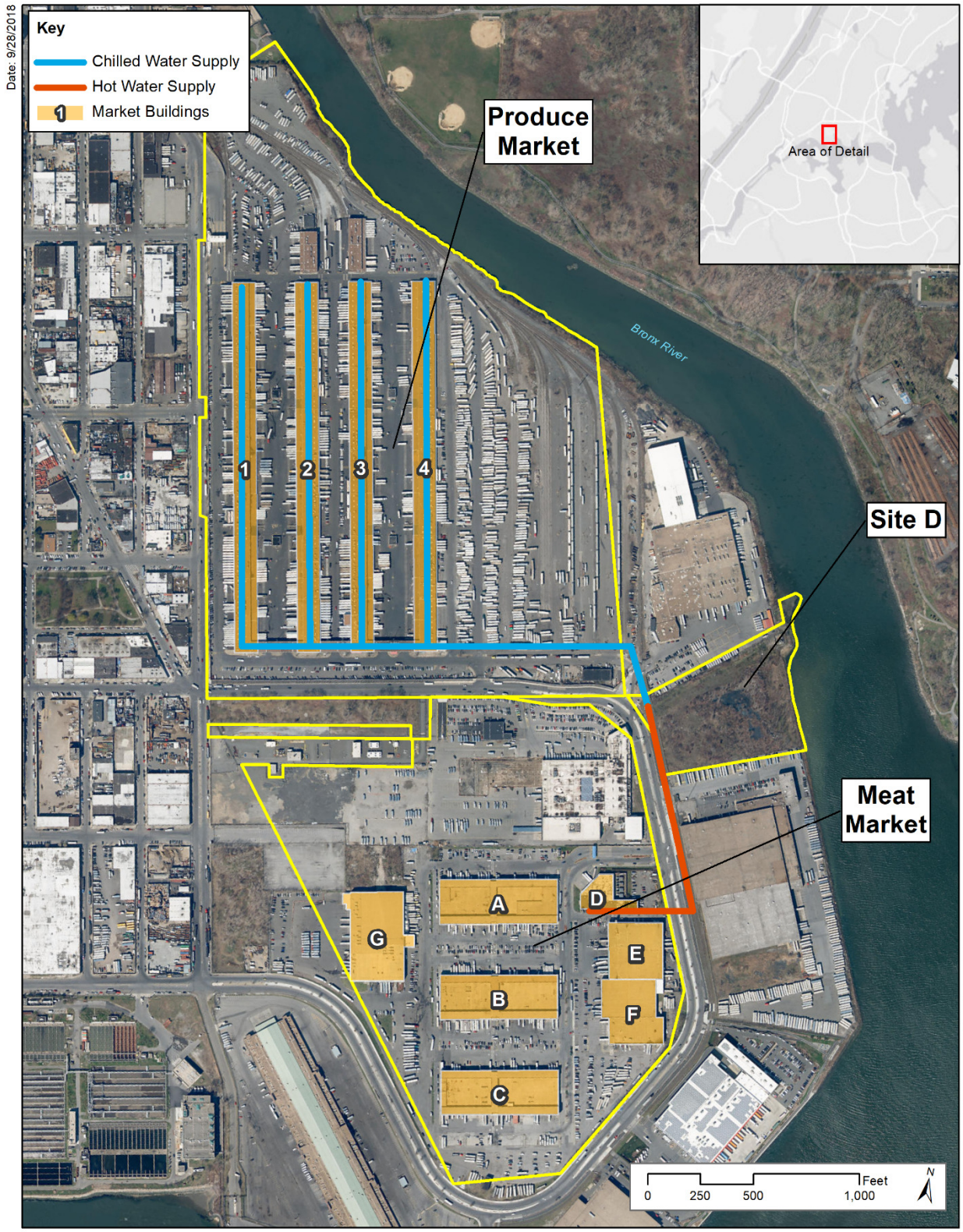
2.3 Structural Design Criteria

Refer to Part 1, Section 3.6 for basic structural design criteria.

Foundations will be provided for the following major equipment along with all miscellaneous support equipment:

- Natural gas engine generators
- Heat recovery hot water heaters
- Absorption chillers/electric chillers
- Water storage tanks and pumping systems

Figure 2-2. Chilled and Hot Water Supply Connections to Markets



- Transformers
- Electrical interconnection switchgear
- One electrical power distribution center (PDC) enclosure
- Aqueous ammonia handling.

The following building enclosures will be provided to house the tri-generation facility equipment:

- Generation equipment building (two-story structure that will house the natural gas engine generators, heat recovery hot water heaters, and chilling equipment and including dedicated space for a workshop, electrical room, fire pump room, and chilled water pump room)
- Natural gas compressor enclosure.

For more information, structures and equipment layout are illustrated on the project site plan and general arrangement drawings found in Appendix 2A.

2.4 Water Sourcing

Potable and service water will be supplied from the City potable water system. Interconnection will be made at the utility line in Food Center Drive. Potable water will also be used for service water with a backflow preventer to protect the potable water supply. Any new connections to the City's system will be coordinated with and submitted to DEP for approval. Water uses for the site are expected to include general washdown, cooling system fill and makeup, process water (hot water and chilled water) makeup, emergency eyewash or shower use, fire protection, and sanitary facility use.

2.5 Wastewater and Stormwater Discharge

Cooling tower blowdown and wastewater sump discharge (process wastewater) will be conveyed to the City's sanitary sewer system. The City sewer tie-in is located along Food Center Drive.

The tri-generation site will be graded and sloped to naturally drain stormwater to new catch basins that will be tied into existing storm sewer lines. Permanent unprotected slopes in cut or fill will be no steeper than a 3 to 1 ratio of horizontal to vertical distance. The minimum grading slope in the main facility complex will be one percent, or as appropriate for surface type, conveying stormwater runoff away from permanent facilities. The proposed surface treatment for the site is crushed stone.

An oil-water separator will be employed to prevent oily waste discharge to the City sewer. All oily waste from the engines and other equipment will be collected in a dedicated tank for removal and disposal offsite. Any lube oil spills that may occur during engine oil fill/drain operation will be contained and prevented from flowing into the stormwater drains. All oily waste will be contained, removed by truck, and disposed of offsite. Clean oil-water separator effluent will be sent to a wastewater sump for verification of quality before being discharged to the City's sanitary sewer system.

Due to the quantity of soil that will be disturbed with this project, the City's Municipal Separate Storm Sewer System (MS4) permit will require a stormwater pollution prevention plan (SWPPP). All new connections to either the sanitary or storm sewer systems will be coordinated with and submitted to DEP for approval.

2.6 Fuel Sourcing

Gas supply will be from Con Edison and will be supplied at a minimum pressure of 15 psig at the main supply line running along Food Center Drive. The maximum line pressure is expected to be approximately 99 psig. The gas supply will be tapped from the existing pipeline off of East Bay Avenue/Food Center Drive by Con Edison where it will terminate at the site-specific gas system interfaces as further defined in Section 5.3. The natural gas tie-in location is identified in Figure 2-3.

Figure 2-3. Natural Gas Tie-In Location

The facility will allow for the future incorporation of biogas fuel blending as an alternative fuel source. Required biogas metering, delivery, and conditioning equipment is not included in the current project scope and will be required at such time that biogas fuel is integrated.

2.7 Geotechnical Data

The site geotechnical characteristics can be generally described as engineered fill materials, similar to other urban waterfront locations. The site will be environmentally remediated prior to construction of the tri-generation facility and the site elevation will be raised as part of the site development process. Final geotechnical parameters will depend on the remediation and site preparation methods chosen.

2.8 Electric and Thermal Load Requirements

2.8.1 Produce Market Electrical Load Design Basis

Both the Meat Market and Produce Market were identified as suitable users for thermal energy supplied by the new tri-generation facility. Electricity from the tri-generation facility will be exported to the Con Edison grid during normal operation and will be supplied to the Produce Market during emergency, or microgrid, conditions. To evaluate the applicable electric demand, billing data was solicited from the tenants of the Produce Market and monthly billing data was received from Con Edison for six tenants representing 41 percent of the total stall space within the Produce Market. The total load for the Produce Market was estimated by extrapolating this data according to square footage. Figure 2-4 summarizes the estimated 2015 and 2016 electric requirements for the Produce Market. The average monthly electrical consumption varies from approximately 2.4 MW to 4.7 MW with the monthly peak demand ranging from approximately 4.5 MW to 8 MW.

2.8.2 Produce Market Thermal Loads

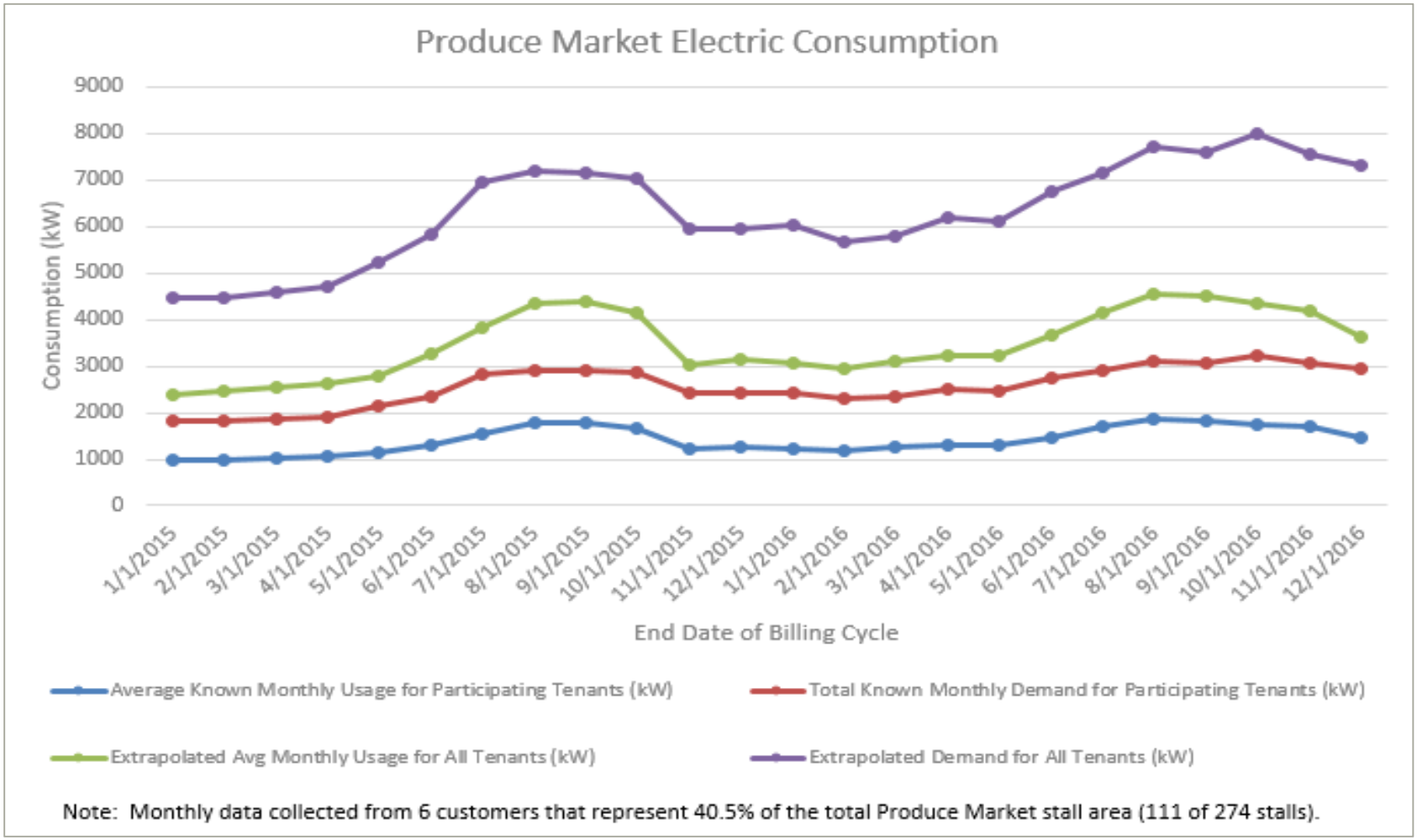
The thermal load at the Produce Market is in the form of a refrigeration load serving the chilled space used for produce storage. This load was determined assuming that the current chilling is served by electric chillers and considering the Produce Market electric profile shown in Figure 2-4.

Discussions were held with representatives of the Produce Market dating back to July 15, 2016 with the most recent discussion held on August 28, 2018 to more fully understand the chilling load requirements.

Produce Market buildings contain separate stalls for produce storage that are separated by insulated walls. Stall construction varies by building. Some stalls are more fully insulated then others, with some stalls using 6-inch foam wrapped steel stud walls and others having minimal insulation installed to a block wall with wood sheathing. Stalls can vary in size but many stalls are 25 feet wide by 75 feet long with access doors on each end of the stall. There is office space on the second floor, or mezzanine level, of the buildings.

Stalls are controlled at different temperatures based on the type of produce stored. Produce storage space temperature requirements range, generally, from 33°F to 60°F. Most stalls are held between 38°F and 42°F. Colder space temperatures are utilized to store green produce and berries (between 33°F and 35°F). Tropical fruits are stored at a higher temperature (nominally 60°F). Some vendors try to hold stalls at the same temperature year round, but many vendors will vary stall temperatures based on the seasonal produce stored. The cooling/refrigeration equipment operates throughout the entire year, but will operate less frequently during the winter due to cooler temperatures. Humidity is controlled in the stalls, but no special humidity control is generally utilized beyond refrigeration for most stalls. The buildings do have gas heaters to maintain minimum temperatures on very cold days, but these heaters are rarely operated.

Figure 2-4. Produce Market Electric Consumption



The temperature in each stall will typically be controlled separately with most stalls having dedicated space-conditioning equipment. There is not a standardized refrigerant or type of equipment utilized through the market, and the age of the equipment varies per stall. A typical installation includes roof mounted refrigeration equipment comprised of a compressor and condenser with an indoor evaporator coil and a blower. Refrigeration lines connect the indoor and outdoor equipment.

The largest electrical load for the market is refrigeration equipment, with office and administrative area heating, ventilation, cooling equipment, and mobile equipment charging stations also being significant electrical users. TRUs operating on diesel fuel or electricity are utilized for additional storage space at the market. A limited number of electric plug-ins are available; many TRUs currently operate on diesel with daily fill-ups required.

As part of this project, the existing electrical refrigeration equipment at the Produce Market will be replaced with the chilled water loop and direct electrical demand will be correspondingly reduced. To take advantage of this available electric supply, the project will include the installation of electrical outlets in the TRU parking area to allow for the conversion of existing diesel fueled trailers to electricity. This will reduce local emissions from the TRUs and will maintain a beneficial use of the existing Produce Market electrical power supply capacity by re-allocating it from building chilling to TRU use.

In order to determine the amount of chilling required at the Produce Market, the market electrical loads not associated with chilling, including lighting, office uses, battery powered equipment charging and other facility loads, were first determined to be approximately 600 kW. This information was based upon the utilization of typical Energy Use Intensity by Property Type values, as reported in the Energy Star Portfolio Technical Reference, and applied to the approximate 510,000 square feet of Produce Market storage area. Using the average load curve in Figure 2-4 and the indication by market tenants that the existing chilling equipment runs year round, the estimated electric chilling load can be identified as the blue area represented in Figure 2-5.

The chilling load was then determined by assuming a Coefficient of Performance (COP) of 3.0 for electric roof top chillers. The value of 3.0 was selected as a representative value based upon typical industry data for the range of traditional, packaged, rooftop mounted, and commercial refrigeration units currently employed at the Produce Market. COPs for equipment of this type generally range from 2.6 to 3.6. Using this COP and the electric loading profiles in Figure 2-5, it was determined that the total market chilling load ranges from 1,530 tons to 3,233 tons of refrigeration with an average of approximately 2,253 tons.

Finally, it was assumed that 40 percent of the Produce Market tenants would ultimately adopt the proposed chilled water system and that of the total building cooling loads, 40 percent would be able to accept chilled water supplied from the tri-generation facility. A market outreach process in conjunction with EDC will ultimately be needed during final design to confirm expected adoption rates and off-takers for the chilled water supply. The current conceptual design assumes that chilled water distribution piping will be routed to all existing Produce Market buildings to achieve the 40 percent adoption rate. From the above assumptions, the total available Produce Market chilling loads were determined to be 612 tons to 1,293 tons with an average of 901 tons. Figure 2-6 demonstrates the derived Produce Market refrigeration load profile.

Figure 2-5. Produce Market Average Electric Load

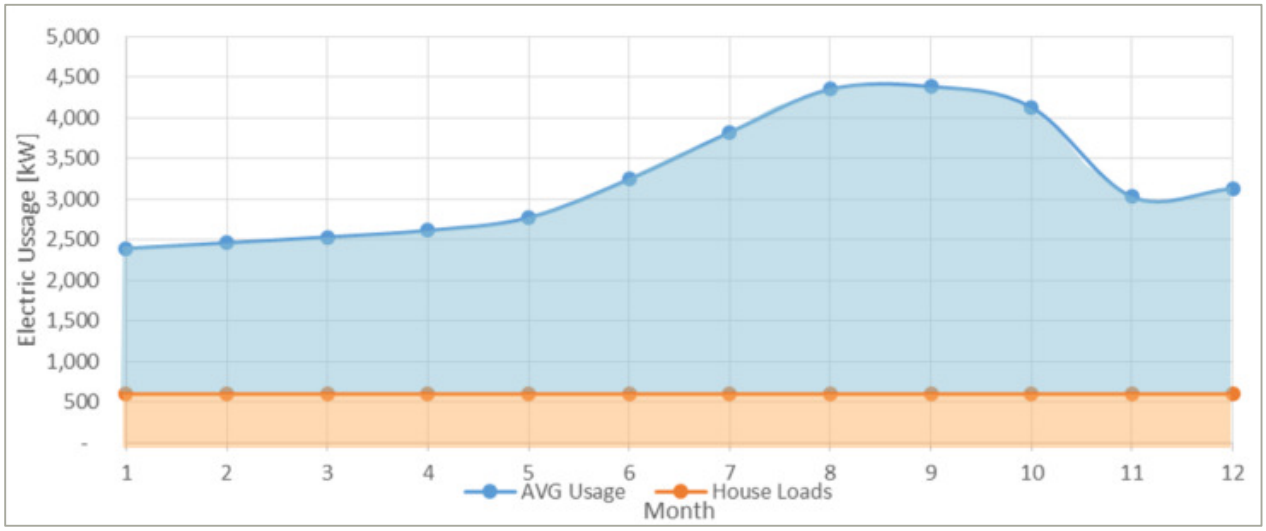
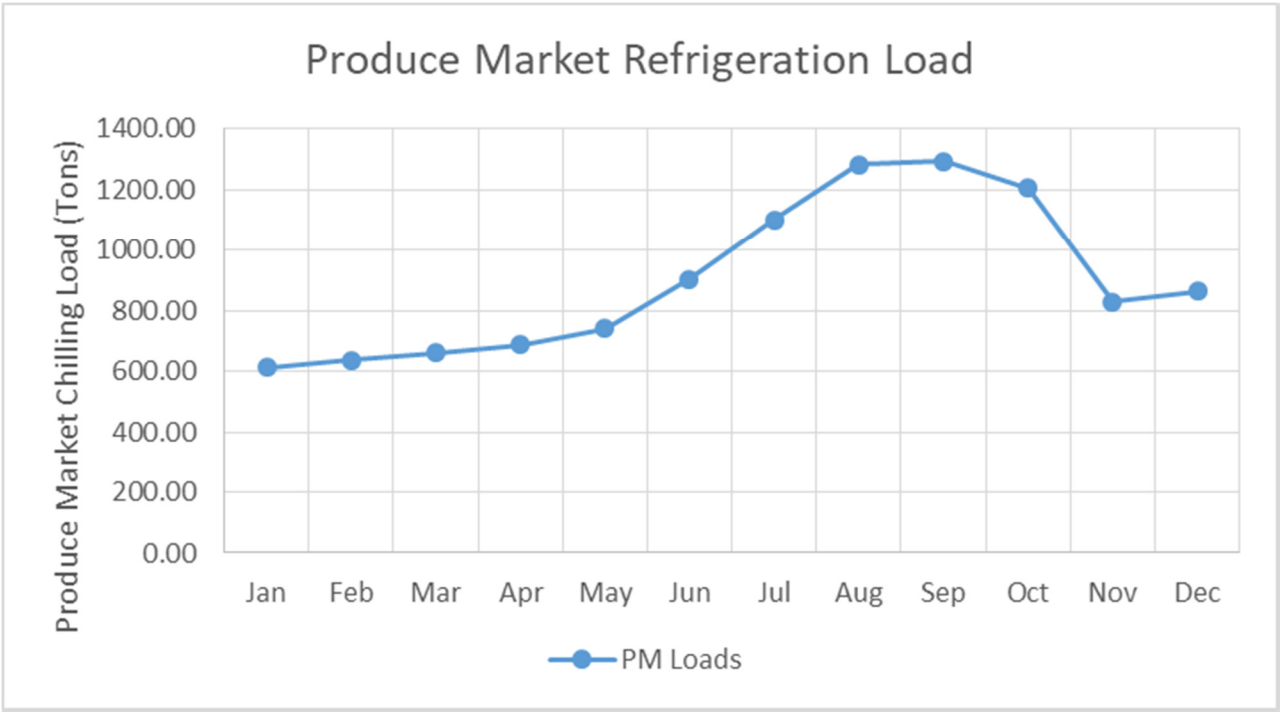


Figure 2-6. Produce Market Target Refrigeration Load Profile



Given the load/demand information outlined above, the average monthly energy consumption for the Produce Market varies from approximately 2.4 MW to 4.7 MW with the monthly peak demand ranging from approximately 4.5 MW to 8 MW. The tri-generation facility will be designed with two nominal 2.6 MW natural gas engine generators to supply power to the grid during normal operation and to be able to serve the demand of the Produce Market during islanded, or microgrid, operations.

These engine generators will also be able to provide a total thermal energy output of approximately 4.8 MW (16.4 MMBtu/hr) divided into energy delivered to the Meat Market and the Produce Market. Up to 2.4 MW (8.09 MMBtu/hr) of thermal energy can be recovered from the exhaust of the two engine generators in the form of high temperature hot water at a temperature of 350°Fwith another 2.3 MW to 2.7 MW (7.8 MMBtu/hr to 9.2 MMBtu/hr) being recoverable from the engine, lubricating oil, and intercooling systems in the form of low temperature hot water at a temperature of 200°F.

The high temperature hot water will be forwarded to the Meat Market with any excess being forwarded to the absorption chillers to produce chilled water for the Produce Market. With a peak monthly thermal demand of approximately 5.6 MMBtu/hr and an average of approximately 4.2 MMBtu/hr, under most operating conditions, the tri-generation facility will generate more high temperature hot water than what the Meat Market will be able to utilize.

The excess thermal energy in the form of both high and low temperature hot water will be utilized to produce up to 1,300 tons of chilled water for export to the Produce Market.

2.8.3 Meat Market Thermal Loads

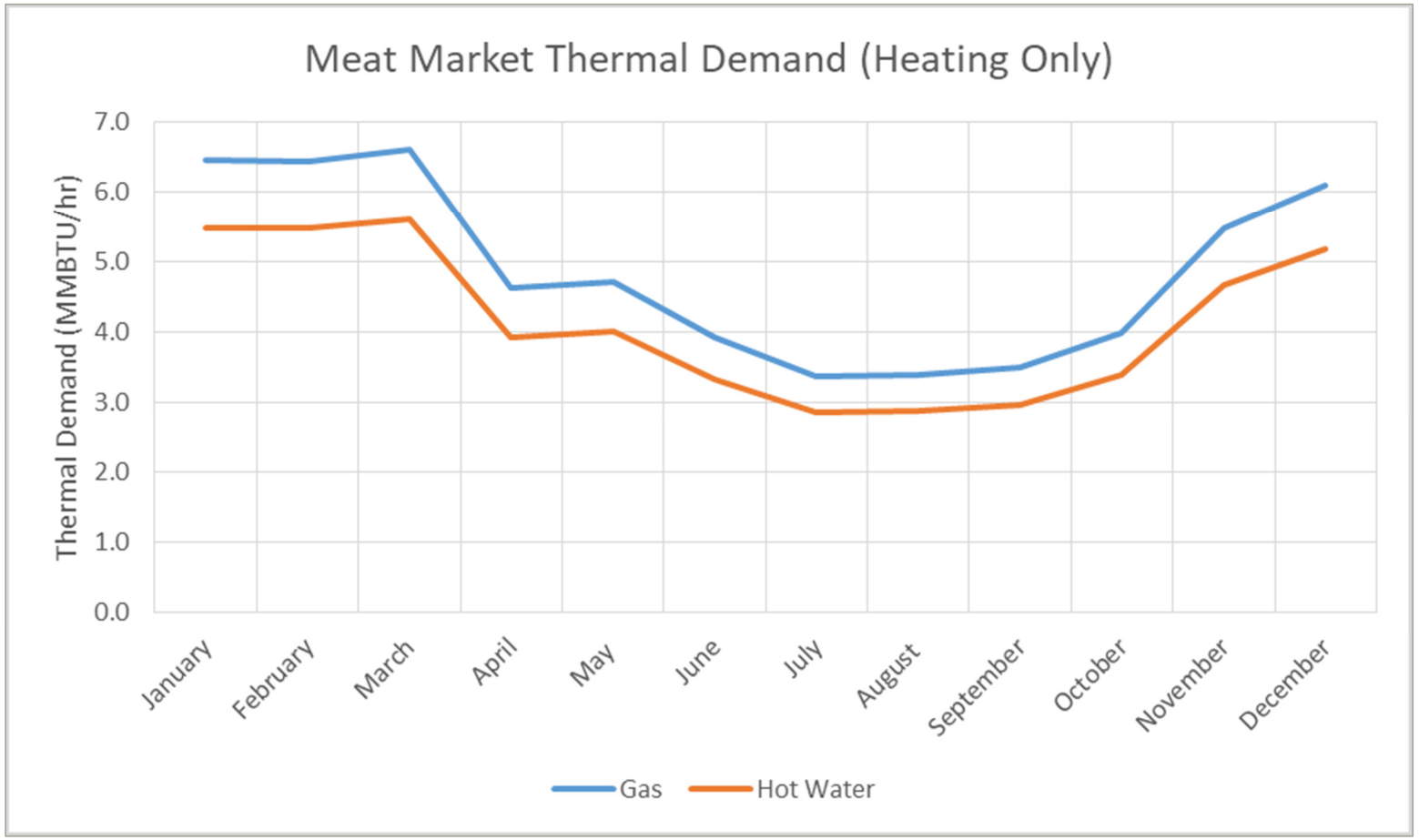
To determine the existing thermal demand to be served by the tri-generation facility, load data regarding the historical Meat Market gas consumption was obtained from Con Edison and evaluated. The resultant annual thermal energy load profile for the Meat Market is represented in Figure 2-7. During normal operation, the tri-generation facility will be expected to serve this thermal load via a hot water supply of 350°F to the Meat Market. Further details regarding the required delivery conditions and interface for the hot water supply are further defined in Section 5. The average monthly thermal demand, in the form of hot water, is expected to range from approximately 2.9 to 5.6 MMBtu/hr with instantaneous demands exceeding these values.

2.9 Engine Emissions Limits

The tri-generation facility will be designed consistent with the efficiency and air quality requirements of the following:

- City Environmental Quality Review (CEQR) Technical Manual
- Con Edison's Standby Rate Pilot Program (including the City's participation in the Air Quality Collaborative)
- Con Edison's Multi-Party Offset Tariff or General Rule 20.2.1(B)(8) in the electric tariff (to comply with these requirements, the tri-generation facility will be designed to maintain an average annual efficiency of 63 percent or greater, a peak efficiency of 65 percent or greater, and a NO_x emissions standard of 1.6 lbs/MWh or less)
- New York State Facility Air Permit (Subpart 201-5)/Subpart 201-4: Minor Facility Registrations).

Figure 2-7. Meat Market Thermal Loads



The natural gas engine generators will be specified as lean-burn natural gas engines with low nitrogen oxide (NO_x) emissions. The exhaust system of each engine will be equipped with an oxidation catalyst for carbon monoxide (CO) removal and a selective SCR system with ammonia injection for NO_x removal. The reduction efficiency of the CO and NO_x catalyst systems is expected to be 80 percent or greater. The lean-burn engine will be configured to limit the exhaust NO_x emissions at the inlet to the SCR system and provide operational flexibility to be able to balance efficient combustion with more optimal removal of CO and NO_x in the exhaust emissions control system. Table 2-1 shows achievable natural gas engine generator emissions with associated emissions control technologies.

Table 2-1. Typical Natural Gas Engine Generator Emissions

Parameter	Emissions g/bhp-hr	Emissions lb/MMBtu	Percent Reduction	Emissions g/bhp-hr	Emissions lb/MMBtu
	Uncontrolled			Controlled	
NO_x emissions at stack	1.00	0.35	90%	0.10	0.04
CO emissions at stack	2.10	0.74	80%	0.42	0.15
VOC emissions (non-methane, non-ethane volatile organic carbons)	0.25	0.09	60%	0.10	0.04
PM10/PM2.5 Particulate matter	0.02	0.01	-	0.02	0.01
SO2 Sulfur dioxide	0.004-	0.001	-	0.004	0.001
Formaldehyde	1.00	0.35	90%	0.10	0.04

Note: g/bhp-hr – grams per brake horsepower-hour; and lb/MMBtu – pounds per million British thermal units.

2.10 Noise Limits

Site D is zoned M3-1, per the New York City Zoning Resolution. The site will remain zoned as M3-1 with the construction of the tri-generation facility and must meet the requirements of the New York City Zoning Resolution and New York City Noise Control Code. Compliance with sound pressure levels at the site boundary based on these requirements are described in Part 1, Section 3.10 of this DBD. The tri-generation facility will be enclosed and other acoustical attenuation measures may be necessary to limit exceedances with noise emitting criterion also described in Part 1, Section 3.10.

2.11 Grid Interconnection Requirements/Electrical Configuration

Electricity supplied from the tri-generation facility will connect to the Con Edison power system at the 13.2 kV feeders adjacent to the project site under Food Center Drive as a high tension service in accordance with Con Edison Specification EO-2022. See Appendix 2A for the electrical manhole locations, which will be used for the electrical

interconnection to the 13.2 kV feeders, and Appendix 2B for electrical interconnection details.

2.12 Trailer Refrigeration Unit Power Supply

Due to limitations on storage space within the Produce Market, many tenants supplement their storage with mobile trailers equipped with onboard refrigeration equipment. TRUs either remain docked in the building loading bays to allow market staff easy access between the trailers and internal storage spaces of the Produce Market or are stored in a holding area located to the east of the Produce Market near the existing rail yard. Figure 2-8 shows the location of the holding area with respect to the Produce Market. In either location, the trailers typically require continued refrigeration.

Figure 2-8. Refrigerated Trailer Holding Area Location

The majority of the vendors in the Produce Market currently use diesel powered TRUs to control the temperature within these trailers. The emissions from the diesel burned in these units are a major contributor to emissions such as NOx, CO, and PM10/2.5 in the Hunts Point area. As part of this project, provisions will be made to install electric trailer outlets to allow the conversion of the diesel powered TRUs to electric power.

Produce Market staff indicated that the existing electrical infrastructure cannot support additional loads beyond those currently served. Therefore, any power required to run the electrical TRUs would need to be accompanied with an equivalent load offset at the market. The chilled water loop supplied by the new tri-generation facility and servicing the Produce Market is expected to offset electric loads associated with the cooling equipment currently used to provide onsite refrigeration. This chilled water loop is expected to offset between 700 and 1500 kW of electric refrigeration load at the Produce Market allowing the addition of electric powered TRUs.

Each TRU is expected to require a 460 volt, three-phase, power supply rated at approximately 17.5 kW each. The project will include the installation of power outlets for the connection of 50 refrigerated trailers within the trailer holding area or at the Produce Market loading bays. The power supply for these outlets will be derived from the existing Produce Market 480 volt electric distribution system.

All required new electrical infrastructure as well as modifications and repairs to existing parking areas and pavement will be included as part of the project.

3 Site Layout

3.1 Site Plans (Tri-generation Facility)

The project site for the tri-generation facility is located in the FDC on a vacant parcel of land referred to as Site D. Site D is situated between Food Center Drive (also referred to as Market Street and East Bay Drive on some drawings and maps) and the Bronx River as depicted in Figure 2-9.

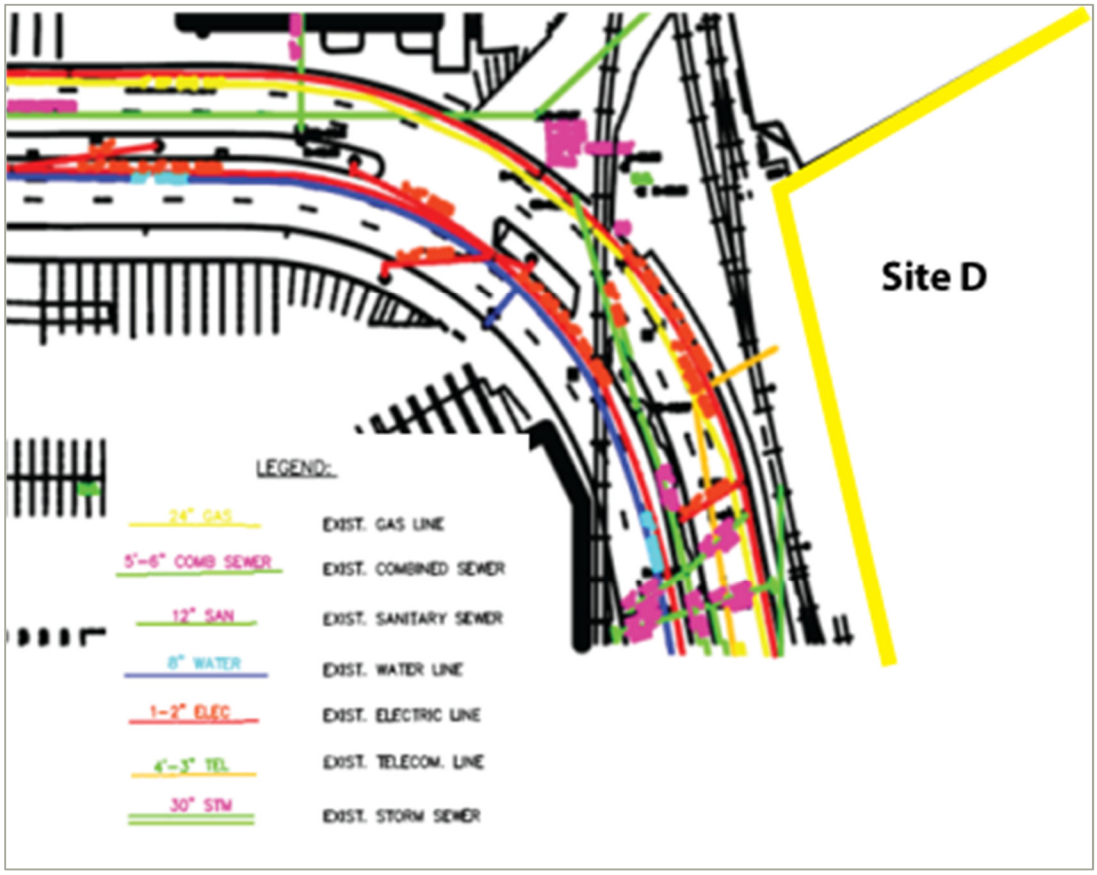
Conceptual site layout drawings depicting the tri-generation facility are included in Appendix 2A. The proposed site layout allows space for an expansion of the tri-generation facility building for the future build out of a third natural gas engine generator and associated heat recovery equipment. Access to the site will be from Food Center Drive on the southern end of the west side of the site. The entrance road will be used for construction access to the site as well as main facility access after construction.

During the facility construction, craft parking and laydown areas will utilize the space within the main facility boundary/fence line. Major equipment such as the natural gas engine generators will be delivered to site and set directly on the foundation in one pick. Given the soil characteristics of the site, piles will be required under the facility roads to handle the weight of heavy equipment deliveries and lifts. Craft parking areas and heavy laydown areas will also require piles.

Con Edison interconnects are available at the western site boundary at Food Center Drive as shown in Figure 2-10. Utilities available include natural gas supply (24-inch line), sanitary and storm sewer, electric, telecommunications, and water (8-inch line). Additional utility plan drawings developed for the South Bronx Greenway project in 2011 are included in Appendix 2A.

Figure 2-9. Aerial of Site D (Existing Conditions)

Figure 2-10. Proximity of Utilities to Site D



Equipment for the facility is generally located on the west side of Site D and as far inland as possible to reduce risk of coastal flooding impacts and allow the east half to remain unused for future development. The natural gas yard and gas compressor enclosure are located on the northern most end of the property. The ammonia storage tank, oil tanks, and service water tanks are located on the southern end of the site in close proximity to the road to facilitate truck loading and unloading. The engine generators, heat recovery equipment, and refrigeration equipment are all located within a new building generally located on the west half of Site D. Electrical equipment is housed within the building in a dedicated electrical room.

3.2 Renderings

[To be developed.]

4 Technology/Facility Performance

4.1 Natural Gas Engine Generator Technology

Final natural gas engine generator selection will be made by the project Contractor. Potential engine options identified in the 2.6 MW size range and suitable for a tri-generation application include:

- GE Jenbacher J616 (2.633 MW)
- Caterpillar G3520H (2.483 MW).

4.2 Natural Gas Engine Generator Performance

Table 2-2 summarizes the performance of the two identified natural gas engine generators. The characteristics of the final, selected natural gas engine generators will be consistent with those identified in the table. Representative manufacturer data sheets are included in Appendix 2C.

Table 2-2. Representative Natural Gas Engine Generator Performance

	Net Power	Electric Efficiency	Minimum Operating Load	Exhaust Temperature	Exhaust Flow	Cooling Water Energy
Make/Model	(ekW)	(1.0 PF, LHV)	(ekW)	(°F)	(kpph)	(MMBTU/hr)
GE Jenbacher J616	2,649	45.2%	50%	687	32.56	4.6
CAT G3520H	2,428	43.5%	50%	735	28.96	3.9

The natural gas engine generators will be capable of satisfying the following operating requirements:

- No more than five minutes start time from ignition to full load
- Capable, at a minimum, of turning down to 50 percent of full load while maintaining air emissions compliance
- Capable of handling an average of five start-stop cycles per day.

5 Mechanical Systems and Equipment

5.1 Generator/Heat Recovery/Exhaust Gas System

The natural gas engine generator, exhaust gas, and engine cooling water systems will be specified as a package to be supplied by an engine equipment manufacturer or an engine system integrator.

Each natural gas engine generator package will be capable of nominally 2.6 MW gross electrical output per unit and will consist of:

- Engine

- Generator, air cooled
- Engine piping and control module
- SCR and oxidation catalysts with ammonia injection skid
- Exhaust silencer
- Fuel gas regulating, metering and control skid
- Intercooler and jacket water radiator system and circulating pumps
- Fresh and waste lube oil tanks with auxiliaries
- Generator protective relay
- Generator breaker
- Engine controls
- Access platforms, support steel, ladders and/or stairs.

The high temperature hot water system for each unit will be designed for a nominal 60,000 pounds per hour (lb/hr) water flow with an exit water temperature of 350°F and inlet/return water temperature of 300°F. The high temperature hot water system for each unit will include:

- Exhaust heat recovery hot water generator
- Modulating exhaust bypass damper and actuator
- Modulating water flow control valve and circulating pump assembly
- Hot water generator non-return and isolation valves, instrumentation, and safety relief valves
- Water level control with low/high water cutouts and manual reset low-low water switch
- System drain assembly
- Control panel.

The low temperature hot water system for each unit will be designed for nominally 127.5 kpph water flow with an exit water temperature of 200°Fand inlet/return water temperature of 165°F. The system will consist of the following for each natural gas engine generator unit:

- Engine cooling water heat exchanger, plate and frame type
- Modulating engine cooling water three-way control valve with hot water supply temperature control
- Safety relief valves and miscellaneous Instrumentation.

The exhaust heat recovery will be controlled by modulating the exhaust gas bypass damper and the inlet water control valve. The engine cooling water heat recovery load will be controlled by the variable frequency drives on the hot water distribution pumps to vary water flow and the engine cooling water temperature control valve to maintain or vary the hot water supply temperature. During turndown operation, any excess exhaust

heat will be rejected to atmosphere by the bypass damper and any engine cooling water heat not recovered will be dissipated to the engine radiators.

Process flow diagrams depicting this and all mechanical systems are included in Appendix 2D for reference.

5.1.1 Engine Radiator Cooling

For the thermal energy not recovered via the high temperature and low temperature hot water systems, a closed loop cooling water (CCW) system will provide cooling water to the engines and reject the waste heat to the air via fin-fan coolers (radiators). The system will consist of multi-cell, water-to-air fin-fan coolers, pumps, expansion tank(s), provisions for radiator fluid (glycol solution) makeup, and a low temperature preheating unit. The cooling system will include at least a 10 percent heat duty margin in its total heat removal capacity.

Fans will be low noise, axial flow, propeller type. Fan blades will be made of aluminum or fiberglass reinforced plastic (FRP). Fan tip speed will not exceed 12,000 ft/min. Each fan will be powered by a totally enclosed, high efficiency fan-cooled electric motor powered by the engine.

5.1.2 Inlet Air and Exhaust

The inlet air system supplies filtered clean air to the natural gas engine generator for combustion. The system will consist of bird screen, weather guard, inlet air filter, inlet air silencer, ductwork, expansion joints, instrumentation, and support steel. The engine exhaust air system will consist of expansion joint, ductwork, exhaust air silencer, weather guard, and bird screen.

The engine supplier will provide a galvanized steel screen at the entrance to the weather hoods to prevent birds and debris from entering the inlet. The inlet air filter will be a dry type, replaceable filter that will be capable of removing dirt and abrasives from combustion air to the degree of cleanliness required by the engine. The filter will be provided with a differential pressure gage.

The inlet silencer will attenuate tonal noise and the inlet ductwork and plenum will be coated carbon steel. The ductwork exterior will be acoustically insulated with mineral fiber board insulation and lagged by the pre-packaged (containerized) engine supplier.

The exhaust air system will be designed to meet the noise emissions limit as listed in Section 2.10. An exhaust air silencer will be installed for critical noise attenuation.

The exhaust duct will be horizontal and include access and provisions for emissions compliance testing. Provisions will include test ports and sufficient duct length to meet EPA test method requirements.

5.1.3 Engine Startup

The natural gas engine generator will be furnished with an electric start-up (charging) system. The start-up package will include the following equipment:

- 24 V start-up motor, including battery disconnect switch

- A battery for each engine generator
- Battery charger
- Alternator
- Radiator jacket water heater.

5.1.4 Lubricating Oil

The lubricating oil system will provide lube oil to the natural gas engine generator. The engine will have provision to add fresh oil via a fill port and drain waste oil via a drain port. The engine will also be furnished with ports to fill fresh oil and drain waste oil via truck. The lube oil system will be provided with a circulating pump and provision for heating/cooling and filters. The lube oil pumps will be positive displacement type that are integral with the engine and gear driven from the engine crankshaft. Lube oil piping will be stainless steel with welded pipe joints and flange guards to be used where practical.

5.1.5 High Temperature Hot Water System

The high temperature hot water system will use an exhaust heat recovery hot water generator to extract waste heat from the engine exhaust. The exhaust heat recovery hot water generator will circulate and heat pressurized hot water through a coil in the exhaust gas stream. The exhaust gas that goes through the exhaust heat recovery hot water generator will be cooled, but temperatures of the exhaust gas will remain high enough to prevent condensation and possible corrosion of the stacks.

Section 5.1 identifies some of the components of the hot water system, in addition to those components the high temperature hot water system will also include:

- Two, 100 percent high temperature hot water system feedwater pumps
- One expansion tank suitable for pressurized hot water
- High temperature hot water distribution piping and piping auxiliaries for absorption chillers
- High temperature hot water distribution piping and piping auxiliaries for hot water supply to the Meat Market.

The high temperature hot water system will utilize the hot water feedwater pumps to circulate the high temperature hot water at an expected flow rate of 60 kpph.

The high temperature hot water will be utilized by two, two stage absorption chillers for generation of chilled water for the Produce Market. Each two stage absorption chiller will have a control valve that regulates high temperature hot water flow to the chiller.

High temperature hot water will also be circulated to the outlet of the existing boilers at the Meat Market via a dedicated pipeline. The pipeline will be routed underground where possible and routed on an overhead pipe bridge over Food Center Drive and where other road or infrastructure crossings become necessary. Necessary approvals and permitting for road or right-of-way crossings will be required as outlined in the permitting and approval matrix included in Appendix 1A of Part 1 of this DBD. This hot water will service Meat Market heating, washdown, and other process loads, offsetting gas consumption in

the hot water boilers at the Meat Market. The hot water to the boilers will interface with existing equipment in a parallel configuration allowing the existing boilers to supply the Meat Market loads in the event that hot water from the tri-generation facility is not able to be supplied. Makeup water for any losses of high temperature hot water will be supplied from the existing Meat Market hot water makeup water system.

During normal operation the high temperature hot water system will prioritize supply to the Meat Market and any additional hot water generation will be used in the two stage absorption chillers.

In the event of a grid outage when the tri-generation facility is operating in island mode, the high temperature hot water system will prioritize supplying the local absorption chillers to provide refrigeration to the Produce Market. During these events hot water supply to the Meat Market will drop off and the existing local boilers will be required to supply emergency generation of hot water at the Meat Market.

5.1.6 Low Temperature Hot Water System

The low temperature hot water system will use the engine jacket water, first stage intercooler, and lube oil cooling system as the heat source. During normal operation, heat will be recovered from the engine cooling water via plate and frame type heat exchangers and will be transferred to the low temperature hot water system. During operating conditions in which the low temperature hot water system heat demands are not sufficient to utilize all of the heat generated by the engine, the engine cooling water fin fan coolers will be utilized to discharge the excess energy to the ambient air and to control temperature returning to the engine.

Section 5.1 identifies some of the components of the low temperature hot water system, in addition to those components the system will also include:

- Two, 100 percent low temperature hot water system circulating pumps
- Expansion tank(s)
- Low temperature hot water distribution piping and piping auxiliaries for absorption chillers
- Low temperature hot water distribution piping and piping auxiliaries for hot water supply to tri-generation facility HVAC system.

Low temperature hot water will be utilized in the single stage absorption chillers to produce chilled water for the Produce Market and for use within the tri-generation facility HVAC system. Each single stage absorption chiller will utilize a flow control valve to regulate water flow to the chiller. Each piece of HVAC equipment in the tri-generation facility will have a hot water coil and a chilled water coil with a control valve that regulates flow based on space conditioning demands.

5.1.7 Chilled Water System

The tri-generation facility will be capable of meeting a peak load of 1,300 tons of cooling capacity using two 400-ton two stage absorption chillers, two 300-ton single stage absorption chillers, and two 700-ton electric driven centrifugal chillers. The electric chillers will be utilized to meet peak load conditions and serve chilling load when the

natural gas engine generators are not operating. The electric chillers will also be available as back up, when the absorption chillers require maintenance. The chilled water system will serve the Produce Market with supply and return chilled water piping installed from the tri-generation facility. The chilled water system will be designed to the criteria outlined in Table 2-3.

Table 2-3. Chilled Water System Design Criteria.

Operating Parameter	Design Criteria
Chilled Water Supply Temperature	32°F
Chilled Water Return Temperature	41°F
Chilled Water System Flow Rate	3,467 GPM
Chilled Water System Design Operating Capacity	1,300 tons

The main components of the chilled water system will include:

- Two, 100 percent chilled water circulating pumps
- Two, 400-ton two stage absorption chillers
- Two, 300-ton single stage absorption chillers
- Two, 700-ton electric chillers
- Expansion tank(s)
- Chilled water distribution piping and piping auxiliaries for chillers
- Heat rejection system
- Chilled water control system
- Glycol mixing and makeup system
- Chemical pot feeders.

The chilled water system will include chemical pot feeders for chemical treatment (or dosing) and a glycol mixing and makeup equipment for makeup to the chilled water system. The chilled fluid in the chilled water system will be a mixture of propylene glycol and water to prevent freezing of the water in the chilled water system. Chemical treatment will be determined based on equipment selection and water quality. Chemicals will be added to prevent the chilled water system from corrosion, scaling, fouling, and microbiological growth.

5.1.8 Chilled Water System Users

Each tenant connected to the chilled water system will be provided supply and return connections, and will have individual chilled water metering to measure flow, inlet temperate, and outlet temperature. Each tenant connected to the chilled water system will be responsible for equipment to utilize chilled water from tri-generation facility.

5.1.9 Chilled Water Distribution System

Chilled water will be pumped from the tri-generation facility to the participating tenants in the Produce Market via new chilled water supply and return piping. Chilled water supply and return to each participating tenant will be measured on a BTU basis using a flow meter and temperature transmitters on the chilled water supply and chilled water return piping going to each tenant.

To utilize chilled water from the tri-generation facility, new refrigeration/cooling equipment is anticipated to be required. A review of the equipment installed at each participating stall is required to determine if existing refrigeration/cooling equipment is capable of utilizing the chilled water. Existing refrigeration/cooling equipment is expected to be refrigerant type equipment that would likely need to be modified or replaced to utilize the chilled water.

The chilled water can be utilized to serve as the cooling medium in direct applications, where chilled water is circulated through fan coil units or other cooling coils or heat exchangers. Chilled water could also be utilized for cooling heat rejection from refrigeration equipment condensers.

The absorption chiller technology can provide a chilled water supply temperature of 32°F with an expected return temperature of 41°F. Each stall will require a review of space temperature demands and the heat gains to the space to determine if chilled water can be utilized in direct applications. Some spaces will not be able to utilize chilled water due to the required room temperature set point being too close to the chilled water supply temperatures. Beneficial use of chilled water from the tri-generation facility will be limited to spaces that can benefit from the chilled water supply and return temperatures noted above.

The chilled water supplied to each stall could be utilized in fan coil units that include a fan and chilled water coil. The chilled water supply through the coil would be controlled by actuated valves that open when a set point temperature is reached. The fan would push or draw air though the coil based on the thermostat calling for cooling. To reduce the discharge air temperature from the chilled water coil, custom multiple row coils may need to be utilized for these fan coil units. Multiple row coils increase the coil surface area that allows for additional heat transfer. The discharge air temperature is limited by inlet and outlet wet bulb coil temperatures, chilled water supply and return temperatures, and entering air temperature. With multiple row coils, discharge air temperatures can be achieved in the range of 33°F to 41°F based on the number of coil rows and the piping arrangement of the coils.

Stalls that are maintained at temperatures above 41°F are candidates for receiving chilled water from the tri-generation facility, due to approach temperatures of inlet and outlet air and chilled water. Stalls that are operated between 38°F and 41°F could be considered but will require additional analysis to determine if enough coil surface area can be installed to serve the space. Spaces below 38°F are not likely candidates for utilizing chilled water from the tri-generation facility due to space temperature being too close to the chilled water supply temperature without additional cooling equipment.

5.1.10 Absorption Chillers

Two Stage Absorption Chillers

There will be two, two stage absorption chillers that have a nominal capacity of 400 tons each. These two chillers will utilize high temperature hot water recovered from the exhaust heat of the natural gas engine generators. The chillers will include an evaporator/absorber section and condenser/low temperature generator and will be of a single shell, hermetic design using lithium bromide as the absorbent and water as the refrigerant. The main components of the absorption chiller will comprise a generator, an evaporator for chilled water and a water cooled absorber/condenser. These two stage absorption chillers will also have a second generator in the cycle to utilize the high temperature hot water as the energy source to improve the chiller's coefficient of performance.

Single Stage Absorption Chiller

There will be two single stage absorption chillers that have a nominal capacity of 300 tons each. The single stage absorption chillers will utilize low temperature hot water as the heat source for the generator. The chillers will be a complete single stage hot water absorption chiller package. The chiller will consist of a generator/condenser section, evaporator/absorber section, controls, pumps, heat exchanger, and energy control valve. The chillers will be of a hermetic design, factory assembled and leak tested prior to shipment. Chiller controls will be factory mounted and wired.

5.1.11 Electric Chillers

There will be two centrifugal electric driven chillers that will be utilized as back up to the absorption chillers. Each electric driven chiller will be sized for 700 tons. These centrifugal liquid chillers will be factory packaged with the evaporator, condenser, compressor, electric motor for the compressor, lubrication system, control center, instrumentation, and all interconnecting piping and wiring shipped as one unit. The compressor will be a single stage centrifugal type powered by an electric motor. The chiller will utilize a water cooled condenser. The chiller will utilize R134a refrigerant or the chiller manufacturer's standard refrigerant.

The chillers will be sized for the same chilled water inlet and outlet temperatures as described in Section 5.1.9.

Electric driven chillers will utilize actuated control valves to regulate flow through the chillers and control the chilled water temperatures. This will be controlled by the tri-generation facility control system.

5.2 Cooling Water System

The chillers require cooling water to reject the heat from the chiller condensers. The cooling water system is anticipated to be sized based on a 77°F wet bulb temperature with a cooling tower outlet water temperature of 85°F with a cooling tower inlet air temperature of 95°F to 100°F. The cooling water system will include the following:

- Package cooling tower (multiple cell configuration)

- Two by 100 percent cooling water circulating pumps
- Cooling water system piping and piping auxiliaries
- Cooling water system controls.

The cooling tower is anticipated to be an induced-draft, counter flow-type, factory assembled cooling tower. The packaged cooling tower will be stainless steel or galvanized steel construction and include the necessary chemical treatment system(s) to maintain cooling tower chemistry. The cooling tower fans will be of a low noise, propeller type with the fan speed controlled via variable speed drives. Cooling water pumps and cooling water control valves at each chiller will be controlled by the facility control system.

5.3 Fuel Gas System

Pipeline quality natural gas will be supplied to the natural gas engine generators from Con Edison and will be supplied at a minimum pressure of 15 psig at the main supply line running along Food Center Drive. The maximum line pressure is expected to be approximately 99 psig. Con Edison will install the new supply line from a tap into the existing gas pipeline near East Bay Avenue/Food Center Drive to a terminal point in the tri-generation facility gas yard.

The pipeline will terminate at a pig receiving station (if required by Con Edison) where a branch line will come off the pipeline to supply the natural gas engine generators. The branch line will terminate with a manual isolation valve and an insulating flange. The pipeline, pig receiving station, and branch line up to the insulating flange will be provided and installed by Con Edison.

The fuel gas system will be designed for the maximum delivery pressure of 99 psig.

The fuel gas system supplied as part of the tri-generation project will consist of an emergency stop valve, a metering station, fuel gas compressors and a treatment/conditioning system to remove impurities from the natural gas to meet the natural gas engine generator supplier's quality and pressure regulation specifications. The fuel system will be in complete conformance to applicable NFPA requirements.

5.3.1 Emergency Shutoff Valve

The natural gas engine generator emergency shutoff valve (ESV) will be accessible under emergency conditions. The ESV will be provided with both manual and automatic closing capabilities locally. The ESV will be arranged to fail closed on the loss of power and will isolate all natural gas from the natural gas engine generator. The valve type will be a trunnion-mounted ball valve. A manual isolation valve will be installed upstream of the ESV. All other fuel gas system equipment and components will be located downstream of the ESV.

5.3.2 Facility Fuel Gas Flow Meter

A custody transfer quality fuel gas flow meter will be included and will have an accuracy of 0.1 percent. The associated flow computer will provide the following data to the natural gas engine generator control system:

- Flow – Standard cubic feet/minute
- Flow – MMBtu/hour.

5.3.3 Fuel Gas Filter/Separator and Drains Tank

Pipeline natural gas is typically sufficient for supply to a reciprocating engine without the need for additional filtering or liquid separation. If, during final design, the gas supply at this location is found to be of insufficient quality, the equipment described below will be incorporated.

A one by 100 percent capacity horizontal filter/separator will remove excessive moisture and particulates from the natural gas supply line.

The filter/separator will have the removal efficiency indicated below based on the range of fuel gas conditions indicated in the pipeline supply natural gas quality:

- 100 percent removal of liquid 8 µm and larger
- 100 percent removal of solids 1 µm and larger
- 99.99 percent removal of solids 3 µm and larger
- Less than 0.1 gallon/MMscf entrained liquid carryover.

The fuel gas drains tank will be an atmospheric horizontal tank constructed of carbon steel. The tank will collect and store liquids discharged from the filter/separators, and other equipment as needed. The drains tank vent will include a flame arrestor. The tank will be manually emptied by a vacuum truck for waste disposal. The tank will be of double wall construction. The tank will be UL listed for the service. The fuel gas drains tank will have insulation and heat tracing to prevent the collected fluid from freezing.

5.3.4 Fuel Gas Pressure Regulator

A pressure regulator will be installed to reduce the pipeline gas pressure to engine supplier's terminal point pressure requirement, if required.

The fuel system will be integrated with the engine to provide for complete metering of fuel to the engine during starting, acceleration, and deceleration, and will regulate fuel requirements in response to changes in load, speed, and ambient temperature.

5.3.5 Fuel Gas Compressors

When the pipeline natural gas pressures are insufficient to supply the natural gas engine generators, fuel gas compressors will be utilized to boost the supply pressure. Fuel gas compressors will be supplied in a redundant two by 100 percent configuration capable of supplying flow to both natural gas engine generators from a single compressor. The engine fuel gas pressure requirement is expected to be between 60 psia and 120 psia. The minimum inlet pressure will be determined by the final equipment manufacturer. The system design will allow the system to operate without the use of the compressors at times when the pipeline supply pressure is adequate to supply the engine minimum requirements.

5.4 Aqueous Ammonia System

A 19 percent aqueous ammonia system will receive, store, and forward ammonia to the SCR ammonia flow control skid. The ammonia system consists of the following major equipment:

- One by 100 percent capacity ammonia storage tank
- One by 100 percent truck unloading station
- Two by 100 percent capacity ammonia forwarding pumps with space for an additional pump for the potential future addition of another engine generator.

5.4.1 Ammonia Storage Tank

The storage tank capacity will be sized to store a 30-day supply of ammonia at full load operation of both natural gas engine generator units.

The storage tank will be of all-welded carbon steel construction with an interior coating. The tank will have a minimum design pressure of 30 psig. The tank will be provided with the following accessories:

- Pressure/vacuum relief valve set at the tank design pressure
- Pressure transmitter
- Magnetic level indicator with guided wave radar level transmitter
- Temperature indicator
- One 24-inch diameter access manhole
- Manually operated tank drain valve
- Suction line vortex breaker and isolation ball valve
- The aqueous ammonia tank will be elevated to provide sufficient suction head to the aqueous ammonia forwarding pumps
- Tank supported upper level platform and ladder to access way and valves
- The tank exterior will be painted white.

A concrete secondary containment capable of containing at least 110 percent of the full volume of the storage tank will be provided. The containment wall will not exceed 4 feet in height. A ladder will provide access inside the containment area. A containment drain line equipped with a normally closed, encapsulated butterfly valve will be used to drain any precipitation from the containment. The drain valve will be capable of being locked in the closed position. The drain line will discharge to the wastewater system.

A roof will cover the ammonia tank containment and unloading area, keeping rainwater out of the containment area.

5.4.2 Ammonia Unloading

Tank trucks delivering the aqueous ammonia will be equipped with unloading pumps or air compressors. A truck unloading station fully accessible from outside the storage tank

containment will be provided. The unloading station will consist of quick release connections for ammonia fill and vapor return with isolation ball valves. The tank fill line will have a simplex filter and an actuated shut off valve upstream of the tank. The shutoff valve will be configured as an automatic overfill protection system (AOPS) set to close on tank high-high level or overpressure. A local control panel at the unloading station will have the following features:

- Tank pressure indicator
- Tank level indicator
- Tank high-high audible alarm
- Shut-off valve emergency stop pushbutton
- Chemical spill alarm pull station
- Control of any remotely actuated valve required to unload and fill the tank.

The road near the truck unloading station will be sloped to the ammonia containment to contain any minor spills that may occur during the unloading process. The roof over the ammonia tank containment area will also cover the sloped unloading station road.

5.4.3 Ammonia Forwarding and Injection System

Two, 100 percent capacity aqueous ammonia forwarding pumps will be provided. Spare space will be allocated to add an additional pump. The pumps will be skid mounted with suction strainers, piping, valves, and instrumentation. The piping and control systems will allow any of the pumps to supply any of the SCR systems. Ammonia forwarding pumps will be magnetic drive with a vent line to mitigate vapor lock. The pumps wetted materials will be stainless steel.

The ammonia forwarding pump skid will be located inside the storage tank containment on elevated structural steel grating. Access to the forwarding pump skid will not require entry down into the containment. The ammonia forwarding pumps will deliver the ammonia to engine-dedicated injection skids supplied with each SCR system.

5.4.4 Ammonia Detection System

Ammonia leak detection instrumentation will be provided at the ammonia unloading area, storage and forwarding pump area and at the SCR injection skids. Ammonia detection instrumentation will interface with a local alarm panel including a beacon light and horn. The alarm panel will interface with the facility control system.

5.5 Service Water System

The facility service water system will be fed from the existing city water supply located on Food Center Drive. A backflow preventer will be installed in the service water line to prevent contamination of the incoming potable water supply.

The service water system will store and provide service water to the following services/equipment:

- Makeup water to the chiller cooling towers

- Makeup water to the chilled water system
- Cooling of the water sample panels and hot water system drainage streams
- Washdown hose connections for facility maintenance.

A schematic representation of the system is shown on the process flow diagrams in Appendix 2D.

The service water system will consist of the following major components:

- One field-erected service water storage tank with self-supporting roof
- Electric immersion type heaters for the service water storage tank
- Two, 100 percent capacity service water pumps with single-speed motors
- Piping, valves, controls, and instrumentation necessary for proper system operation.

The service water system will be designed to accommodate the peak service water requirements of the various tri-generation facility water users with any one service water pump in service. The service water storage tank will be sized for a minimum 24-hour supply of tri-generation facility service water based upon maximum flow conditions. Design and construction of the atmospheric service water storage tank will be in accordance with applicable standards including AWWA D100-96, and venting, drainage, overflow, and accessibility requirements.

The water balances found in Appendix 2E represent the estimated water quantity requirements for each of the consumers.

5.6 Potable Water System

The potable water system will provide drinking quality water to various building plumbing systems and eyewash/safety shower units in select locations within the tri-generation facility. Supply to the potable water system will be from the city water supply located on Food Center Drive.

The potable water system will be composed of the following components:

- Emergency shower/eyewash combined units
- Wash rooms and staff break room
- Water heaters for safety showers and hot water users
- Piping, valves, controls, and instrumentation necessary for proper system operation.

The potable water system will be designed to accommodate the normal daily use of water plus additional water for the combined emergency shower/eye wash stations.

5.7 Wastewater System

As a best practice, the wastewater system will collect, treat, store, and dispose of industrial and sanitary wastewater from various sources, including those from the chemical drainage systems. The wastewater system will include the following:

- One wastewater collection sump
- Wastewater sump pumps including sump level detection and control panel
- One oil/water separator, with containment for captured oil/grease and forwarding pumps for discharging clear water
- Curbed containment areas around certain chemical bearing or storing equipment
- Piping, valves, controls, and instrumentation necessary for proper system operation.

For pressurized portions of the wastewater system, design pressures will be the maximum sustained pressure in the system (or the applicable portion thereof) with a 25 psi margin added and then rounded to the next 5 psi increment. The design temperature will be the maximum sustained temperature in the system (or applicable portion thereof) with a 10°F margin added.

Sampling connections will exist for operator confirmation that wastewater is achieving treatment levels prior to discharge from the sump. The quantity of water discharged from the sump must also be recorded. A magnetic flow meter with +/- 1 percent uncertainty and 10 to 1 turndown will be provided on the sump pump discharge header to record this data on a totalizing basis.

The oil/water separator will be designed to reduce the oil and grease content of the wastewater to a level not exceeding a 15 mg/L maximum and a 10 mg/L monthly average.

Containment areas which do not drain to the chemical waste sump will be sized to accommodate full tank/system volumes plus the “design” supply of fire water (when applicable) should a leak occur and fire result.

The sanitary waste system will collect wastes from the wash rooms and other potable water uses and will discharge the effluent into the existing sanitary sewer located on Food Center Drive. The sanitary waste system will include discharge piping (below grade) from building plumbing systems and drainage manhole.

The sanitary discharge system will be designed for the maximum and average daily sewage flow rate from the tri-generation facility based upon a design population of seven operating staff on-site per day on average, peaking to approximately 20 people when transient contractors are present for maintenance or other reasons.

5.8 Compressed Air System

A combined service and instrument air distribution system will be supplied from a centralized compressed air skid and will serve the entire facility including, but not limited to the following areas:

- Natural gas engine generator and chiller system operating bays
- Fire pump room
- Warehouse shop
- Natural gas compressor enclosure
- Aqueous ammonia system.

The compressed air will meet the minimum requirements outlined in Table 2-4.

Table 2-4. Compressed Air System Design Criteria.

Operating Parameter	Design Criteria
System Design Pressure	150 psig @ 130℉
Operating Pressure (upstream of the flow controller)	125 psig
Operating Pressure (downstream of the flow controller)	100 psig
Compressed Air Quality	ISO 8573.1 class 1.2.1

The central air compressor facility will consist of:

- Two, 100 percent rotary screw air compressors
- One service air receiver
- One general purpose coalescing pre-filter
- One desiccant air dryer with a full capacity coalescing pre-filter and particulate after-filter
- One instrument air receiver
- One system flow controller.

5.8.1 Main Air Compressors

Two, 100 percent capacity main air compressors, each sized to meet the maximum required peak air demand plus a margin of at least 10 percent will be installed. Each packaged air compressor will include the following features:

- Packaged rotary screw type compressor
- Variable speed drives
- Constant speed, with load/unload control (to be used instead of variable speed if pulse air is not supplied from the main compressors)
- 125 psig outlet pressure
- Oil-free design
- Air cooled
- Compressor control system data link to the facility distributed control system (DCS) to allow remote monitoring and start/stop operation of compressors
- All equipment skid mounted with full enclosure including quick release access panels
- Enclosure with sound proofing for less than 80 dBA near field noise emissions
- Pressure unloading vents with silencers.

5.8.2 Air Dryers

A 100 percent capacity desiccant type air dryer sized for the peak instrument air demand plus a margin of at least 10 percent will be provided. The air dryer will include the following features and functionality:

- The dryer capacity will be sized based on the air compressor discharge pressure of 100 psig, maximum rated flow, discharge temperature associated with the compressor inlet ambient conditions of 90°F dry bulb temperature, and 100 percent relative humidity.
- Dryer discharge air at -40°F dew point at 125 psig.
- Twin tower configuration.
- Desiccant regeneration by external heater or heat of compression.
- Inlet coalescing high efficiency filter with differential pressure alarm and automatic zero air loss condensate drain valve. The filter element will remove total oil to less than 0.01 mg/m3 and particulates larger than 0.01 micron. The filter will be rated in accordance with ISO 12500.
- Outlet particulate filter with differential pressure alarm. (Particulate filter will be designed to remove 100 percent of all particles larger than 1.0 micron, and rated in accordance with ISO 12500.)
- Dew point monitor with alarm.

5.8.3 Air Receivers

Two vertical air receiver tanks will be installed with the following features:

- Service air receiver volume (in gallons) will equal a single compressor rated capacity (in cfm, free air delivery or FAD)
- Instrument air receiver volume will be based on the instrument air system demands (receiver will be capable of providing 100 percent of the maximum system demand flow for one minute with pressure decay from 110 to 100 psig, with a minimum size equal to the service air receiver)
- 150 psig maximum allowable working pressure (MAWP)
- ASME Section VIII registered and stamped pressure vessel
- Carbon steel with shop applied external finish coating (wet receiver will have a shop applied internal epoxy coating)
- Automatic zero air loss condensate drain valve with manual bypass
- Pressure relief valve
- Temperature gage
- Pressure gage and pressure indicating transmitters.

5.8.4 System Pressure-Flow Controller

The compressed air system will include a pressure-flow controller that will allow the central compressed air skid to operate at 125 psig while maintaining the compressed air distribution network supply at 100 psig. The pressure-flow controller will include the following features:

- Adjustable set point for downstream pressure of 100 ± 5 psig

- 3-way valve bypass to allow maintenance on the flow controller
- Electronic control.

5.9 HVAC System

Buildings, enclosures, and interior spaces will be heated, ventilated, and air-conditioned, to provide proper environmental control to meet equipment protection and safety requirements, and provide personnel comfort in normally occupied areas. For areas that are not continuously occupied, the HVAC systems will be designed to provide a minimum level of personal comfort when maintenance activities are being performed.

The HVAC system will be designed to the ambient conditions established in Part 1, Section 3.5 of this DBD.

The HVAC system in the tri-generation facility will be designed to maintain the minimum conditions as noted in Table 2-5.

Table 2-5. Tri-generation Facility HVAC Design Conditions

INDOOR DESIGN CONDITIONS					
Building/Room Name	**Cooling Design Temp, ℉**	**Heating Design Temp, ℉**	**System Type**	**Redundancy**	**Filtration**
Engine Bay	Ambient + 15	55	H&V	Multiplicity	yes
Electrical Room	72	72	HVAC	Redundant	Yes
Control Room	72	72	HVAC	Redundant	Yes
Maintenance Shop	72	72	HVAC	Redundant	Yes
Gas Compressor Enclosures	Ambient + 15	55	H&V	Multiplicity	None

Notes:
1. Systems with multiplicity will be configured as (n+1) redundancy. Redundant systems will be configured with full backup (100 percent) capability redundancy.
2. Filtration requirements will be in accordance with the recommendations of ASHRAE 62.1. Filters will be at least a MERV 6 rating.
3. Electrical equipment rooms will not exceed 104℉ (40℃) under any operating condition during the loss of one item of HVAC equipment.

5.9.1 Air Changes

Any building or enclosure that has a hazardous area classification zone designated inside it will maintain adequate ventilation at all times as defined by NFPA 497. Adequate ventilation will be a ventilation rate that affords six air changes per hour, one cfm per square foot of floor area, or other similar criterion that prevents the accumulation of significant quantities of vapor-air concentrations from exceeding 25 percent of the lower flammable limit.

In addition to adequate ventilation, battery rooms will have sufficient airflow to maintain less than 0.8 percent hydrogen concentration in the room based on manufacturer's data for hydrogen gas release.

Air changes per hour for non-occupied, non-hazardous areas will be at least one during winter heating operation.

5.9.2 Design Pressure

The pressure in individual portions of the administration building will be maintained positive in relation to the exterior, storage areas, and vestibules. Toilet rooms, janitor's closets, and any other similar areas will be maintained under negative pressure and exhausted directly to the outdoors with respect to adjacent building spaces.

5.9.3 Heating

Building heating will be serviced by an independent line off of the low temperature hot water loop. When the building is in a heating mode, the exhaust vents will be closed. Electric unit heaters will also be installed as a back-up source of heat if the engines are not in operation.

5.9.4 Air Conditioning

Building air conditioning will be serviced by an independent line off of the chilled water loop generated by the onsite absorption refrigeration equipment.

5.9.5 Shop Fabricated Enclosures

Power distribution centers (PDC), and other similar shop fabricated enclosures that require HVAC, will use AHRI certified wall mounted units. The HVAC unit will use electric heating elements and R-410A refrigerant. Air conditioning drain pans will be piped to a drain hub. The local power disconnect switch will be accessible. The HVAC unit will include a filter service door with disposable air filter.

5.9.6 HVAC Equipment

HVAC rotating equipment (air handling units and fans) will have vibration isolation from their supporting structures and will be purchased completely assembled, tested and balanced by the manufacturer. HVAC equipment and systems will be designed such that components which require maintenance are easily accessible.

All HVAC systems that require ductwork will be designed to utilize low-pressure ductwork. Ductwork in finished spaces will be installed in the walls and ceiling and not exposed to view.

Smoke and fire dampers as well as fire rated caulks and sealants for fire rated wall penetrations associated with the ductwork will be included in the design as required by NFPA and Building Codes.

5.10 Fire Protection/Suppression System

5.10.1 General

The fire protection system for the tri-generation facility will be comprised of passive fire protection measures, a fire alarm and detection system, a fire water supply, fire

suppression systems, and portable extinguishers. The design basis described herein is consistent with NFPA 850 and approved approaches to fire protection for other similar facilities. This design approach will require participation from an insurance underwriter (if applicable) and review by the FDNY, and may require code clarifications or design variances where local code requirements exceed typical industry standard practice or are difficult to meet due to project- or site-specific circumstances.

In addition to the requirements listed herein, final design will include development of a fire protection DBD and fire risk evaluation, consistent with the recommendations of NFPA 850, which will define the project specific hazards, considerations, applicable code requirements, and proposed fire protection provisions.

Equipment enclosures and structures will be of noncombustible or fire-resistive construction.

All components of the fire protection system will be UL listed and/or Factory Mutual (FM) approved for the proposed application.

5.10.2 Fire Alarm and Detection

The fire alarm and detection system will be provided in accordance with NFPA 72. The fire alarm system will be a supervised, intelligent, and addressable type system. All fire detection and automatic fixed fire suppression systems will be provided with local audible and visual signals with remote annunciation.

A master fire alarm control unit will be located in the main control room of the facility. All local fire alarm control units, including those associated with the engines, will be connected to and monitored by the master fire alarm control unit.

Gas detection will be provided for the following areas: ammonia (at ammonia storage tank and unloading area); and natural gas (compressor enclosure, in building gas connection). Gas detection systems will be provided with local audible and visual signals with remote annunciation.

5.10.3 Fire Water Supply

The facility will be provided with a fire water supply that is fed from the City's municipal water system. It is anticipated that the fire water supply will provide water to a private fire hydrant system, as required by Section 508 of the New York City Fire Code when the front entrance of a building is more than 250 feet from a hydrant on a public street (as measured by an approved route).

The fire water supply main will loop around the facility with six-inch diameter branch lines to feed the fire hydrants. The fire service main will be designed to NFPA 24 and the requirements of DEP. Fire hydrants will be dry barrel type spaced such that the entire area may be reached by 250 feet of hose from a yard hydrant or a street hydrant, in accordance with Section 508 of the New York City Fire Code.

All valves controlling fire protection water supplies for will be electrically supervised by the fire alarm system as required by Section 903 of the New York City Fire Code.

5.10.4 Fire Protection Systems

Minimum fire detection and suppression systems to be provided for facility buildings, structures, and equipment are outlined in Table 2-6.

Table 2-6. Fire Protection and Suppression Systems

Area or Equipment	Suppression System	Detection
Engine/Chiller Building	Automatic water-based sprinkler system	Rooms containing gas piping will be equipped with gas detection
Control Room	Gaseous suppression system	Aspirating type smoke detection
Warehouse/Shop	Automatic dry-pipe sprinkler system	
Offices/Wash Rooms	Automatic wet-pipe sprinkler system	
Electrical Room		Smoke detection
PDC's (switchgear, MCC)	Portable extinguishers	Smoke detection
Gas Compressor Enclosure	Self-contained gaseous or water mist system	Gas detection, flame and/or heat detection
Outdoor Oil-filled Transformers	Note	N/A

Note: Passive fire protection via the use of approved less-flammable dielectric fluids, spatial separation in accordance with NFPA 850, and/or fire barriers in accordance with NFPA recommendations will be provided, which will eliminate the need for a fixed, water-based fire suppression system.

5.10.5 Standpipes and Hoses

A standpipe designed in accordance with the requirements of NFPA 14 will be provided in buildings and structures where required by the New York City Fire Code or where recommended by NFPA standards. A standpipe system is not anticipated to be required at the time of writing this DBD but will be confirmed during final design.

5.10.6 Fire Extinguishers

Portable multipurpose dry chemical extinguishers will be located throughout the facility. These extinguishers will be selected and installed in accordance with NFPA 10 and the New York City Fire Code.

Supplemental 20 lb carbon dioxide fire extinguishers with a UL rating of 10B:C will be located to serve electrical and control equipment rooms.

6 Electrical Systems and Equipment

6.1 General

The major electrical system components associated with the tri-generation facility and their mutual relationships to each other are shown on the one-line diagram in Appendix 2B.

The electrical system will be designed to support full power offtake from the natural gas engine generators and to meet the functional requirements of the auxiliary loads for all modes of operation. Sufficient instrumentation and protective and control devices will be provided to ensure operational reliability and availability of the electrical systems.

The design of the generation system is not intended to satisfy requirements for emergency applications which require onsite fuel storage and rapid starting capabilities. The generation system and associated auxiliaries will be capable of both base-loaded continuous operation in parallel with normal utility power, and islanded operation with manually controlled load starts. No design provisions are included to support automatic transition to and from islanded operation or automated load sequencing equipment. Manual engine start in an island configuration will be possible with manual load control at the served facilities.

The tri-generation facility will connect to the Con Edison distribution system for power offtake during normal operation, for microgrid operation during a loss of utility service, and for housekeeping loads during maintenance periods or outages at the tri-generation facility. Interconnection equipment will include primary service 13.2 kV switchgear, service transformers, 4.16 kV service switchgear, and related components.

Auxiliary loads will be fed at 480 VAC with interior and exterior lighting to be supplied at 277 VAC, whereas general power will be supplied at 120/208 VAC. The low voltage auxiliary distribution will be powered from two Unit Auxiliary Transformers.

The auxiliary power system will be designed to supply the functional requirements of the auxiliary loads. Sufficient instrumentation and protective and control devices will be provided to ensure operational reliability and availability of the electrical systems.

The tri-generation facility electrical system will be developed and designed based on applicable codes and standards in order to provide reliability of service, safety of personnel and equipment, ease of maintenance and operation, and maximum interchangeability of equipment.

6.2 Operating Modes

6.2.1 Normal Operation

During normal operation, utility power is available from Con Edison from all high tension feeders. Under these conditions, the facility will be operated to export power through one or more high tension feeders. Alignment of the switchgear will flexibly support parallel export with both generators connected to all feeders, “split plant” export with tie breakers opened to separate generators and align to specific feeders, or “best line” single-sided operation such that only one feeder connection to the Con Edison system is closed. Operating mode requirements will be further defined by Con Edison Coordinated Electric System Interconnection Review (CESIR) results.

The natural gas engine generators and tri-generation systems will be brought online by initiating a start at the DCS operator stations. The generator start sequence will automatically start the engine and establish normal operating frequency and voltage, establish synchronizing conditions across the generator breaker, close the breaker, and

load the generator according to a pre-programmed ramp. Generating loading (kW and kVAR) will be user settable and may be manually adjusted at the DCS operator stations.

While the generator is operating, waste heat will be recovered automatically as discussed in other sections of this DBD. Single-button shutdown sequencing will control separation from the electrical grid, cooldown, and shutdown. Emergency stop will also be possible locally and remotely, providing immediate shutdown without ramping down power export or performing cooldown.

Control and protection features will be included to perform alignment changes with closed transitions at the service bus. Operation of the primary service feeder breakers will be possible from the DCS operator stations by local operators. Alterations to the primary service feeder breaker alignment will not be required for normal operations.

6.2.2 Shutdown from Normal Operation

One or both generators may be shut down by local operators of the tri-generation facility, as needed. The service bus will normally remain energized, allowing import of utility power to plant auxiliary loads and chillers.

6.2.3 Islanded Operation

Islanded operation of the tri-generation facility is planned in cases of utility outage. As such, the natural gas engine generators will be provided with all necessary control provisions to support islanded operation.

The natural gas engine generators respond to load changes more slowly than similarly sized diesel engines. As a result, frequency and voltage dips during large load additions can exceed equipment capabilities and result in nuisance tripping. Load shedding and load sequencing are required to manage islanded operation. No automatic load shedding equipment will be installed as part of this Pilot Project. Islanded loading control will be manual from the individual load sites. More information on microgrid load operation is provided in Section 7.

The natural gas engine generators will be capable of starting or rejecting load in blocks of up to 625kW without exceeding a 25 percent voltage deviation. Each generator will be capable of islanded operation alone or load sharing between the two generators.

6.2.4 Restoration from Islanded Operation

Only generator breakers will be provided with auto-synchronization controls. In order to re-establish normal operations following a period of islanded operation, the generators will be shut down by local operators of the tri-generation facility to allow for a dead bus restoration of the normal breaker lineup.

6.3 Protection and Monitoring System Requirements

Microprocessor based multifunctional protective relays with metering and monitoring features and associated instrument transformers will be provided to either disconnect and/or alarm the status of electrical equipment during electrical system abnormal

conditions. The proposed relay design will be submitted to Con Edison during detailed design as required by Con Edison Specifications EO-2022, EO-2115, and EO-2161.

Relays, except for switchgear relays, will be functionally grouped and mounted on freestanding panels.

Protective relaying devices will be coordinated so that electrical disturbances (fault and overload) are interrupted at the point nearest the fault, with the next upstream protective device providing back-up protection. However, overcurrent settings for new generation-related breakers need not coordinate with remote load breakers and permanent distribution system protective devices as such coordination is not practicable for the provided engine size.

Ground fault protective devices will trip the respective breaker or starter. Protective devices on medium voltage circuits will operate through a lockout relay (86) or equivalent device or circuit to prevent automatic equipment restart or reclose.

Protective devices will be rated for the maximum available fault current as determined by system studies.

Current sensing relays will be either the draw out case type or will be provided with test plugs to permit testing and calibration without disrupting the current transformer secondary circuit.

A comprehensive protective relaying and monitoring system, including generator differential protection, will be provided with the generator package provided by the generator manufacturer to minimize the effects from generator faults and malfunctions. The Engineer during final design will be responsible for determining and providing relay settings for all the protective relays furnished with the natural gas engine generator package.

Primary and back-up relaying will be supplied direct current (DC) power from separate circuits. All electrically operated breakers will have trip coil continuity monitoring with visual indication.

The following protective relay functions will be provided:

- Utility protection (relay protection will be provided in accordance with Con Edison requirements to protect the Con Edison distribution system from facility faults; relay settings will allow for intentional backfeed into Con Edison feeder system as required under all proposed operating modes)
- Unit differential (87U).
- Generators:
    - Negative sequence (46)
    - Phase overcurrent (50/51P)
    - Ground overcurrent (51G) or neutral overcurrent (51N)
    - Stator ground (64)
    - Volts/hertz (24)
    - Over/undervoltage (59/27)

  - Over/underfrequency (81O/U)
  - Loss of excitation (40)
  - Reverse power (32)
  - Voltage imbalance (60)
  - Generator differential relay (87G)
  - Back-up voltage restrained overcurrent (51V).
- Primary service feeder breakers:
  - Over/undervoltage (59/27)
  - Over/underfrequency (81O/U)
  - Note that reverse power (32) and directional overcurrent (67) are typically requirements for Con Edison protection, but are not suitable for use in power export applications.
- Service transformers:
  - Phase overcurrent (50/51P)
  - Transformer differential relay (87T)
  - Transformer neutral overcurrent (50/51N).
- Secondary service feeder:
  - Phase and ground time overcurrent
  - Incoming and tie breaker synchronism check with dead bus close
  - Feeder phase overcurrent and ground overcurrent
  - Transformer neutral overcurrent.
- Medium voltage (MV) and low voltage (LV) buses:
  - Bus undervoltage relaying for alarm (MV buses only)
  - Incoming and tie breaker synchronism check with dead bus close
  - Feeder phase overcurrent and ground overcurrent.
- Aux transformers:
  - Protected by upstream feeder relay.
- 480 V motors fed from motor control centers (MCCs):
  - Phase overcurrent (instantaneous and timed)
  - Ground timed overcurrent (motors 25 hp and above).
- Panels, LV transformers, heaters and miscellaneous loads fed from MCCs:
  - Phase overcurrent protection
  - Ground overcurrent (feeders 100 A and larger)

- Relays providing trip input to medium voltage breakers will trip the associated circuit breaker via a manually reset lockout relay.

The following monitoring indications will be available for the packaged natural gas engine generator:

- Generator watts
- Generator gross watt-hours
- Generator amperes, three-phase
- Generator vars
- Generator voltage, three-phase
- Generator frequency
- Generator power factor.

The following indications will be available for switchgear breakers:

- Breaker position
- Relay status.

6.4 Electrical Interconnection System

For the interconnection with the Con Edison system, a new high tension service will be implemented in accordance with Con Edison Specification EO-2022. The interconnection will include installation of 13.2 kV primary service switchgear.

NEMA 3R walk-in enclosures will be installed at the service entrance to house the metal clad switchgear, the primary service feeder circuit breakers, revenue service metering cabinets, and cable entry compartments. The switchgear line-up will also house a control section displaying a mimic bus of the new equipment for the control of both generation and distribution.

The switchgear will meet all requirements for service entry switchgear of Con Edison Specification EO-2022.

6.5 Secondary Service Power System

6.5.1 Function

The secondary service system includes both equipment for generating and exporting electricity from the facility and equipment to distribute power to the Con Edison's distribution system.

The new service will be of parallel design, including three (or more, as determined by Con Edison) transformers with normally paralleled secondaries connected through normally closed main and tie bus circuit breakers.

6.5.2 Equipment

The following equipment is included in this secondary service system:

- Two engine generators and co-packaged auxiliaries including engine control systems
- 13.2 kV primary service switchgear
- 13.2 kV-4.16 kV service transformers
- 4.16 kV medium voltage switchgear, including generator circuit breakers
- 4.16 kV medium voltage motor controllers
- Medium electrical cables and associated raceway.

6.5.3 Operating Requirements

Each Con Edison feed will be connected to a dedicated service transformer via an underground conduit from the primary service feeder switchgear. The function of the service transformers is to step up the distribution system voltage level to the Con Edison system voltage level. The maximum rating of the service transformers will be based upon the maximum megawatts that the combined generators can output at 0.85 power factor based upon final generator manufacturer ratings.

Service transformers will be pad-mounted three phase, two-winding, ONAN, 60 Hz, 13.2 kV-4.16 kV, less flammable oil filled and will meet all NEMA requirements. The transformer's connection will be delta primary-low resistance grounded wye secondary, or as required by Con Edison and will be intended for both step-up and step-down operation. Surge arresters will be installed on the 13.2 kV winding of each transformer, and the insulation strength of the transformer is correlated with the expected over-voltages and characteristics of the arrester in accordance with IEEE C62.22. Oil containment will be provided for each transformer. Fire walls will be installed as required by code.

The generators will be capable of continuously carrying the maximum engine power output. The generators will be rated 0.85 pf (minimum) lag to unity pf, 60 Hz, from 90 percent to 105 percent of nominal voltage. The electrical auxiliary systems for the generators will include generator controls, excitation equipment with automatic and manually operated voltage regulators, line and neutral terminal enclosures, neutral grounding equipment, instrument transformers, starting system, and surge protection equipment, as well as metering and protective relaying equipment. Major generator electrical auxiliaries will be supplied by the engine generator vendor as a factory-integrated system to minimize the need for engineering and construction tie-ins after procurement of the equipment.

The generators will be low resistance grounded.

Generator circuit breakers will connect the generator output to the medium voltage switchgear. The generator circuit breakers will be installed for generator protection and unit synchronization. The generator circuit breakers will be closed by the synchronization control system furnished by the associated equipment manufacture in response to action of the operator to synchronize the generators.

The service switchgear will be indoor metal clad in either one or two high breaker arrangement that is of arc resistant Type 2B (IEEE C37.20.7) design. Breakers will be rated at least 1200 A. Main electrical busses will be insulated, copper bar construction with tin-plated joints with a minimum 5 percent spare ampacity. Horizontal draw-out, vacuum circuit breakers will be provided. Breakers will be operated by a motor-charged stored energy spring mechanism. Primary disconnecting contacts will be silver to silver. Circuit breakers are to be electrically operated and controlled through the facility's control system and by locally (switchgear) mounted hand switches while local control is active in the "test" position.

The service switchgear will be arranged in three or more bus sections rated at 1200 A connected to together by tie breakers. Final selection of section count will be determined by results of Con Edison interconnection studies and will provide one section per Con Edison high tension feeder. The switchgear will be expandable to support potential new feeder loads or generator connections or will have at least two spaces available for additional breakers.

The service switchgear bus will be rated for at least 25,000 A of fault current, with final rating determined by detailed short-circuit study model.

6.6 Auxiliary Power System

6.6.1 Function

The function of the auxiliary power system will be to distribute electrical power to tri-generation facility systems and equipment under all operating conditions. The auxiliary power system also supplies electrical power for controlling equipment (reference one-line diagrams in Appendix 2B). Auxiliary power will be fed from the 4.16 kV switchgear via high resistance grounded auxiliary transformers to the 480 V switchgear, and from the 480 V switchgear to MCCs.

Equipment sizing for the auxiliary power system is estimated based on major process load needs and general lighting requirements.

6.6.2 Equipment

The preliminary configuration for the system includes the following equipment:

- Two 4.16kV/480 V auxiliary transformers
- 277/480V switchgear
- 277/480V motor control centers
- 277/480V distribution panelboards
- Low Voltage distribution transformers.

6.6.3 Operating Requirements

The auxiliary transformers will be rated to supply the total facility load under all operating conditions. A 20 percent sizing allowance will be used for the final design of each

transformer. Transformers will be rated to carry the total operating load of the auxiliary system at the self-cooled rating.

The transformers will be outdoor FR3 filled liquid type. Transformers will include a de-energized tap changer in the high-voltage winding with five taps, two 2.5 percent above and two 2.5 percent below nominal positions. Transformer accessories will include oil level indication, oil and winding temperature indication, and tank pressure relief devices including directed relief flow attachment(s). Oil containment will be provided for each transformer. Fire walls will be installed as required by code.

The low voltage system will be high resistance grounded. High resistance grounded wye systems will include monitoring and alarm systems for the detection and alarm to the DCS of a ground fault. Each grounded transformer will be provided with a dedicated ground detection system.

Low voltage switchboards and MCCs will be located in a dedicated electrical room. Switchboards and MCC enclosures will be NEMA 1.

Low voltage switchboards and MCCs will utilize copper bus bar with tin plating.

Low voltage MCCs will utilize molded-case circuit breakers with electronic tripping devices as appropriate. The continuous current rating of the MCC main buses will be designed to supply the total running load under all operating conditions, plus a 20 percent sizing allowance. The bus bracing and the interrupting ratings and continuous current ratings of the combination starters and feeder breakers will be based on the available fault current and the electrical characteristics of the connected loads. Each MCC will include the combination starters and feeder breakers required to supply the connected load, plus additional spares and space as identified in the one-line drawings. Markings indicating arc flash hazards will be placed on switchboards, panelboards, control panels and motor control centers.

Panelboards will be enclosed in a cabinet. The panelboards will be mounted in a dust resistant cabinet enclosure with a full gasket between the box and between the cabinet door and cabinet front. Panelboards will utilize rigid buses of copper or copper alloy and will be furnished with an equipment grounding bus. AC system branch circuit protective devices will be either thermal magnetic type circuit breakers designed for automatic tripping, or replaceable dual element fuses arranged in series with manually operated quick-make quick-break switches.

Distribution transformers will be energy efficient type NEMA ST 20, general purpose, dry-type, self-cooled, and ventilated in NEMA 1 enclosures.

6.7 Uninterruptible Power Supply

6.7.1 Function

The function of the uninterruptible power supply (UPS) system is to supply regulated 120 VAC power to vital control equipment such as the DCS under all operating conditions. To support safe shutdown, this system will be sized to support facility operations for a period of four hours.

The system also functions as an isolation device to protect the vital AC loads from transients on the normal power system.

6.7.2 Equipment

The UPS system will be composed of one UPS unit with an integrated static transfer switch and manual bypass switch. The system will include a series of distribution panelboards that are wired to the various components that will be powered by the UPS.

6.7.3 Operating Requirements

The UPS system will be sourced from the auxiliary power system. The system will also include a static transfer switch, manual bypass switch and distribution panelboards. The equipment will provide 120VAC power to essential control, safety and information systems.

The equipment will supply each essential load that would be affected by a loss of power of more than 1/4 cycle in duration, and voltage and frequency deviations (± 0.5 percent voltage, ± 5 percent frequency) from nominal. The equipment will be rated so that one each redundant inverter can supply the total essential load demand.

UPS branch system circuit protective devices will be fast acting semiconductor protection fuses.

6.8 DC Power System

6.8.1 Function

The function of the DC system is to provide power to critical DC loads including the switchgear controls and the engine starting system. The starting batteries may be shared with switchgear control, or a dedicated switchgear control DC system may be provided.

6.8.2 Equipment

The DC power system will be composed of the following components:

- Four, 100 percent engine battery chargers (two per generator at generator manufacturer's standard voltage)
- Two engine batteries (one per generator at generator manufacturer's standard voltage)
- Power distribution panelboards
- Two, 100 percent switchgear battery chargers (if required)
- One switchgear battery (if required).

6.8.3 Operating Requirements

To power the DC system, high performance vented lead acid batteries will be provided having a design life of at least 20 years. As noted in Section 6.8.1 above, these batteries will be utilized to power critical, internal facility loads and control systems and to start the

engine generators. They will not be interconnected to the grid for power supply purposes. Batteries will comply with all codes and requirements including spill containment and eye wash station.

The engineer during final design will determine the capacity of each battery as a function of the critical DC loads identified and the required duty cycle/duration of load required for safe system shutdown and/or operation, as applicable. With the actual discharge capacity of the battery at 80 percent of rated discharge capacity, with the battery initially fully charged at the floating voltage specified, and with the battery chargers disconnected, the battery will be capable of supplying the duty cycle specified.

Two identical chargers will be provided for each battery system. Each charger will have the capacity to recharge the battery in 12 hours following complete discharge, while supplying the DC loads.

All DC panelboards designated as main battery panelboards will have insulated buses. DC system branch circuit breakers will be thermal magnetic circuit breakers unless otherwise required by the engine manufacturer.

6.9 Heat Tracing and Freeze Protection

6.9.1 Function

Freeze protection will be provided for piping as defined during final design. Heat tracing will be provided, if needed, to regulate process temperatures. The electric heat tracing system provides heat for:

- Equipment, piping, and instrument tubing containing water, air, and other fluids which may be subject to freezing.
- Equipment and piping containing process liquids where minimum temperatures are to be maintained, such as concentrated caustic solution lines where crystallization of the caustic occurs below a certain temperature.

6.9.2 Equipment

The following equipment is included in the heat trace system:

- Power transformers (277/480 V-120/208 V, three phase, step-down transformers)
- Power distribution and control panel cabinets
- Self-regulating heating cable
- Mineral insulated (MI) type heating cable for high temperature applications.

6.9.3 Operating Requirements

Piping systems and instrument lines containing water and air which are located outdoors or indoors in unheated areas will be heated to prevent freezing which may result in flow blockage and/or equipment damage. The heat tracing system will be designed to

maintain a pipe temperature of 40°F at design ambient temperature and wind speed. The design will consider the pipe insulation material and thickness.

Field instruments used in steam and water or air service, located outdoors or indoors in unheated areas, will be installed in heated enclosures and will utilize pre-insulated and pre-heat traced tubing bundles.

Transformers will be sized in accordance with designed load and an additional 20 percent spare capacity. Minimum transformer size will be 15 kVA.

Control/distribution panels will be designed with a minimum of 12 circuits on each panel.

6.9.4 Construction Materials and Special Features

Step-down transformers will be ventilated dry type with weather-shields. Distribution panels and thermostat enclosures will be in accordance with NEMA 4 standards. All electrical equipment and enclosures will be suited for extreme ambient conditions.

Local heat tracing cabinets will include a 208 Y/120 volt distribution with a main circuit breaker and a GFCI feeder breaker for each heat trace circuit. Indicating lights, alarm relays, contactors, and test pushbuttons will also be included in this cabinet.

Low temperature heating cable will be self-limiting, parallel cable, and will be used for piping systems with an operating temperature of 300°F and below. For high temperature applications, MI type heating cable will be used.

A control thermostat will be supplied to energize all of the branch circuits on a given panel. For freeze protection, the thermostat will be set for 40°F.

Local heat tracing cabinets will include the following control/alarm features:

- Voltage or continuity alarm light and relay for each branch circuit.
- Test pushbutton for each circuit that energizes the heat trace circuit and a “Circuit Energized” indicating light. The pushbutton will also test the circuit alarm lights.
- Panel “Power On” indicating lights.
- Panel “Loss of Power” alarm relays.

The above features may also be supplied using micro-processor based control and monitoring systems.

The following alarm signals will be transmitted to the DCS from each local heat tracing cabinet:

- Branch circuit “Circuit Trouble” and “Loss of Power” common alarm.

6.10 Cable and Raceway System

6.10.1 Cable

The electrical power distribution system will be designed and cable sized to limit the allowable voltage drop at auxiliary load equipment to 10 percent of the load nominal

voltage rating under normal continuous operating conditions (as allowed per industry standards at the load terminals such as motors).

Low voltage power and control cables will consist of stranded copper conductors with solid dielectric insulation rated for a conductor temperature of 90℃ and will have chloro-sulphonated polyethylene jackets.

Power cable ampacities will be determined on the basis of equipment full load current, 25 percent overload margin, steady state and starting voltage drop, ambient correction factor, group derating factor based on raceway installation, and short circuit withstand duration requirements. Where more than one raceway is used for a given circuit, the lowest calculated or NEC tabulated ampacity will be used.

6.10.2 Raceways and Conduit

Aboveground circuits will be installed in conduit and tray. Underground circuits will be installed in buried conduit or concrete reinforced duct bank as required by the final design.

Conduit will be used for the raceway system and will extend circuits from duct banks to devices, equipment or cabinets. All conduits will be sized in accordance with the requirements in NEC Chapter 9. Exposed conduits will be rigid galvanized steel. Liquid tight flexible metal conduit of minimum practical length will be utilized between conduit and equipment boxes for vibration, expansion considerations, and ease of equipment removal.

6.10.3 Concrete Encased Duct Banks

Duct banks will be used to connect the new high tension service entry equipment from the customer manhole to the load side of new primary service switchgear, to connect the primary switchgear to the service transformers, and to connect the service transformers to the secondary service switchgear. Embedded conduit may be used within the building and for instrumentation runs along new buried services.

Schedule 40 polyvinyl chloride will be used for concrete encased duct banks. All duct banks will have a slope and arranged to drain toward manholes.

6.10.4 Manholes and Handholes

Manholes will be added as required to establish the high tension interconnect service. Manhole locations are shown on the site plan in Appendix 2A, but will be confirmed with Con Edison prior to design finalization. Manholes will comply with Con Edison specifications for cable manholes (EO-2022 and EO-24680B).

6.11 Grounding and Lightning Protection

Electrical equipment and systems will be grounded in accordance with NFPA 70 and Con Edison requirements per EO-2022. The ground fault return path will be either through a ground conductor, the metal conduit and/or the metal tray system between power source and load. Any discontinuities will be bonded with an appropriately-sized copper conductor.

Lightning protection of the facility will be provided in accordance with NFPA 780 and UL 96 for all structures. The lightning protection system will interface with the ground grid through dedicated down conductors and stingers.

6.12 Enclosures and Area Classification Requirements

Classification of hazardous areas will be in accordance with NFPA 70 Article 500. All equipment will be supplied and installed in accordance with area classification. The Engineer during final design will determine the area classifications for all hazardous areas and provide drawings and supporting documentation for review.

All electrical equipment and enclosures/cabinets/panels will be provided with suitable environmental and corrosion protection. All outdoor enclosures will be provided with drains for removal of condensation. NEMA rated enclosures are preferred, but equivalent International Electric Code (IEC) enclosures are acceptable substitutions providing the rating exceeds the NEMA ratings.

6.13 Electrical System Studies

The Engineer during final design will perform all necessary system studies to establish the equipment ratings basis for the complete electrical design. As a minimum, system studies will include the following:

- Fault level study
- Relay settings study (including generator protective relays and feeder protection relays)
- Voltage drop study (steady state operation)
- Feeder sizing study
- Arc flash study (medium and low voltage equipment).

The limits of the studies will be inclusive of all systems up to the Con Edison tie points, and will include contribution from Con Edison's distribution system where applicable.

7 Microgrid System and Equipment

7.1 General

The FDC area is currently provided with power from five separate Con Edison primary feeds originating from Con Edison's Mott Haven Substation. The primary feeders supply low voltage networks in the residential areas northwest of the FDC area and also supply several transformers at a number of Con Edison vaults within the FDC area. Generally, these transformers are interconnected as a spot network on the low voltage side. Every spot network within the FDC area feeds a number of individual customer meters at 480 V. The locations of network connections for each feeder are shown on Con Edison feeder maps included in Appendix 2F. Networks that are owned and maintained by Con Edison are shown as red circles. Connections to customer-owned networks or high tension services are shown as red squares.

During normal operation of the tri-generation facility, the generation output will be connected to the Con Edison system in accordance with their high tension service guidelines (see Section 6.0). Pending completion of the CESIR analysis, no additions are expected to be required to the Con Edison system to facilitate this kind of connection. However, in an emergency when the Con Edison connection to the electrical power grid is not available, the tri-generation facility output must be separated from the bulk Con Edison system and retain a connection to the Produce Market through a microgrid. This separation will occur in the Con Edison primary feeders at locations upstream of the Produce Market load connections.

The existing distribution system in the FDC area does not have sectionalizing devices suitable for providing this separation. New sectionalizing devices and all associated controls, communications, infrastructure, and operational improvements required for their proper function will be designed, procured, installed, and commissioned as part of this project and as further described below.

7.2 Operating Modes

7.2.1 Normal Operation

During normal operation, utility power is available from Con Edison from high tension feeders. Under these conditions, the microgrid will be operated with all microgrid interconnection devices closed.

Remote indication and operation of the microgrid interconnection devices will be possible, but will not be used for normal operations. Remote indication and operations will be controlled from the facility microgrid controller.

7.2.2 Islanded Operation

Islanded operation of the microgrid is planned in cases of utility outage. Transition to islanded operation will be initiated from the facility DCS operator stations after manual verifications of condition and any required interactions with Con Edison identified during CESIR. Following establishment of islanded conditions, the facility will initiate black start of the microgrid.

7.2.3 Restoration from Islanded Operation

Only facility generator breakers will be provided with auto-synchronization controls. In order to re-establish normal operations following a period of islanded operation, the generators will be shut down to allow for a dead bus restoration of the normal lineup. Transition from islanded operation will be initiated from the facility microgrid controller after manual verifications of condition and any required interactions with the Con Edison identified during CESIR. Synchronism check relays and breaker interlocks will be provided to prevent mis-operation of the microgrid interconnection devices.

7.3 Microgrid Interconnection Device Locations

New underground or pad-mounted sectionalizing switches will be installed within all Con Edison feeders serving the FDC area as microgrid interconnection devices and

consistent with Con Edison Specification EO-2161. Final locations will be established by Con Edison with consideration paid to the cost of installation, affected customer base, and flood risk of the immediate area. Appendix 2F identifies proposed locations. The proposed microgrid boundaries are based upon review of Con Edison feeder maps and the mains and service (M&S) plate for the Hunts Point area with the intent of providing islanded operation as defined above.

A minimum of six new switches are required to satisfy the requirements identified above. An aerial overview of the proposed locations of these switches to achieve the necessary system microgrid is included in Appendix 2F. There are no obvious locations where two or more switches could be installed near each other, so all six will be installed in different locations. Feeders 4X58 and 4X62 are pole-mounted switches in locations where sectionalization is most advantageous, with the remaining switches located at existing Con Edison vaults. Sectionalization at these locations affects spot networks as identified in Table 2-7.

Table 2-7. Hunts Point Spot Networks By Feeder

Feeder	4X58	4X59	4X60	4X61	4X62
# of Switches	1	2	1	1	1
Affected Spot Networks	Produce Market ***200 Food Center Dr.*** ***Baldor*** Meat Market ***Anheuser Busch Citarella/Sultana*** NY Prison Barge Fish Market	Produce Market Meat Market ***Anheuser Busch Sultana/Citarella*** Fish Market NY Prison Barge	Produce Market	Produce Market ***200 Food Center Dr.*** ***Baldor*** Meat Market Fish Market	Produce Market ***200 Food Center Dr.*** ***Baldor*** Meat Market **Anheuser Busch Citarella/Sultana** NY Prison Barge Fish Market
Additional Low Voltage Loads	Department of Sanitation site adjacent to Citarella Street lighting Connection south of Food Center Drive at the intersection with Halleck Street, possibly serving street lights on the access road to the Vernon C. Bain Center (correctional facility) Small building south of the Meat Market parking area Connection along the gas line crossing into the Bronx River				

Note: The above spot networks are identified on the feeder maps, but additional, secondary customer accounts that may be served out of each spot network are not identified.

The spot networks that are shown in bold text in Table 2-7 may serve additional Con Edison customers that would also be isolated from the Con Edison grid by the sectionalization switches and connected to the microgrid. Table 2-7 also includes low voltage service connections that are supplied from the affected spot networks.

With the exception of the Produce Market, the customers identified in Table 2-7 are not intended to receive full back-up from the tri-generation facility. As such, these accounts will be isolated manually during islanding so they could not draw power from the microgrid and potentially overload the installed generation during microgrid operations. The potential existence of secondary, non-named customers on these feeders remains to be verified by Con Edison as additional loads that would potentially need to be disconnected.

7.4 Microgrid Interconnection Device Requirements

Con Edison will own and operate the sectionalization switches. As such, design requirements will be subject to Con Edison input. Microgrid interconnection devices will be remote supervisory, vault-mounted, underground 13.8kV distribution switchgear, rated at 600 A continuous and 40 kA fault current.

Microgrid interconnection devices will require the following control capabilities:

- Remote and local control via the microgrid controller
- Locally derived control power for operation and data communication (control power will allow for operation following loss of utility power)
- Monitor status and analog electrical quantities (i.e. kW, kVAR. Amps, Volts).

No automatic protective actions or automated operating sequences are required at the new sectionalizing switches to satisfy project requirements. Protection features may be designed and installed by Con Edison as part of overall system improvements. Line and load-side voltage sensing will be provided to control close permissives for the switches. Closing to a dead line or paralleling a live line and live load will not be possible.

Sectionalizing switches will include ground positions to provide a means to ground the primary feeders. The ground switch will be inhibited from closing if voltage is present on the primary service feeder.

The switches will be controllable via a microgrid controller located at the tri-generation facility with local indication of position and indication input to the microgrid controller. Subject to design requirements identified by Con Edison during final design, supervisory control and data acquisition (SCADA) connection will provide remote indication and control of the new sectionalizing switches to Con Edison's operations staff.

7.5 Microgrid Controller Requirements

The final architecture and device and interface requirements/specifications for the microgrid controller will be developed during final design. At this stage, it is assumed that radio connections will be used for all the communications between microgrid interconnection devices. The data exchange between the microgrid devices to/from SCADA is expected to use open standard protocols, such as DNP3 or Modbus over TCP/IP or serial, or hardwired I/O.

The microgrid controller will centrally manage all actions in the microgrid and interfaces for the microgrid devices described below.

- Microgrid interconnection devices:
  - Monitor status conditions including position and fault state.
  - Monitor analog electrical quantities (i.e. kW, kVAR. Amps, Volts) of the feeders via transducers and associated CT/VTs.
  - Control open/close.
- Facility distributed control system:

  - Monitor the DCS status and analog electrical quantities. (This includes the synchronization status so that the microgrid controller can open/close the microgrid interconnection devices as required to manage short-term parallel transitions.)
- Con Edison's SCADA, providing Con Edison with:
  - Visibility of status and analog electrical quantities at all microgrid interconnection devices and the Facility distributed control system.
  - Remote override control of the microgrid interconnection devices operation.

8 Instrumentation and Control Systems

8.1 General

This section defines the general design basis for the instrumentation and control equipment including the central control room (CCR) equipment located in the generation building. A control system architecture drawing is included in Appendix 2B.

The instrumentation and control equipment will be designed such that the performance of all systems and equipment, particularly in terms of reliability and availability, are as defined herein. Under no circumstances will lack of redundancy in the control system effectively reduce the redundancy provision of the main systems and equipment.

Primary facility control will be afforded by the following integrated systems:

- Distributed control system (DCS)
- Natural gas engine generator control package
- Discrete functional controls and monitoring packages associated with air emissions, gas compression, compressed air, emissions control devices, gas and fire detection
- Instrumentation associated with mechanical and electrical systems
- Protective relaying and metering interface
- SCADA systems
- Micro grid controller.

Primary human-machine interface will occur at the DCS and engine generator control terminals located in the CCR. Local control stations and operator interfaces will also occur throughout the facility for local control and maintenance. Instrumentation required for local operator observation of system performance (e.g., local flow detection) and those required for system performance testing will also be provided. All instrumentation and control equipment will comply in all respects with the requirements of all applicable codes and standards and be suitable for the selected control systems employed and physical climate at the facility, designed to meet stated service life goals.

The following sections identify the main functional requirements for the instrumentation and control equipment for the natural gas engine generators, heat recovery systems, hot

and chilled water systems, as well as associated auxiliary systems and balance of facility equipment. Only requirements of the major systems are described herein, but the final design of the instrumentation and control equipment will include all additional minor and support systems necessary to meet the facility operating requirements.

8.2 Design Objectives

The instrumentation and control equipment will enable power generation operations to be carried out in a safe, effective, and reliable manner without invoking equipment or system operational limits. The design of the instrumentation and control equipment will, to the greatest extent, employ recognized principles leading to:

- A safe operating environment for personnel
- Protection of the facility operating equipment from damage
- Production of power for the Produce Market during a utility outage event (voltage control, three power feeders, load following based on microgrid meters)
- Production of power during normal power export operations (base load set MW output)
- Cost effective control system architecture that is maintainable and allows for future expansion
- High availability and maintainability.

Primary facility control and monitoring will be accomplished from the DCS operator stations that will be located in the CCR. Local controls and indications will be restricted to those necessary for non-routine operations for which there is ample time for a roving operator to accomplish. Local control systems where provided will allow for proper system maintenance, testing and commissioning, and include provisions for equipment isolation and essential tripping facilities. Where local controls are employed, alarms and indications will be provided to the CCR operator to ensure the local system is configured for the intended operating role and functioning within design parameters.

The extent of remote manual controls, indications, automatic modulating controls, automated sequences, and facility/personnel protection systems will be such as necessary to enable the following operations to be carried out from the CCR:

- All routine facility operations (including all normal and emergency start-up, shut-down operations and operations when on load) involving the natural gas engine generator.
- All non-routine facility operations for local controls for which there is not ample time for a roving operator to accomplish.

Protection equipment will be provided with an appropriate level of redundancy to secure personnel safety, economic protection of the systems and equipment, environmental protection, and a low probability of loss of generation. No single failure within the protection system will lead to inadvertent operation of the protection system or cause the loss of the protection function. The black starting function will be robust and free of spurious faults or permissives that prohibit simple operator engagement when needed.

All equipment will be designed such that any interruption in electrical, pneumatic, or hydraulic power supply will not result in injury to personnel and damage to systems or equipment.

A principle design requirement for the instrumentation and control systems will be the minimization of the number of facility personnel (including operational and maintenance staff) required to safely operate and maintain installed systems and equipment.

Where allowed by codes and standards, control systems will utilize multiple transmitters for sensing off-normal conditions for alarm and interlock functions instead of process switches. The preferred scheme for multiple transmitters is the middle of three median select methods. This method will also apply to control system inputs in those loops where redundancy is required for facility availability. DCS maintenance graphics will be developed and provided to allow the operator to select individual transmitters during maintenance periods. Deviation alarms will be provided to alert the operator to differences in transmitter signals.

8.3 Facility Control

8.3.1 General

The overall design of control systems and equipment will be based on a philosophy of centralized operation from the DCS operator stations located in the CCR. The facility will be designed with the level of automation required by operating personnel to control the engine, chillers, and other facility auxiliaries from the CCR. The facility will be capable of operating from minimum stable load to full load in automatic control while all controllers are in automatic, permissives are met, and redundant equipment is in standby and ready for service.

Full control of all equipment supplied by the natural gas engine generator manufacturer will be provided through the supplier-furnished control systems. Any “group control” or automatic sequence control provided will be per the supplier’s standard packages. The engine control system will include provisions to allow all normal start-up, operation and monitoring functions from the DCS operator stations.

Systems controlled by programmable logic controller (PLC) will provide complete local “stand-alone” system control and monitoring. Each PLC control system will include a communication interface to allow all normal start-up, operation, and monitoring of the associated equipment from the DCS. Additional supplementary control and monitoring will be provided at the local PLC operator stations as required for additional manual operating and maintenance functions. Comprehensive alarming and fault finding actions for all equipment controlled through PLCs will be available through the PLC operator stations. Through the DCS operator stations, the operator will have all necessary information available to evaluate any emergency situation including the ability to take actions necessary to prevent immediate injury or damage.

The DCS interface with supplier-furnished PLC control systems will be through redundant Ethernet gateways. All critical control and safety functions will be hardwired.

Auxiliary equipment that does not require continuous operation for electric power production can be fully integrated in the DCS or be monitored, controlled, and protected

locally, with limited monitoring of trouble alarms and status (e.g., pump running) and control (start/stop or stop) from the DCS. Any auxiliary equipment that requires immediate attention for the safety of personnel or facility will be controlled and alarmed remotely through the DCS, either by grouped or individual alarms as appropriate for the application. Other features of the control strategy will include:

- Hardwired safety interlocks and trip functions will be provided as required by applicable codes.
- Facility processes that have personnel safety and/or environmental impact such as dedicated safety hardware platforms for Safety Integrated Level 3 (SIL-3) and Safety Integrated Level 2 (SIL-2) will be finalized during final design.
- Minimum reliance will be placed upon roving operators except as required to perform local system and equipment operational checks following a prolonged outage or maintenance.

8.3.2 Availability

To maximize facility main and peaking generation and black start availability, the design of control systems will incorporate functional and geographic distribution of controllers and inputs/outputs (I/O) to minimize the impact of failures. Single failures within each functional area will not result in a reduction of facility availability. This philosophy will also extend to electrical and pneumatic power supplies for each area.

The instrumentation and control system will be structured to reflect the redundancy provisions of the systems and equipment so that no single fault within the control system can simultaneously cause both the standby and duty systems or equipment to be unavailable.

8.3.3 Minimum Staff Requirements

To provide a consistent operator interface platform, the DCS operator stations will be utilized as a common operator control, display, alarm, trending, and data logging system for all systems with the exception of a small number of package systems that utilize stand-alone local control. Systems which use stand-alone local control will be provided with remote DCS monitoring and/or control in accordance with the functional requirements of Section 8.4.

See Appendix 2B for the envisioned control system architecture. For each system that is not directly controlled by the DCS, details will be provided by the Engineer on how each system will be interconnected (e.g., communications, hard-wired) with the DCS for central monitoring and control. The details will clearly demonstrate that the functional requirements put forth in this DBD are met.

8.3.4 Remote Operator Locations

Certain facility systems will require that remote control room or control stations near the process location are available to properly control and monitor the process. A study will be performed by the Engineer to optimize the facility layout and include the appropriate local

control areas such as designing enclosures for housing DCS I/O panels and other equipment.

8.4 Distributed Control System

8.4.1 General

As a minimum, the DCS will provide operator controls, alarm data, and facility coordination functions necessary to achieve safe and effective remote control of systems and equipment from the CCR. It will also record and be able to subsequently display system and equipment data and produce all reporting required for Owner permit compliance and data retention. This will include environmental emissions, the results of performance calculations, and data required to meet the requirements for electricity sales.

The DCS system design will utilize geographical and functional distribution of control components and I/O to minimize field wiring requirements and impact on facility operation due to equipment failures. Spare I/O and I/O cards will be provided at each I/O cabinet and within each processor. The quantity of spares per cabinet is to be specified by the Engineer to meet the capacity criteria defined herein.

The DCS will perform both analog and digital control and display duties. It will have resident high level diagnostic routines and fault indicators so that failures can be rapidly identified and rectified by plug in replacement.

8.4.2 Operator Interface

The normal operator interface, located in the CCR, will be via a number of light-emitting diode (LED) displays and keyboards or equivalent soft key devices (operator workstations) offering a hierarchy of operator selectable control and display formats. The type of keyboard or soft key device used will allow rapid access from display to display by use of dedicated functional keys or equivalent soft key devices.

The numbers and grouping of the operator workstations will be commensurate with maintaining a satisfactory level of operator workstation facilities consequent to the failure of a full operator workstation system. The CCR will contain all operator workstations, but will include dedicated control areas for each unit.

The CCR will include a minimum of two 24-inch LED screens and one 46-inch LED screen associated with the operator workstations. The 46-inch screen station will have full functionality as an operator workstation but will primarily be used for alarm displays.

The engine generator control system will be provided with one single 24-inch LED operator station. The operator station will be located in the CCR adjacent to the DCS operator station.

8.4.3 Automated Sequences

Sufficient automated sequences will be provided to allow starting/stopping of major system and equipment groups from single initiation; however, the system will allow item-

by-item starts if required by the operator. Facilities will be provided to inform the operator of the completion of each step in an automated sequence.

8.4.4 DCS Performance

The DCS will ensure that there is adequate computer free time, network utilization time, program run time, and memory utilization under worst case traffic handling conditions, based on final design. A demonstration of these requirements will be required as a part of acceptance testing at the supplier's facility.

In addition to the acceptance testing at the supplier's facility, the functionality of the system will also be demonstrated as a part of final testing and start-up/commissioning of the tri-generation facility.

8.4.5 Validity of Data

The DCS will have the ability to recognize that a particular analog signal is incorrect and take alternative action or to indicate the doubt inherent in any calculated results or data display using that particular signal.

8.4.6 Operator Displays

Operator workstation graphics will show overview and group or detailed information to assist the operator in any type of control action required. Overview displays will provide an at a glance view of facility and major subsystem status, and provide the operator with a graphical view of the process to help with training and visual understanding of control action. These displays must remain uncluttered when designed for control operations.

Graphics and symbols will be designed in accordance with the DCS supplier's standard. All graphic displays will be approved by the Owner's operator. All operator graphics will have consistent graphic symbols and navigation. Graphics will be based on the final piping and instrument diagrams prepared by the Engineer.

In general, graphics and operator interactions will be designed to use the standard DCS pop-up faceplates. Operators will be able to easily access specific displays and graphics by pressing dedicated function keys or screen targets, selecting from a list of displays in directories or menus, or by typing display or graphic names.

All DCS graphic displays will be globally available to all operator workstations. It will be possible to move between related displays and graphics of different detail levels or of the same detail level with a maximum of two operator actions. It will be possible to cycle through a predefined series of displays with a maximum of one operator action.

Special indication will be used to indicate that a value is invalid or in an alarm condition. Alarm conditions will be displayed consistent with color coding used on the sequence of event recording (SER) and DAS alarm displays.

Faceplates will show dynamic process and status information about a single control loop and will permit an operator to change control parameter values or mode for the loop. Faceplates will be defined to pop up when the appropriate location on a process graphic is selected with the pointing device.

Standard displays will show the operational status of the communication system. The communications parameters of each module connected to the communication system (on-line, off-line, failed, primary failed, back-up failed) will be shown.

Each controllable device will have an accessible permissive display dynamically showing all interlocks, trips and conditions that would prevent operator control or automatic actions. All conditions, including those that are not monitored by the system, will be included in the permissive displays. The DCS control logic will have a “first cause of trip” trap for each major component (e.g. gas compressor). The first cause of trip information will be operator accessible via the permissive/trip displays.

Trend and tabular data displays are related to overview displays and will be provided. Common tabular displays will organize key data to match the facility mode while eliminating unrelated data. Trend data displays will be available from overview and detail displays to allow viewing of real time data as well as historical data.

8.4.7 External Interfaces

The DCS shall be provided with hardware and software for interfacing with the systems listed below for control and monitoring purposes:

- Performance Monitoring Systems — Capability will be provided to interface with the engine manufacturer’s external monitoring system to access system data for the purposes of optimization, performance, and maintenance.
- Interface with Con Edison — Hardware and software will be provided to interface between Con Edison operations and the microgrid interconnection devices in real time via the microgrid controller. Facilities will be incorporated such that load switching commands from the DCS may either be registered or blocked by Con Edison.

For the listed systems that are equipped with operator interfaces, DCS graphics shall be provided to mimic the operator interface to allow primary facility control and monitoring from the DCS operator stations located in the CCR.

The DCS interface with vendor-supplied control systems will be through redundant gateways. All critical control and safety functions will be hardwired.

8.4.8 Communications Network

The proposed form of communications network used in the DCS will be adequate to provide the full extent of data traffic handling and free time required under the all operating conditions. The communication network will be fault tolerant such that no single failure of a device or cable will prevent communication between the processing equipment and the operator stations.

Fiber optic communications is preferred for all DCS network communications. As a minimum, all DCS, engine, and PLC communications that travel through high electrical noise areas or outside a building structure will be fiber optic.

8.4.9 DCS Cabinets

Relays, interposing relays, optical isolators, and other isolation equipment will, as far as is practicable, be housed in DCS panels. Cabinets will be provided with any required environmental conditioning based on the physical location of the cabinets. Cabinet layout and design will consider access for maintenance and repairs. Instrument and control devices (transmitters and solenoid valves) will be powered from the DCS to the greatest extent possible.

8.4.10 Spare Capacity

The DCS will include 30 percent spare I/O capacity by I/O type and 30 percent spare cabinet and terminal space at the time of shipment. Spare capacity requirements are applicable to each DCS cabinet location and for each processor including remote I/O locations. Processing capacity and communication network capacity will be sufficient so that the use of spare I/O does not impact system performance.

8.4.11 Engineering Support

One engineering workstation (EWS) will be provided for DCS maintenance including design of operator graphics, control strategies, storage, printing of associated documentation, and monitoring of the network and attached equipment. Electronic copies of user manuals will be loaded onto the EWS/Server and will be accessible to users via any workstation.

Configuration of the control system will be done from the EWS where it is possible to download the individual control algorithms to the control cards. The system will always record the latest configuration such that faulty cards may be replaced and be reconfigured in minimal time. The system will provide automatic documentation of all control configurations and settings.

The system will use a menu driven technique requiring alterations to a value to be confirmed by the operator before implementation. The system will maintain a record of all changes made.

Equipment will be provided to effectively support and secure control software contained in all user programmable devices during its life cycle (i.e., design, development, installation, operation, maintenance and modification).

Provision will be made to protect and maintain the integrity of the media upon which software resides by the use of unique labels. Unauthorized access to the EWS and other software based systems will be controlled by the use of passwords.

The EWS will include one 11 x 17-inch color laser printer for printing system documentation and graphic displays.

8.4.12 Sequence of Event Recording

In order to determine the precise cause of a trip, an SER capability is required. The DCS will include a number of SER capable digital I/O channels dedicated to detecting and logging a trip condition and critical parameters to a resolution of one millisecond. These

will be trips associated with the engine control equipment, generator protection and interconnecting relays.

8.5 Central Control Room

8.5.1 General

Activities associated with the routine operation, control, and monitoring of systems and equipment will be performed from the CCR located in the main building. Recognized ergonomic principles will be incorporated into the design of the CCR equipment in order to minimize the incidence of operator error and maximize efficiency.

The overall appearance of the CCR will be that of a professional nature. All fixtures and fittings will be of a durable finish. The scope of supply will include all control room furniture including consoles.

8.5.2 CCR Equipment

The equipment in the CCR will include the following:

- DCS control consoles and other hardware
- Physical security equipment, including closed circuit TV monitors and main security gate access controls
- Fire detection system main annunciator panel
- Computers for administrative/maintenance functions
- File cabinets, operations tools and personal protective (safety) equipment.

8.5.3 Lighting Design

With the large use of LED monitors within the CCR, particular attention will be given to lighting arrangements such that there is no glare or reflection problems from LED monitor surfaces when viewed from any normal operating position. This will include the provisions for ‘up-lighting’, anti-reflective visual display unit (VDU) filters, and matte instrument surfaces, as necessary.

The lighting level will be adjustable to suit operational requirements.

8.5.4 Telecommunications

Telecommunications system will be provided and located near the CCR operator console. Space will be provided for a telephone on the operator console and in other designated facility areas.

8.5.5 Electrical Power Supply

All instrumentation and control systems and equipment will be powered from the UPS.

9 Civil, Structural, and Architectural

9.1 Generation Building

The generation building is expected to be of pre-cast concrete construction or a pre-engineered metal building system. The building will be of sufficient size to house the generation and chilling equipment, a maintenance shop, electrical equipment room, distribution and fire pumps, control room, offices and restrooms.

The control room, offices, and restrooms will be located on a mezzanine level above the ground level warehouse and electrical equipment areas.

9.2 Foundations

Foundations will be designed using reinforced concrete to resist the loading imposed by the building, structure, or equipment being supported. The foundation design will consider the following:

- Soil bearing capacities
- Deep foundation capacities
- Lateral earth pressures
- Allowable settlements
- Structure, equipment, and environmental loadings
- Equipment performance criteria
- Access and maintenance
- Temporary construction loading.

Foundations will be designed using static analysis techniques assuming rigid elements and linear soil pressure distribution so that the allowable settlement and bearing pressure criteria are not exceeded. Foundations will be proportioned so that the resultant of the soil pressure coincides as nearly as possible with the resultant of the vertical loading. The minimum factors of safety against overturning, sliding, and net uplift will be 1.5.

Geotechnical exploration, testing, and analysis information will be used to determine the most suitable foundation system. Elastic (short-term) and consolidation (long-term) foundation settlements will be calculated and limited to the following design values:

- Total settlement - 1 inch
- Differential settlement - 0.1 percent slope between adjacent column support points.

The following design criteria are specifically applicable for the natural gas engine generators:

- Foundation pads must satisfy flatness requirements of a maximum deviation in elevation of five mm over the entire foundation length and not more than 1.5 mm in any one meter.
- Concrete compressive strength will not be less than 4,000 psi.

As noted in Section 2.7, the existing site requires remediation. The remediation approach is preliminary and will include in situ solidification of the existing underground waste material. A bentonite wall will be installed on the river side of the site as a barrier along the river. All structures, including access roads and parking, will need to be pile supported. The bearing capacity of the solidified material is currently expected to be on the order of 50 psi. Buildings and structures will need to have a vapor barrier. It is currently assumed that the site will be remediated, substructures will be removed, piles will be installed, and final grade will be established prior to the start of construction of the Pilot Project.

Piles will be required to support the major equipment to account for settling that may occur after remediation. The piles will either need to be installed prior to final capping of the site or the piles can be installed after the site is capped, although this will require remediating the disturbed cap area again where any piles are driven through the cap. The cap will need to be of suitable material to accommodate future site construction activities and foundation designs. The final remediated site will be graded towards the property boundaries. This DBD will need to be revisited once further details of the remediated site and subsurface conditions are determined.

Costs for site remediation, installation of the cap, and building up and grading the site to the required elevation and soil bearing capacity are not included in the cost estimates for the tri-generation facility. Costs for excavation of spreader foundations, back fill, spread footer foundation designs, and piles installation to support the construction of the tri-generation facility after site remediation is complete are included. Costs to remediate the site in any areas where the cap may be disturbed via pile installation are not included in the cost estimate for the tri-generation facility.

Shallow foundations such as spread footings and mats may be designed for supporting equipment of less than 10 tons. For larger equipment, deeper foundations are required. Foundations will be designed to meet the requirements of the New York City Building Code as well as the specific requirements of the equipment supplier, where applicable.

All foundations for rotating or vibrating machines will take into account the dynamic loads of the machine including start-up, shut-down, and upset conditions. All supplier limits on natural frequency of the supporting foundation will be considered to minimize the potential for resonance.

9.3 Roads

Roadway, driveway, and parking area design will conform to New York City Department of Transportation standard specifications and the following criteria:

- Minimum paved road width of 24 feet with aggregate shoulders (base extension)
- Minimum centerline radius of curvature of 50 feet, unless restricted
- Geotextile membrane will be used where necessary to stabilize roadbeds

- AASHTO HS20-44 loading conditions for pavement design (reinforcing required)
- Maximum longitudinal slope of approximately 8 percent
- Maximum transverse gradient of approximately 2 percent.

9.4 Landscaping and Fencing

The tri-generation site will require perimeter access control fencing. The fence will be 6 feet minimum tall, woven wire fabric with 3-strand barbed wire and have a lockable vehicle access gate at the entrance drive.

Additional landscaping and fencing features may be identified as the tri-generation facility at Site D is submitted to the Public Design Commission for review during conceptual and final design stages of the project. Currently, costs for additional landscaping and fencing features are not included in the project capital costs described in Section 11 of this DBD.

Temporary construction fencing will be provided as required.

10 Operational Considerations and Costs

Operating costs can be broken down into two categories: fixed and variable. Fixed operating costs include overall site maintenance, insurance (site maintenance and insurance assumed to be approximately 1 percent of the installed project cost), property taxes (property taxes not included), and facility staffing.

Variable operating costs include consumables such as fuel, parts, aqueous ammonia, water, and wastewater discharge. They also include maintenance costs for engines, chillers, and other major equipment that are a function of the operating hours in a given year. Equipment replacement costs are also variable operating costs. The performance of SCR and oxidation catalysts, for example, degrade over time and these catalysts will require periodic replacement. Typical life expectancy of the catalysts is approximately 30,000 operating hours.

It is assumed that seven permanent staff will be in place to operate the tri-generation facility and to manage annual maintenance activities. It is also assumed that most of the equipment maintenance work (fixed and variable) will be outsourced. Maintenance contracts and agreements for equipment can also include an annual fixed cost for management of the maintenance contract. Additional assumptions and annual costs for operating and maintaining the tri-generation facility are shown in Table 2-8.

Table 2-8. Annual Operating and Maintenance Costs ($2022)

Estimated Annual Operating and Maintenance Costs	
Assumptions	
Annual Hours of Operation (hours)	8,760
Average Heat Input, HHV (mmbtu/hr)	48.25
Fuel Price ($/mmBtu)	8.20
Engine Service Contract ($/MWH)	16.00
Cost Type	**Cost**
Annual Major Equipment Maintenance	$884,000
Hot/Chilled Water Distribution Maintenance	$150,000
Annual Fuel	$3,115,000
Annual Variable Maintenance	$91,000
Facility Staff (Assumes 7 Full Time Operators)	$1,050,000
Insurance, Site Maintenance (Assume 1% of Capital Cost)	$691,000
Annual Total	**$5,981,000**

11 Project Capital Costs

AACE Class 3 project cost estimates were developed for the tri-generation facility. Inside-the-fence conceptual cost estimates were developed based on a conventional contracting strategy (separate design and construction contracts). The cost estimates were developed based on budgetary major equipment pricing from major equipment suppliers, union labor rates specific to New York City, equipment quantities, layout takeoffs, and reference data from similar projects. The estimates do not include outside-the-fence or incremental site specific costs such as fuel supply infrastructure upgrades and electric transmission infrastructure beyond that noted within this DBD.

The following approach and assumptions were utilized to develop the conceptual capital cost estimates:

- Natural gas supply interface with Con Edison is in the on-site gas yard.
- Electrical scope including the interconnection to the Con Edison system and system sectionalizing switches have been included.
- Land acquisition costs excluded.
- Sales tax, extended warranties, and performance bond/sureties are excluded.
- Estimate assumes a March 2022 COD.
- Escalation to COD based on a flat 3 percent annual escalation rate.
- Project direct costs include equipment, commodities, and construction labor.

- Contractor's construction indirect costs include provisions for construction and building permits, testing, expenses, services, temporary facilities, tools, rental equipment, and other costs related to construction.
- Contractor's contingency, general and administrative (G&A), and fees are based on observed industry trends and previous project experience.
- Contractor's project indirect costs include project management based on typical burden rates.
- Final design engineering including project management based on typical burden rates.

In addition to the Contractor's costs and design engineering costs noted above, construction management and Owner's costs are estimated at 10 percent of the installed project cost. These costs include provisions for:

- Project development
- Owner's project management and oversight
- Environmental and site permitting
- Site preparation
- Operating spares and equipment maintenance contract initiation costs (as applicable)
- Oversight of the Engineer during final design and construction Contractor activities
- Operations personnel (prior to COD)
- Operator training
- Startup and commissioning and performance testing.

The estimated project capital costs for the tri-generation facility were provided to EDC. The total project cost represented an estimated installed cost for a March 2022 COD and includes estimated construction management and Owner's costs.

12 Project Schedule

A Level I project implementation schedule was developed from initial project development to project COD, which currently is planned for March 2022. The project implementation schedule is included in Appendix 2G for reference. This implementation schedule was developed based on a review of key project milestones, construction activities, equipment lead times, permitting lead times and experience on previous/similar applications. The schedule incorporates typical equipment lead times from potential major equipment suppliers. The construction period, from Contractor mobilization to complete installation, is anticipated to be less than two years.

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PART 2 APPENDICES

2A:
Tri-generation Facility Site Plan

Tri-generation Facility General Arrangement, Operating Floor Plan

Tri-generation Facility General Arrangement, Roof Plan

South Bronx Greenway Utility Plan Drawings

2B:
Tri-generation Facility Control System Architecture

Tri-generation Facility One-line Diagram, 4160V Service Bus

Tri-generation Facility One-line Diagram, MCC

2C: Representative Manufacturer Data Sheets

2D: Tri-generation Facility Process Flow Diagram, Reciprocating Engine

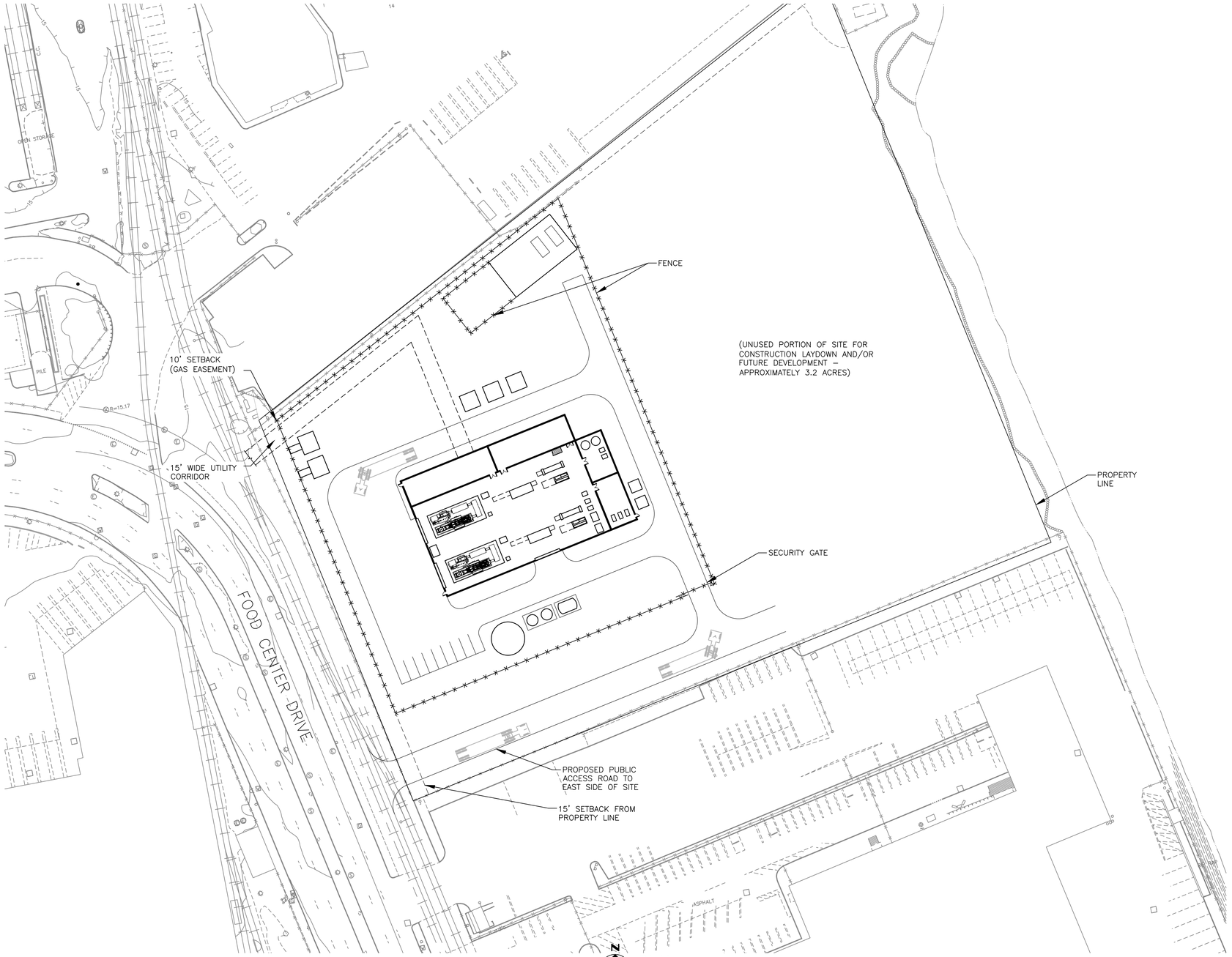
2E: Tri-generation Facility Water Mass Balances

2F: Proposed Sectionalization Information for Con Edison

2G: Project Implementation Preliminary Schedule

APPENDIX 2A

- Tri-generation Facility Site Plan
- Tri-generation Facility General Arrangement, Operating Floor Plan
- Tri-generation Facility General Arrangement, Roof Plan
- South Bronx Greenway Utility Plan Drawings



N

PLAN

SCALE: 1" = 50'-0"

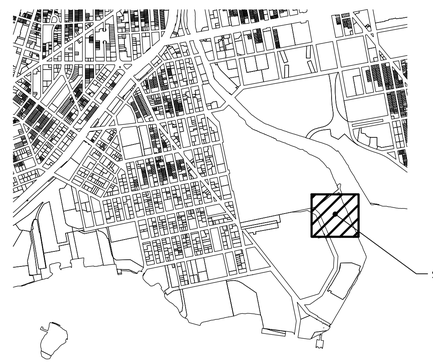
50' 25' 0 50' 100' 150'

NOTES

1. TOTAL SITE SIZE (FENCED AREA) IS APPROXIMATELY 102,300 FT² (2.4 ACRES).
2. BASE POWER BLOCK ELEVATION NOMINALLY 17.33 FEET NAVD88.
3. SEE DRAWING 10029617-OGA-M101 FOR GENERAL EQUIPMENT ARRANGEMENT AND FACILITY LEGEND.

LAYOUT ASSUMPTIONS

1. LAYOUT DESIGNED TO ACCOMMODATE FUTURE BUILD OUT OF TRI-GENERATION FACILITY TOWARD THE SOUTH PROPERTY LINE.
2. 10' MINIMUM RADIAL SETBACKS FROM ELECTRICAL TRANSFORMERS.
3. SEPARATE GATED UTILITY GAS METERING STATION INCLUDED IN SITE GAS YARD.
4. SELECTIVE CATALYTIC REDUCTION SYSTEM USES AQUEOUS AMMONIA STORED IN AN EXTERIOR TANK.
5. FIRE WATER IS SUPPLIED FROM FOOD CENTER DRIVE WATER MAIN AND NO ONSITE FIRE WATER STORAGE IS INCLUDED.
6. 15' UTILITY CORRIDOR TO ACCOMMODATE INCOMING UTILITIES FROM FOOD CENTER DRIVE AND OUTGOING HOT WATER AND CHILLED WATER SERVICE.
7. FRESH AND WASTE ENGINE OIL IS STORED IN EXTERIOR TANKS TO FACILITATE TRUCK LOADING AND UNLOADING.
8. ROADS DESIGNED TO ACCOMMODATE 75' TRUCK ACCESS FOR CONSTRUCTION AND LARGE EQUIPMENT TRANSPORT.
9. WEST SIDE ACCESS ROAD WIDENED TO ACCOMMODATE TRUCKS BACKING INTO ENGINE BAYS.
10. SITE ALONG FOOD CENTER DRIVE ZONED AS M3-1 FOR 15' SETBACKS FROM PROPERTY LINE.
11. CON EDISON MANHOLES PLACED ON THE NORTHWEST PROPERTY LINE. ACTUAL LOCATION OF MANHOLES TO BE DETERMINED BY CON EDISON.
12. BUILDING HEIGHT ASSUMED TO BE 40 FEET FROM GRADE TO TOP OF EQUIPMENT.
13. STACK HEIGHT IS ASSUMED TO BE 75 FEET ABOVE GRADE.
14. BUILDINGS ARE ASSUMED TO PROVIDE NOISE ATTENUATION TO SATISFY PROPERTY BOUNDARY NOISE LIMIT.



N

HUNTS POINT NY KEYPLAN

SCALE: 1" = 2000'-0"

2000' 1000' 2000' 4000' 6000'

ISSUE	DATE	DESCRIPTION
D	09/13/2018	FOR CLIENT REVIEW
C	07/31/2018	ISSUED FOR CLIENT REVIEW
B	07/10/2018	REVISED OVERALL LOCATION ON SITE
A	06/29/2018	ISSUED FOR INTERNAL REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	B. CURRY
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

SITE PLAN

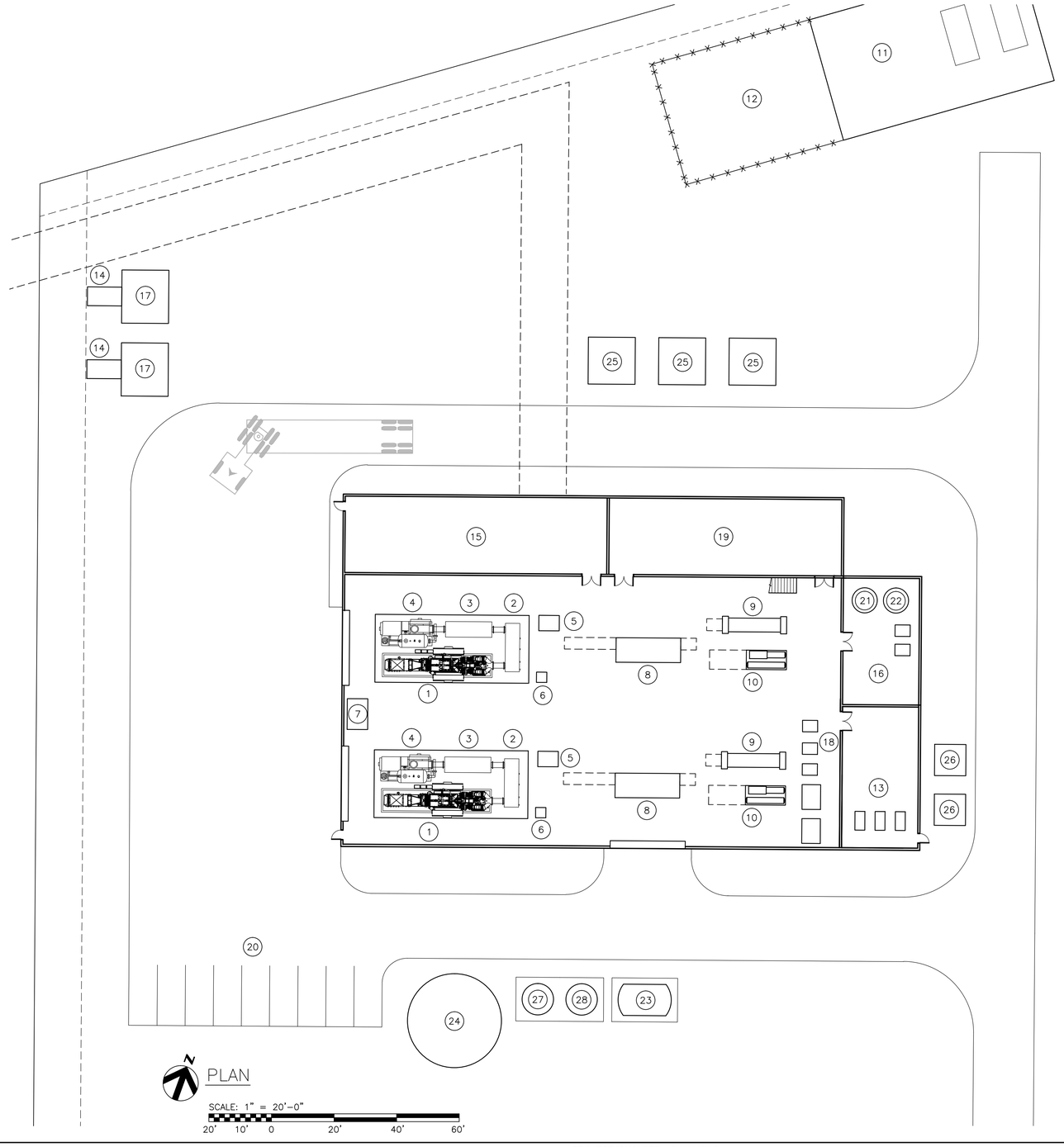
0 1" 2"

FILENAME 10029617_0GA_C101

SCALE AS NOTED

SHEET **C101**

9/12/2018 8:35:23 AM, jbrzys

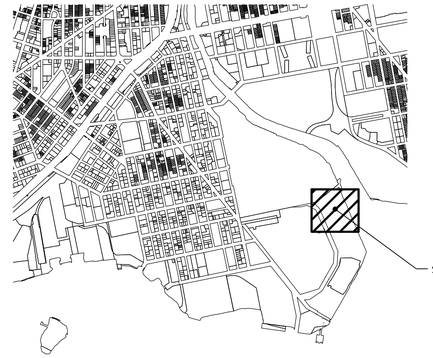


NOTES

1. TOTAL SITE SIZE (FENCED AREA) IS APPROXIMATELY 102,300 FT² (2.4 ACRES).
2. BASE POWER BLOCK ELEVATION NOMINALLY 17.33 FEET NAVD88.
3. REFER TO SHEETS C101 AND M102 FOR ADDITIONAL INFORMATION.

FACILITY LEGEND

1. 2.6 MW ENGINE GENERATOR
2. SCR
3. SILENCER
4. HOT WATER GENERATOR
5. JACKET WATER HEAT EXCHANGERS
6. AMMONIA INJECTION SKID
7. LUBE OIL SKID
8. TWO-STAGE ABSORPTION CHILLER
9. SINGLE-STAGE ABSORPTION CHILLER
10. ELECTRIC CHILLER
11. GAS COMPRESSOR ENCLOSURE
12. UTILITY GAS METERING
13. FIRE PUMP ROOM
14. ELECTRICAL MANHOLE
15. MAINTENANCE SHOP (CONTROL ROOM, OFFICES AND BATHROOMS LOCATED ON MEZZANINE LEVEL ABOVE)
16. CHILLED WATER DISTRIBUTION PUMPS
17. SWITCH GEAR
18. PUMP AREA (5 PUMP SKIDS WITH 2 PUMP EACH)
19. ELECTRICAL ROOM (CONTROL ROOM, OFFICES AND BATHROOMS LOCATED ON MEZZANINE LEVEL ABOVE)
20. STAFF PARKING
21. CHILLED WATER EXPANSION TANK
22. HOT WATER EXPANSION TANK
23. AQUEOUS AMMONIA TANK
24. SERVICE WATER TANK
25. TRANSFORMERS
26. AUXILIARY TRANSFORMERS
27. LUBE OIL TANK
28. WASTE OIL TANK



N
HUNTS POINT NY KEYPLAN
SCALE: 1" = 2000'-0"
2000' 1000' 2000' 4000' 6000'

ISSUE	DATE	DESCRIPTION
C	09/13/2018	FOR CLIENT REVIEW
B	07/31/2018	ISSUED FOR CLIENT REVIEW
A	06/29/2018	ISSUED FOR INTERNAL REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	B. CURRY
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

GENERAL ARRANGEMENT PLAN OPERATING FLOOR PLAN

0 1" 2"

FILENAME 10029617_0GA_M101
SCALE AS NOTED

SHEET M101

9/12/2018 9:36:03 AM_brzys

FACILITY LEGEND

1. ENGINE RADIATOR
2. ENGINE EXHAUST STACK
3. COOLING TOWER
4. EXHAUST AIR

NOTES

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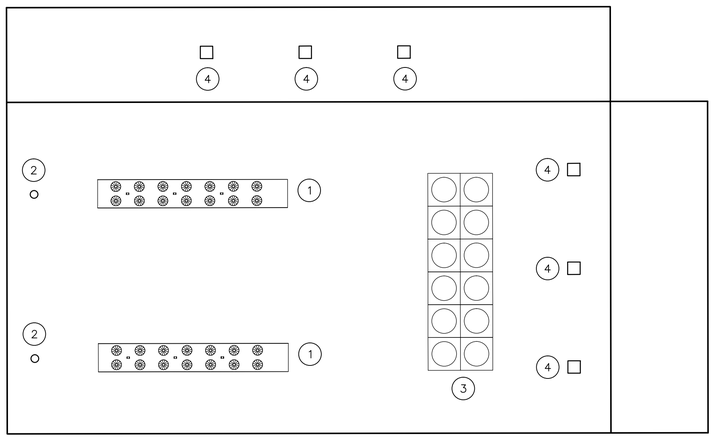
2. BASE POWER BLOCK ELEVATION NOMINALLY 17.33 FEET NAVD88.
3. REFER TO SHEET C101 AND M101 FOR ADDITIONAL INFORMATION.



PLAN

SCALE: 1" = 20'-0"

20' 10' 0 20' 40' 60'

HUNTS POINT NY KEYPLAN

SCALE: 1" = 2000'-0"

2000' 1000' 2000' 4000' 6000'

ISSUE	DATE	DESCRIPTION
C	09/13/2018	FOR CLIENT REVIEW
B	07/31/2018	ISSUED FOR CLIENT REVIEW
A	06/29/2018	ISSUED FOR INTERNAL REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	B. CURRY
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

GENERAL ARRANGEMENT PLAN ROOF PLAN

0 1" 2"

FILENAME 10029617_0GA_M102

SCALE AS NOTED

SHEET M10

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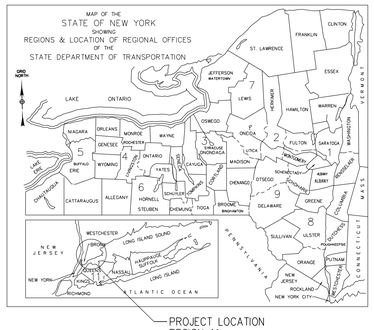
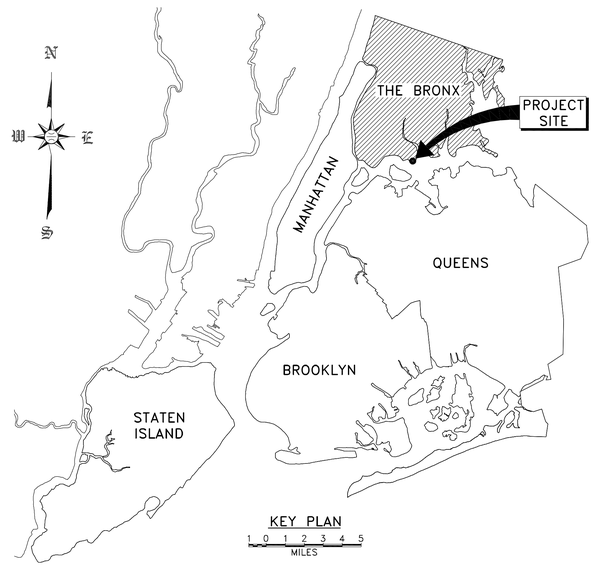
CONTRACT No. 16920004 PROJECT No. 06-512





PREPARED BY:

Mathews Nielsen Landscape Architects PC
120 Broadway, Suite 1040
New York, N.Y. 10271

SIGNATURE L.I.C. # DATE

New York City Economic Development Corporation

STANDARD SHEETS
TO BE IDENTIFIED UPON COMPLETION OF THE BID DOCUMENTS

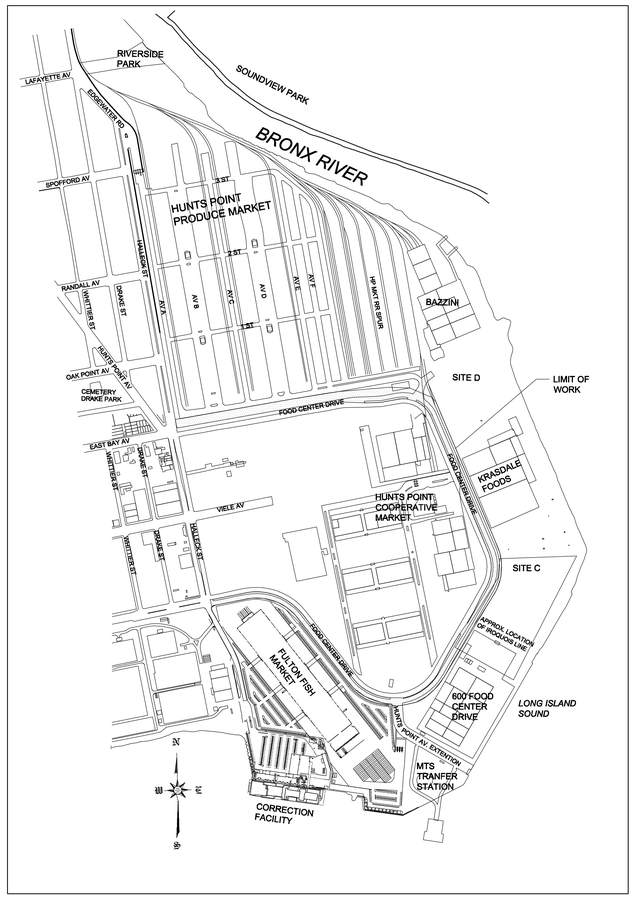
ALL WORK CONTEMPLATED UNDER THIS CONTRACT IS TO BE COVERED BY AND IN CONFORMIT WITH THE STANDARD SPECIFICATIONS (METRIC UNITS) DATED JANUARY 2, 2002.

CONTRACT NO. 16920004

FOOD CENTER DRIVE

ALONG LENGTH OF FOOD CENTER DRIVE FROM RYAWA AVE. TO
HUNTS POINT AVE/HALLECK INTERSECTION., EXCLUDING HUNTS POINT AVE. EXTENSION
TOGETHER WITH ALL WORK INCIDENTAL THERETO
BOROUGH OF THE BRONX, THE CITY OF GREATER NEW YORK

THIS DOCUMENT WAS PREPARED FOR THE NEW YORK STATE DEPARTMENT OF STATE WITH FUNDS PROVIDED UNDER TITLE 11 OF THE ENVIRONMENTAL PROTECTION FUND, LOCAL WATERFRONT REVITALIZATION.



LOCATION PLAN
SCALE: 1"=500'

BRONX COMMUNITY DISTRICT NO. 2

RECOMMENDED BY

I. FRANCIS, P.E. DATE
PLANNING, REGION 11

STATE OF NEW YORK DEPARTMENT OF TRANSPORTATION			
FOOD CENTER DRIVE			
FROM __ TO __ INCLUDING__			
BRONX COUNTY			
FED. ROAD REG. NO.	STATE	SHEET NO.	TOTAL SHEETS
	N.Y.	1	43
FEDERAL AID PROJECT NO.			
CAPITAL PROJECT IDENTIFICATION NO.	PIN_____		

Project:
SOUTH BRONX GREENWAY
FOOD CENTER DRIVE

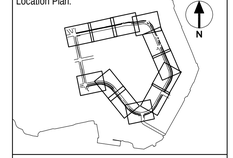
Client:
New York City Economic Development Corporation

Landscape Architect and Prime Consultant:
Mathews Nielsen Landscape Architects, PC
120 Broadway, Suite 1040
New York, NY 10271
Tel (212) 431 3609
Fax (212) 941 1513
www.mnlandscape.com

Civil / Structural Engineering
Dewberry
15 East 26th Street,
New York, New York 10010
Tel:212 685 0900
Fax: 212 685 2340

Environmental Science and Engineering Consultants
HDR
One Blue Hill Plaza
Pearl River, NY 10965
Tel: (845)735 8300
Fax: (845)735 7466

Survey
Mercator Land Surveying, LLC
175 West 93rd Street, 12th Floor
New York, NY 10025
Tel: 646 837 0780
Fax: 212 504 2602

Location Plan:


Seal:

This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund, Local Waterfront Revitalization

Submissions:
Date: Type:

Project Phase:
95% CD SUBMISSION

Drawing Title:
Cover Sheet

Scale:
Date: August 31, 2011
Drawn By: BC, LDR
Sheet No. 1 OF XX
Checked By: SN, RD
Drawing No. CS-101
MNLA Project No. 06-512

ABBREVIATIONS

ABANDONED	ABDN.
APARTMENT	APT.
ASPHALT	ASPH.
BASEMENT	BSMT.
BITUMINOUS	BIT.
BLOCK	BLK.
BLUESTONE	B.S.
BLUESTONE CURB	B.S.C.
BLUESTONE WALK	B.S.W.
BOTTOM OF CURB	B.C.
BRICK	BRK.
BUILDING	BLDG.
BUILT	BLT.
CAST IRON	C.I.
CENTER LINE	C.L.
CHAIN LINK FENCE	C.L.F.
CHAMBER	CH.
CLASS NUMBER	CL. #
COMBINED	COMB.
COMMERCIAL	COML.
CONCRETE	CONC.
CONCRETE CURB	C.C.
CONCRETE WALK	C.W.
DIAMETER	DIA.
DOUBLE BARREL	D.B.
DOWN	DN.
DRAWING	DWG.
DUCTILE IRON PIPE	D.I.P.
EXISTING	EXIST.
EXTRA STRENGTH VITRIFIED PIPE	E.S.V.P.
FIRE ALARM	F.A.
FIRE DEPARTMENT	F.D.
FLAT TOP REINFORCED CONCRETE	F.T.R.C.
FRAME	FR.
GRANITE	GRAN.
GRANITE CURB	GRAN. C.
INTERCEPTOR	INT.
INVERT ELEVATION	INV. EL.
IRREGULAR	IRR.
MANHOLE	MH
NOT IN CONTRACT	N.I.C.
NOT TO SCALE	N.T.S.
PAVEMENT	PVMT.
POINT OF CURVATURE	P.C.
POINT OF INTERSECTION	P.I.
POINT OF TANGENCY	P.T.
PRECAST REINFORCED CONCRETE	P.R.C.
RADIUS	R
REINFORCED CONCRETE PIPE	R.C.P.
ROADWAY	RDWY.
SANITARY	SAN.
SEWER	SWR.
SIDEWALK	SWK.
STANDARD	STD.
STEAM	SM.
STEEL	STL.
STEEL FACED	ST.F.
STEEL FACED CONCRETE CURB	ST.F.C.C.
STONE	STN.
STORM	STM.
STORY	STY.
TOP OF CURB	T.C.
TRAFFIC SIGN	T.S.
VACANT	VAC.
WORKING POINT	W.P.

LEGEND

	EXISTING	PROPOSED
MANHOLES		
ELECTRIC	(E) E	
CABLE TV	C	
TELEPHONE	T	
TRAFFIC	Tf	
NYC MH	NYC	
GAS	G	
WATER	W	
FIRE DEPT.	F	
SUBWAY	SU	
COAL CHUTE	CC	
STORM SEWER	STM	STM
COMBINED SEWER	COMB	COMB
SANITARY SEWER	SAN	SAN
INTERCEPTOR SEWER	INT	INT
UNIDENTIFIED MANHOLE (NO RECORD AVAILABLE)	MH	
BUILT MANHOLE REPLACED BY NEW MANHOLE		
RECORD MANHOLE	S	
HARDWARE RIM EL. & INV. EL. (SEWER, ETC.)	S 61.23 INV.47.89	
EXISTING MANHOLE TO BE RESET		S R
EXISTING MANHOLE TO BE REMOVED		S
BASINS		
CATCH BASIN WITH CURB PIECE – TYPE 1	1	1
CATCH BASIN WITHOUT CURB PIECE – TYPE 2	2	2
CATCH BASIN WITHOUT CURB PIECE – TYPE 3	3	3
EXISTING CATCH BASIN TO BE REMOVED		
TO BE ABANDONED		A
TO BE MODIFIED		M
TO BE ADJUSTED		A
CATCH BASIN – NON-STANDARD		N
NEW CATCH BASIN TO BE CONSTRUCTED IN SAME LOCATION AS OLD BASIN		
INLET		
SEEPAGE BASIN	SB	SB
NEW CONCRETE APRON FOR BIOSWALE		
HYDRANTS		
LOW PRESSURE HYDRANT		
HIGH PRESSURE HYDRANT		
LOW PRESSURE HYDRANT TO BE RELOCATED		R
HIGH PRESSURE HYDRANT TO BE RELOCATED		R
LOW PRESSURE HYDRANT TO BE ADJUSTED (VERTICALLY)		A
HIGH PRESSURE HYDRANT TO BE ADJUSTED (VERTICALLY)		A
SIAMESE CONNECTION		
STREET LIGHTING AND TRAFFIC SIGNALS		
WOOD UTILITY POLE		
WOOD UTILITY POLE WITH STREET LIGHT		
WOOD UTILITY POLE WITH TRAFFIC SIGNAL		T
WOOD UTILITY POLE WITH STREET LIGHT AND FIRE ALARM BOX		F
WOOD UTILITY POLE WITH FIRE ALARM BOX		F
WOOD UTILITY POLE WITH PEDESTRIAN SIGNAL		PS
WOOD UTILITY POLE WITH TRAFFIC AND PEDESTRIAN SIGNAL		TPS
WOOD UTILITY POLE WITH STREET LIGHT AND TRAFFIC AND PEDESTRIAN SIGNAL		TPS
WOOD UTILITY POLE WITH STREET LIGHT AND PEDESTRIAN SIGNAL		PS
STREET LIGHT (METAL POLE)		
STREET LIGHT AND TRAFFIC SIGNAL		T
STREET LIGHT AND TRAFFIC SIGNAL WITH PEDESTRIAN SIGNAL		TPS
STREET LIGHT WITH PEDESTRIAN SIGNAL		PS
STREET LIGHT WITH FIRE ALARM BRACKET		F
TRAFFIC SIGNAL POST		T
TRAFFIC SIGNAL CONTROL BOX		
STANCHION WITH TRAFFIC SIGNAL		T
STANCHION W/PEDESTRIAN SIGNAL		TPS
TRAFFIC SIGNAL POST W/PEDESTRIAN SIGNAL		TPS

LEGEND

	EXISTING	PROPOSED
VALVE BOXES		
GAS	GV	
WATER	WV	
STEAM	St	
EXISTING VALVE TO BE RESET	WV R	
EXISTING VALVE TO BE REMOVED/ABANDON	A WV	
TREES		
EXISTING TREE (SIZE AS LABELED)		
EXISTING TREE TO BE REMOVED		
NEW TREE TO BE PLANTED		
SHRUB		
HEDGE (HEIGHT AS LABELED)		
MISCELLANEOUS		
VAULT (SIDEWALK)	V	
CELLAR WINDOW GRATING		
CELLAR DOOR	CD	
SUBWAY GRATING		
SURFACE WATER FLOW		
TRAFFIC DIRECTION		
PARKING METER		
OIL FILL CAP OR OIL VENT	OR OFILL	
FIRE ALARM BOX	FAB	
POLICE CALL BOX	P	
MAIL BOX, PUBLIC PHONE	MB TEL.	
COLUMN – FOUNDATION (OF ELEVATED STRUCTURES)	OR	
HEADER		
AREA OF ADJUSTMENT		
LIMIT OF NEW PAVEMENT		
BUS PAD		
SIGN (GROUND MOUNTED)		
SIGN (OVERHEAD)		
TRAIN STATION ENTRANCE	DOWN	
SHAFT TO BUILDING BASEMENT	SH	
PEDESTRIAN RAMP		
CURB (CONCRETE UNLESS OTHERWISE INDICATED)		
CURB WITH DROP CURB (DRIVEWAY)	D C	D C
EDGE OF PAVEMENT WITHOUT CURB		
PROPOSED CONSTRUCTION (TOP OF CURB) ELEVATION AND STATION		T.C. 13.8 STA. 26+33
ROCK OUTCROP		
NORTH ARROW		
BARRIERS		
BEAM TYPE MALL BARRIER		
PORTABLE PRECAST CONCRETE BARRIER		
CAST IN PLACE CONCRETE BARRIER		
RETAINING WALL (W/TYPE)	RW (STN.)	
RAILROAD/TROLLEY TRACK		
FENCE (WITH HEIGHT AND TYPE)		
CHAIN LINK FENCE	6'	
IRON PICKET FENCE	5'	
WIRE FENCE	5'	
IRON ON CONCRETE COPING		
WOOD PICKET FENCE	4'	
GUARD POST	GP	
BUILDINGS		
HOUSE INFORMATION — HOUSE NUMBER, BLDG TYPE, FIRST FLOOR ELEV. (CE) CELLAR ENTR. (GE) GARAGE ENTR.		95–02 2–STY.FR. ▼ 25.3 G.E.17.5
STAIRS OR STOOPS		
CANOPY		CANOPY

LEGEND

	EXISTING	PROPOSED
CONDUITS		
WATER MAIN (WITH SIZE – LESS THAN 20")	8"W	8"W
WATER MAIN (WITH SIZE – 20" AND GREATER)*	20"W	20"W
VALVE		
BOUNDARY VALVE		
CHECK VALVE		
REDUCER		
CONNECTION		
CAP		
PLUG		
BLOW-OFF		
ACCESS MH		
ROUNDABOUT		
REGULATOR		
VENTURI METER		
TAP FOR AIR VENT		
STORM SEWER (WITH SIZE – LESS THAN 24")	15"STM.	15"STM.
STORM SEWER (WITH SIZE – 24" AND GREATER)*	24"STM.	24"STM.
SANITARY SEWER (WITH SIZE – LESS THAN 24")	15"SAN.	15"SAN.
SANITARY SEWER (WITH SIZE – 24" AND GREATER)*	24"SAN.	24"SAN.
COMBINED SEWER (WITH SIZE – LESS THAN 24")	15"COMB.	15"COMB.
COMBINED (WITH SIZE – 24" AND GREATER)*	24"COMB.	24"COMB.
INTERCEPTOR SEWER (WITH SIZE – LESS THAN 24")	15"INT.	15"INT.
INTERCEPTOR SEWER (WITH SIZE – 24" AND GREATER)*	24"INT.	24"INT.
EXISTING SEWER/DRAIN TO BE ABANDONED		
CATCH BASIN CONNECTION TO BE ABANDONED		
CATCH BASIN CONNECTION		
GAS LINE (WITH SIZE)	4" G	
STEAM (WITH SIZE)	16" ST	
ELECTRIC		
TELEPHONE		
FIRE ALARM		
LEGAL DATA		
OVERHEAD (AERIAL) UTILITY LINE	A/E,T,F	
MISCELLANEOUS UTILITY LINE – TR–TRAFFIC TA–TRANSIT	TR,TA	
LOT & BLOCK NUMBER	39 BLOCK 2109	
ESTABLISHED/LEGAL GRADE	100.0	
ANGLE	86°–30'–48"	
BLOCK LENGTH	167.01' (65.75 m)	
INTERPOLATED/CALCULATED ANGLE OR LENGTH	[86°–30'–48"] [167.01'(65.75 m)]	
PROPERTY POSSESSION LINE		
MAPPED PROPERTY LINE (RIGHT–OF–WAY LINE)		
SURVEY CONTROLS		
LOT LINE		
SURVEY MONUMENT (CITY) – IDENTIFY BY TOPO NUMBER	M#	
BENCH MARK (LABEL)	BM#	
CONTROL SURVEY TRAVERSE		
CENTER LINE BASE LINE	10+00 11+00	

* LINE SPACING IN SYMBOL TO BE SCALED TO CONDUIT SIZE

GRAPHIC SCALE (IN FEET)
20 0 10 20 40

Project:

SOUTH BRONX GREENWAY

FOOD CENTER DRIVE

Client:

New York City Economic Development Corporation

Landscape Architect and Prime Consultant:

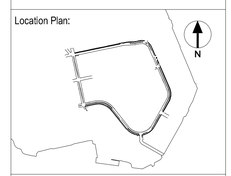
Mathews Nielsen Landscape Architects, PC
120 Broadway, Suite 1040
New York, NY 10271
Tel (212) 431 3609
Fax (212) 941 1513
www.mnlandscape.com

Civil / Structural Engineering
Dewberry
15 East 26th Street,
New York, New York 10010
Tel:212 685 0900
Fax: 212 685 2340

Environmental Science and Engineering Consultants
HDR
One Blue Hill Plaza
Pearl River, NY 10965
Tel: (845)735 8300
Fax: (845)735 7466

Survey
Mercator Land Surveying, LLC
175 West 93rd Street, 12th Floor
New York, NY 10025
Tel: 646 837 0780
Fax: 212 504 2602

Location Plan:



Seal:

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NEW YORK STATE DOS DEPARTMENT OF STATE

Submissions:
Date: Type:

Project Phase:

Drawing Title:
STANDARD LEGEND AND ABBREVIATIONS

Scale:	Date: OCTOBER 17, 2011
Drawn By: MN	Sheet No. 1 OF
Checked By: JM	Drawing No. G-102
MNLA Project No: 06-512	

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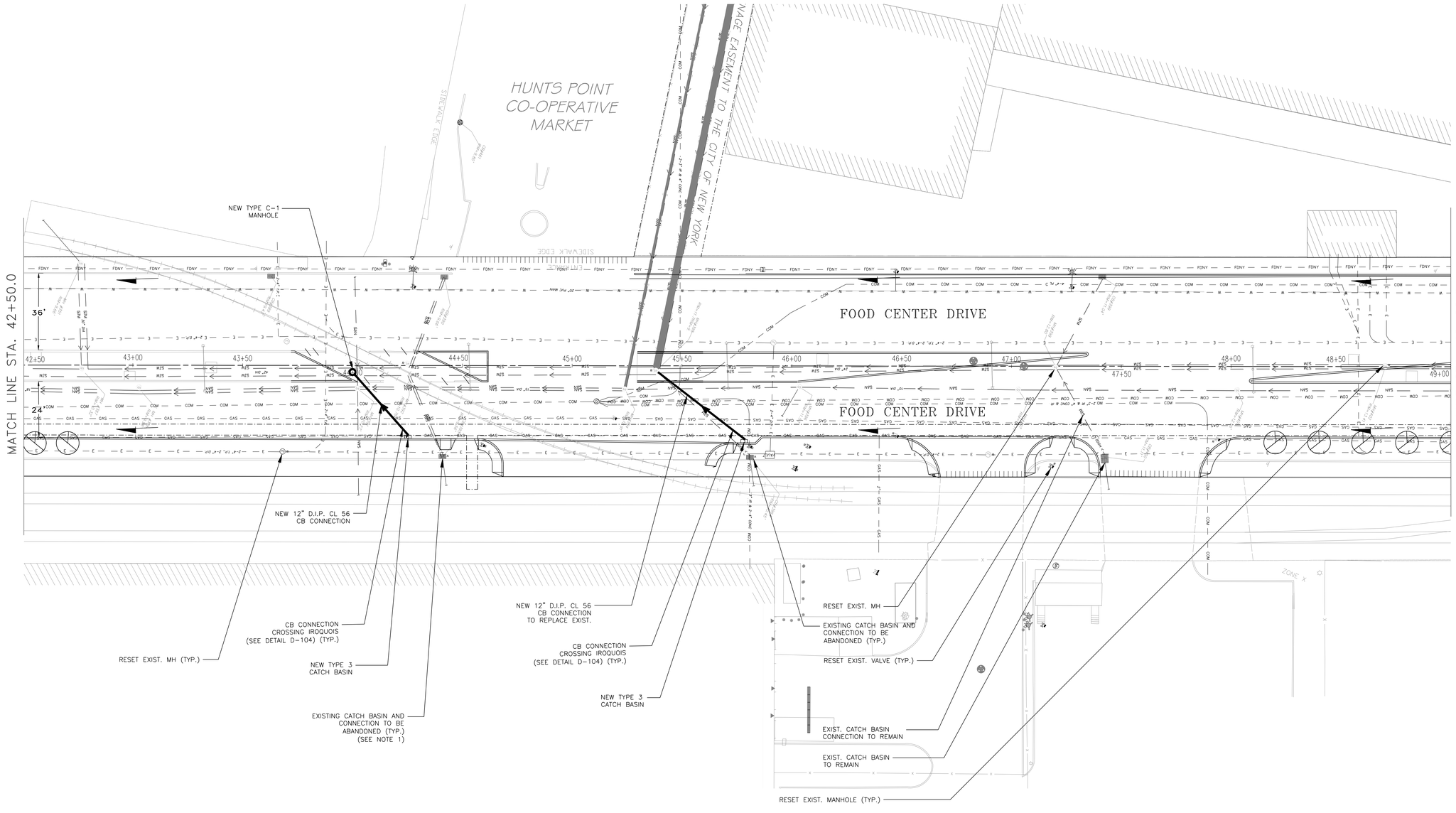

NOTE:

1. ALL EXISTING SEWER STRUCTURE TO BE ABANDONED, MUST BE REMOVED 2'-0" BELOW SURFACE AND REMAINING PORTION TO BE FILLED WITH FLOWABLE FILL AS PER NYCDEP STANDARDS. PIPES TO BE PLUGGED WITH 1'-0" DEPTH OF CONCRETE.

2. NO ACTIVITY WHATSOEVER MAY BE PERFORMED ON IROQUOIS' RIGHT-OF-WAY OR EASEMENT WITHOUT AN IROQUOIS REPRESENTATIVE ON SITE. AN APPOINTMENT WITH A REPRESENTATIVE CAN BE MADE BY CONTACTING THE NEAREST IROQUOIS OFFICE 46 HOURS IN ADVANCE. FOR INFORMATION PLEASE CALL 800.253.5152. FOR EMERGENCIES, PLEASE CALL 800.888.3982.

GRAPHIC SCALE
(IN FEET)
20 0 5 10 20 40

Project:

SOUTH BRONX GREENWAY

FOOD CENTER DRIVE

Client:

New York City Economic Development Corporation

Landscape Architect and Prime Consultant:

Mathews Nielsen Landscape Architects, PC

120 Broadway, Suite 1040
New York, NY 10271
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Survey
Mercator Land Surveying, LLC
175 West 93rd Street, 12th Floor
New York, NY 10025
Tel: 646 837 0780
Fax: 212 504 2602

Location Plan:

Seal:

This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund, Local Waterfront Revitalization

Submissions:

Date:	Type:

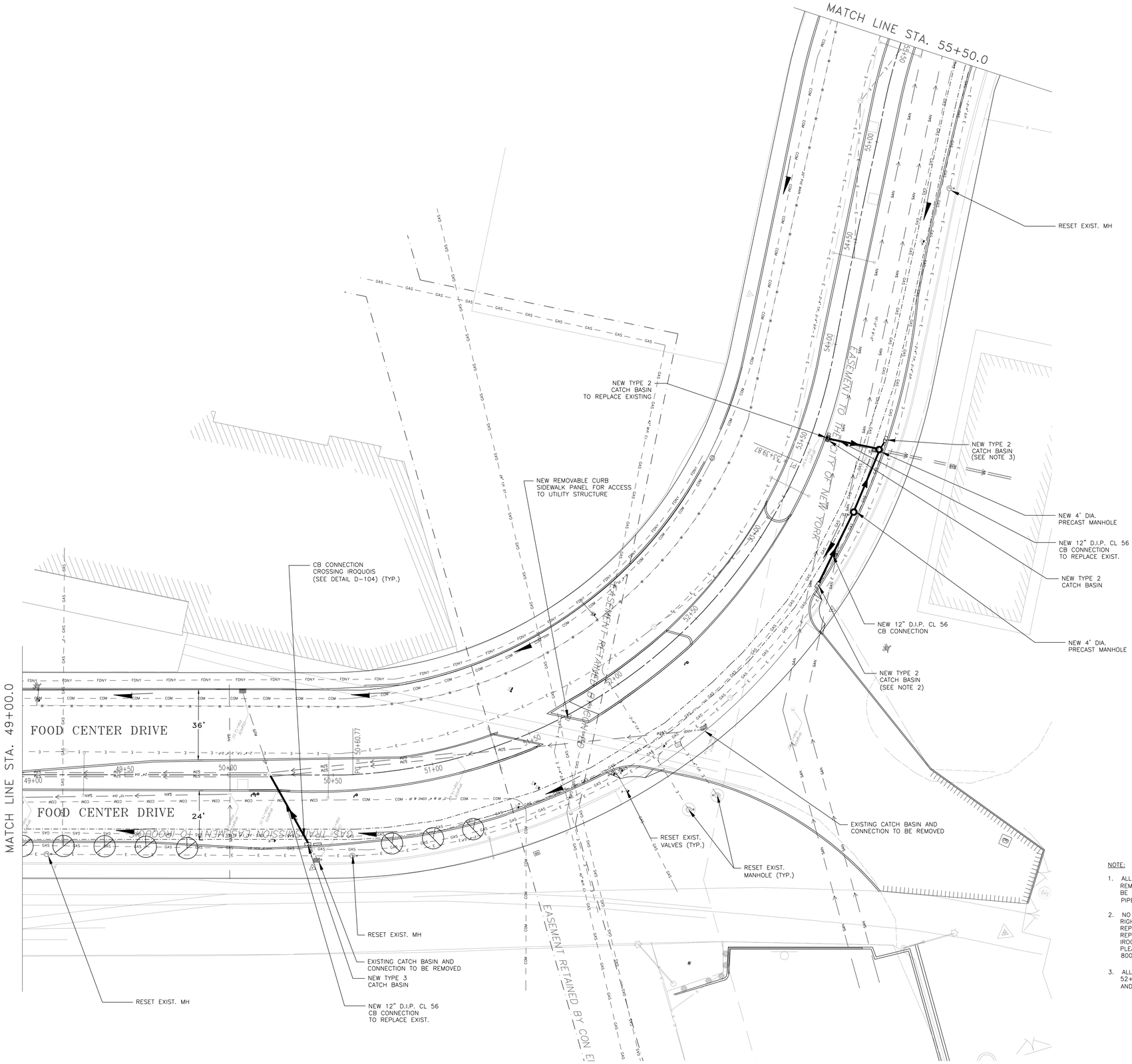
Project Phase:

95% CD SUBMISSION

Drawing Title:

UTILITY PLAN
FROM STA. 42+50.0 TO STA. 49+00.0

Scale: 1" = 20'-0"	Date: AUGUST 31, 2011
Drawn By: MN	Sheet No. 8 OF 12
Checked By: JM	Drawing No. U-108
MNLA Project No: 06-512	



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3. ALL NEW MANHOLES AND CATCH BASINS BETWEEN STATIONS 52+50 AND 72+00 ARE TEMPORARY, AND WILL BE REPLACED AND/OR UPGRADED IN FUTURE NYCEDC PROJECTS.

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40

Project:

SOUTH BRONX GREENWAY

FOOD CENTER DRIVE

Client:

New York City Economic Development Corporation

Landscape Architect and Prime Consultant:

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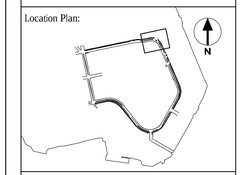
Location Plan:



Seal:

This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund, Local Waterfront Revitalization

NEW YORK STATE DEPARTMENT OF STATE

Submissions:
Date: Type:

Project Phase:
95% CD SUBMISSION

Drawing Title:
UTILITY PLAN
FROM STA. 49+00.0 TO STA. 55+50.0

Scale: 1" = 20'-0"	Date: AUGUST 31, 2011
Drawn By: MN	Sheet No. 9 OF 12
Checked By: JM	Drawing No. U-109
MNLA Project No: 06-512	

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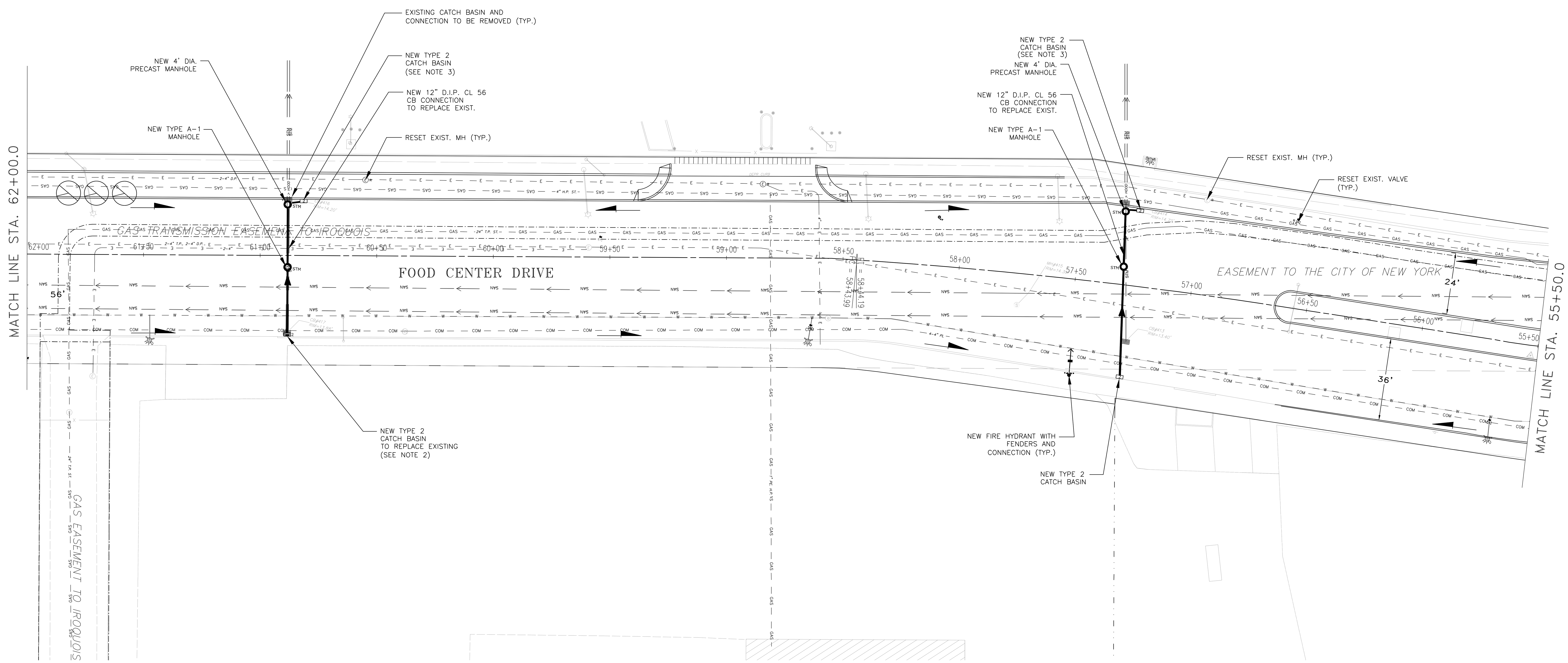

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GRAPHIC SCALE
(IN FEET)

Project:

SOUTH BRONX GREENWAY

FOOD CENTER DRIVE

Client:

New York City Economic Development Corporation

Landscape Architect and Prime Consultant:
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Location Plan:

Seal:

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NEW YORK STATE DEPARTMENT OF STATE

Submissions:
Date: Type:

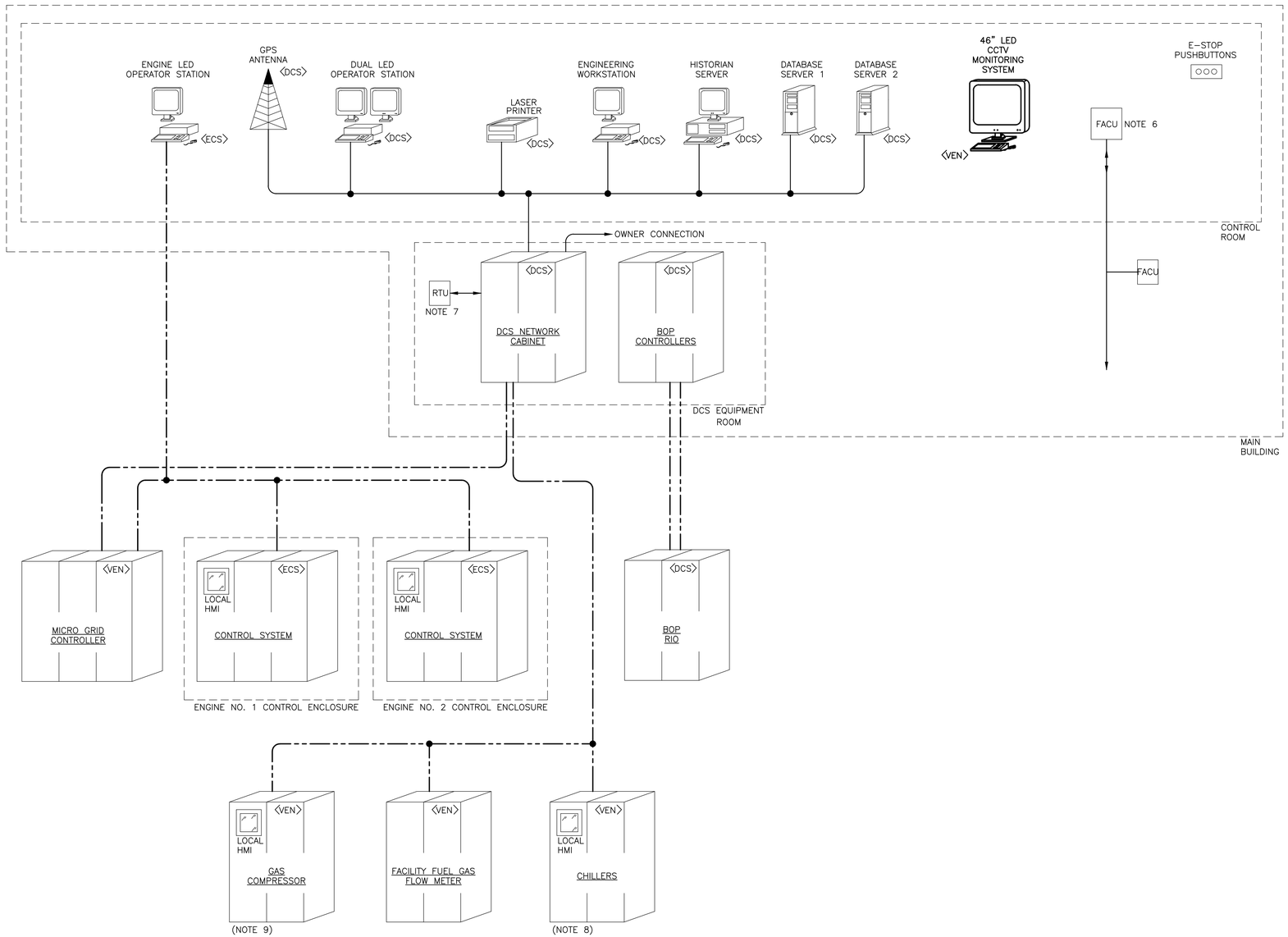
Project Phase:
95% CD SUBMISSION

Drawing Title:
UTILITY PLAN
FROM STA. 55+50.0 TO STA. 62+00.0

Scale:	1" = 20'-0"	Date:	AUGUST 31, 2011
Drawn By:	MN	Sheet No.	10 OF 12
Checked By:	JM	Drawing No.	U-110
MNLA Project No:	06-512		

APPENDIX 2B

- Tri-generation Facility Control System Architecture
- Tri-generation Facility One-line Diagram, 4160V Service Bus
- Tri-generation Facility One-line Diagram, MCC



NOTES:

1. THE QUANTITY OF DCS PROCESSORS/CABINETS SHOWN IS NOT INTENDED TO DEFINE THE ACTUAL QUANTITY REQUIRED. DESIGN ENGINEER TO ESTABLISH ACTUAL QUANTITY REQUIRED TO MEET SPECIFICATION REQUIREMENTS AND STATION CONFIGURATION. IN ADDITION, THE NETWORK AND HARDWARE CONFIGURATION IS NOT INTENDED TO DEFINE A PARTICULAR SUPPLIERS SYSTEM, IT IS INTENDED TO SHOW FUNCTIONAL REQUIREMENTS ONLY.
2. EACH DCS OPERATOR STATION AND WORKSTATION IS INDIVIDUALLY CONNECTED TO EACH OF TWO (2) NETWORK SWITCHES. THE DRAWING REPRESENTATION SHOWN IS FOR CLARITY.
3. EACH DCS CPU IS INDIVIDUALLY CONNECTED TO EACH OF TWO (2) NETWORK SWITCHES. THE DRAWING REPRESENTATION SHOWN IS FOR CLARITY.
4. ALL NETWORK COMMUNICATIONS BETWEEN BUILDINGS SHALL BE REDUNDANT FIBER OPTIC.
5. ECS NETWORK ARCHITECTURE AND HARDWARE CONFIGURATION SHOWN IS NOT INTENDED TO SHOW ALL DETAILS, IT IS INTENDED TO SHOW FUNCTIONAL REQUIREMENTS ONLY.
6. MAIN FIRE ALARM AND GAS DETECTION ANNUNCIATOR PANEL LOCATED IN CONTROL ROOM, WITH LOCAL PANELS CONNECTED VIA NETWORK ACROSS SITE (NOT INTERFACED WITH DCS).
7. DCS SHALL INCLUDE PROVISIONS FOR COMMUNICATION WITH RTU SYSTEM TO SUPPORT AUTOMATIC GENERATION CONTROL (AGC) AND MONITORING OF PRIMARY STATION DATA IF REQUIRED.
8. TYPICAL FOR ALL CHILLERS
9. TYPICAL FOR ALL GAS COMPRESSORS.

LEGEND:

BOP	BALANCE OF PLANT
CCTV	CLOSED CIRCUIT TV
〈DCS〉	DISTRIBUTED CONTROL SYSTEM
ECS	ENGINE CONTROL SYSTEM
FACU	FIRE ALARM CONTROL SYSTEM
MCC	MOTOR CONTROL CENTER
MGC	MICRO GRID CONTROLLER
PLD	PROGRAMMABLE LOGIC CONTROLLER
RIO	REMOTE I/O
〈VEN〉	EQUIPMENT SUPPLIER DEFINITION

COPPER CONNECTION
FIBER OPTIC CONNECTION

ISSUE	DATE	DESCRIPTION
B	09/13/2018	FOR CLIENT REVIEW
A	09/10/2018	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	E. TOWNLEY
ENGINEER	C. WILSON
CHECKED	C. ROGERS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

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NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY
PILOT PROJECT

TRI-GENERATION FACILITY
CONTROL SYSTEM ARCHITECTURE

0 1" 2"

FILENAME K603
SCALE NONE

SHEET 00

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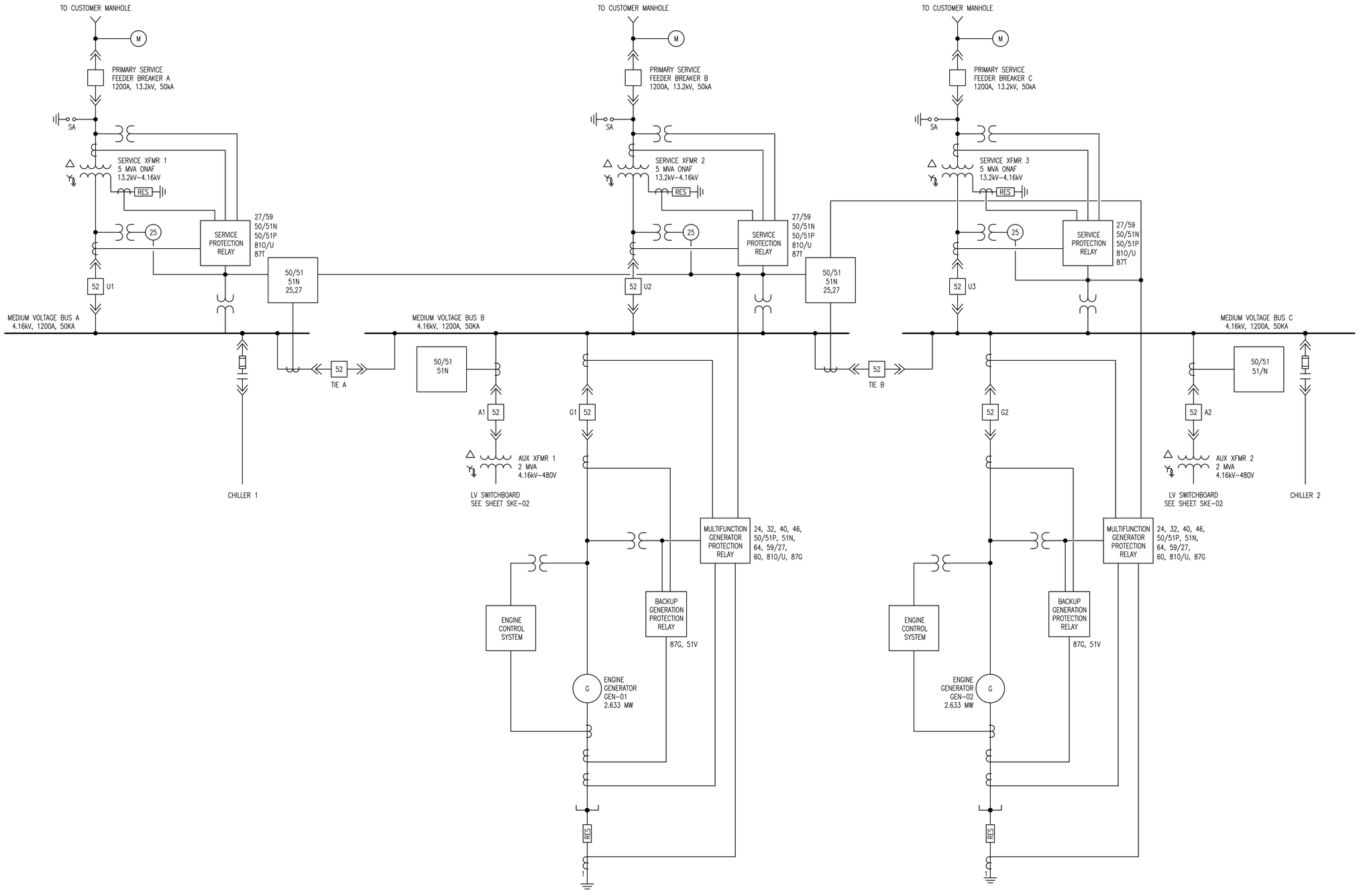

NOTES:

1. ALL EQUIPMENT RATINGS ARE ESTIMATED. EQUIPMENT RATINGS WILL BE FINALIZED UPON SELECTION OF MAJOR EQUIPMENT AND OVERALL SITE DESIGN.
2. ALL MV SWITCHGEAR TO BE ARC RESISTANT TYPE 2B.
3. GENERATORS TO BE LOW RESISTANCE GROUNDED.
4. PRIMARY SERVICE FEEDER BREAKERS TO BE INTERLOCKED WITH CORRESPONDING SECONDARY SERVICE BREAKERS SUCH THAT PRIMARY BREAKER IN THE CLOSED POSITION IS A PERMISSIVE TO CLOSE THE SECONDARY BREAKER.

ISSUE	DATE	DESCRIPTION
B	09/13/2018	FOR CLIENT REVIEW
A	09/10/2018	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	R. BROWN
ENGINEER	A. STOLZ
CHECKED	S.A. SHAUKAT
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

ONE-LINE DIAGRAM 41□0V SERVICE BUS

0 1" 2"

FILENAME SKE-01.dwg
SCALE NONE

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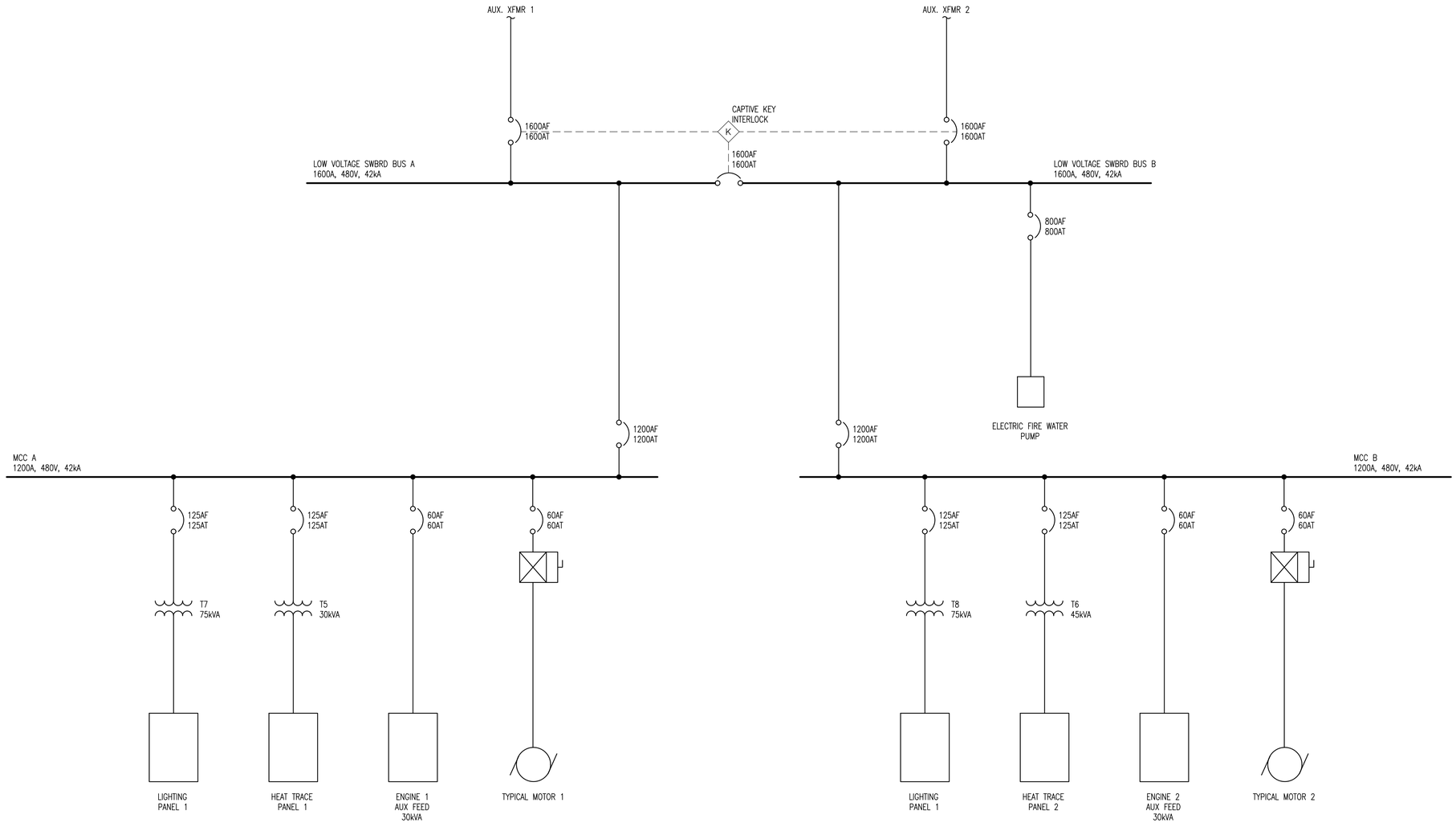

NOTES:

1. ALL EQUIPMENT RATINGS ARE ESTIMATED. EQUIPMENT RATINGS WILL BE FINALIZED UPON SELECTION OF MAJOR EQUIPMENT AND OVERALL SITE DESIGN.
2. TYPICAL MOTOR STARTER SHOWN. LOAD CONTROL AND SIZING WILL BE FINALIZED UPON SELECTION OF MAJOR EQUIPMENT.

ISSUE	DATE	DESCRIPTION
B	09/13/2018	FOR CLIENT REVIEW
A	09/10/2018	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	R. BROWN
ENGINEER	A. STOLZ
CHECKED	S.A. SHAUKAT
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

NYCEDC
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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

MCC ONE-LINE DIAGRAM

0 1" 2"

FILENAME SKE-02.dwg

SCALE NONE

SHEET S□E-0□

APPENDIX 2C

- Representative Manufacturer Data Sheets

VAPOUR ABSORPTION CHILLER
(Data received by HDR from Thermax)

CLIENT:	**NYCEDC**	**DATE:**	**11/2/2017**
PROJECT:	**Hunts Point Resiliency Pilot Project**	**MODEL:**	**5G 8L C**

	DESCRIPTION	**UNITS**	**VALUE**
	Cooling Capacity (±3%)	**TR**	**500**
		BTU/hr	**5998542**
A	**CHILLED WATER CIRCUIT:**		
1.	Chilled Water Inlet Temperature	°F	41.0
2.	Chilled Water Outlet Temperature	°F	32.0
3.	Chilled Water Flow Rate	GPM	1373.0
4.	Passes in Evaporator	Nos.	2+2
5.	Chilled Water Circuit Friction Loss	ft WC	23.0
6.	Glycol in Chilled Water		PG
7.	Concentration of Glycol	%	15.0
8.	Fouling Factor	ft² hr °F/BTU	Standard
9.	Connection Diameter (Indicative)	Inches	14.0
10.	Maximum Working Pressure	PSI g	113.8
B	**COOLING WATER CIRCUIT:**		
1.	Heat Rejected	MBH	15391.0
2.	Cooling Water Inlet Temperature	°F	85.0
3.	Cooling Water Outlet Temperature	°F	96.7
4.	Cooling Water Flow Rate	GPM	2642.0
5.	Cooling Water Bypass Flow	GPM	0
6.	Passes in Absorber / Condenser	Nos.	1+1/4,4
7.	Cooling Water Circuit Friction Loss	ft WC	39.4
8.	Glycol in Cooling Water		NA
9.	Concentration of Glycol	%	0
10.	Fouling Factor	ft² hr °F/BTU	Standard
11.	Connection Diameter (Indicative)	Inches	16.0
12.	Maximum Working Pressure	PSI g	113.8
C	**LT HOT WATER CIRCUIT:**		
1.	Heat Input	MBH	9391.0
2.	Hot Water Inlet Temperature	°F	203.0
3.	Hot Water Outlet Temperature	°F	190.4
4.	Hot Water Flow Rate (± 3 %)	GPM	1541.0
5.	Passes in Hot Water	Nos.	1+1
6.	Hot Water Circuit Friction Loss (Indicative)	ft WC	8.2
7.	Glycol in Hot Water		NA
8.	Concentration of Glycol	%	0
9.	Fouling Factor	ft² hr °F/BTU	Standard
10.	Connection Diameter (Indicative)	Inches	10.0
11.	Maximum Working Pressure	PSI g	113.8

D	**ELECTRICAL DATA:**		
1.	Power Supply (3 Phase + N)	V, Hz	460 (±10%) 60 (±5%)
2.	Absorbent pump (SE)	kW(A)	5.5 (17)
3.	Refrigerant pump	kW(A)	1.5 (5.0)
4.	Vacuum pump	kW(A)	0.75 (1.8)
5.	Power consumption	kVA	19.0
E	**PHYSICAL DATA (APPROXIMATE, ±10%):**		
1.	Length	Inches	296.0
2.	Width	Inches	124.0
3.	Height	Inches	161.0
4.	Dry Weight	lbs	74738.0
5.	Operating Weight	lbs	114642.4
F	**TUBE METALLURGY:**		
1.	Evaporator		Copper
2.	Absorber		Copper
3.	Condenser		Copper
4.	Hot Water Generator		SS 430Ti

Note: 1. This Selection is valid for Insulated Chiller only.
2. For Non-Insulated Chiller, the Capacity & Heat Source Consumption will vary.
3. Plant room temperature should be from +5°C to +45°C (41°F to 113°F).
4. Please contact Thermax representative/office for Customized Specifications.

VAPOUR ABSORPTION CHILLER
(Data received by HDR from Thermax)

CLIENT:	**NYCEDC**	**DATE:**	**11/2/2017**
PROJECT:	**Hunts Point Resiliency Pilot Project**	**MODEL:**	**HD 80A TCU**

	DESCRIPTION	**UNITS**	**VALUE**
	Cooling Capacity (±3%)	**TR**	**500**
		BTU/hr	**5998542**
A	**CHILLED WATER CIRCUIT:**		
1.	Chilled Water Inlet Temperature	°F	41.0
2.	Chilled Water Outlet Temperature	°F	32.0
3.	Chilled Water Flow Rate	GPM	1373.0
4.	Passes in Evaporator	Nos.	2+2
5.	Chilled Water Circuit Friction Loss	ft WC	39.4
6.	Glycol in Chilled Water		PG
7.	Concentration of Glycol	%	15.0
8.	Fouling Factor	ft² hr °F/BTU	0.0001
9.	Connection Diameter (Indicative)	Inches	14.0
10.	Maximum Working Pressure	PSI g	113.8
B	**COOLING WATER CIRCUIT:**		
1.	Heat Rejected	MBH	11626.0
2.	Cooling Water Inlet Temperature	°F	85.0
3.	Cooling Water Outlet Temperature	°F	93.8
4.	Cooling Water Flow Rate	GPM	2642.0
5.	Cooling Water Bypass Flow	GPM	0
6.	Passes in Absorber / Condenser	Nos.	1+1/1
7.	Cooling Water Circuit Friction Loss	ft WC	14.8
8.	Glycol in Cooling Water		NA
9.	Concentration of Glycol	%	0
10.	Fouling Factor	ft² hr °F/BTU	0.00025
11.	Connection Diameter (Indicative)	Inches	18.0
12.	Maximum Working Pressure	PSI g	113.8
C	**HT HOT WATER CIRCUIT:**		
1.	Heat Input	MBH	5626.0
2.	Hot Water Inlet Temperature	°F	350.0
3.	Hot Water Outlet Temperature	°F	331.9
4.	Hot Water Flow Rate (± 3 %)	GPM	671.0
5.	Passes in Hot Water	Nos.	3.0
6.	Hot Water Circuit Friction Loss (Indicative)	ft WC	13.8
7.	Glycol in Hot Water		NA
8.	Concentration of Glycol	%	0
9.	Fouling Factor	ft² hr °F/BTU	Standard
10.	Connection Diameter (Indicative)	Inches	6.0

11.	Maximum Working Pressure	PSI g	149.3
D	**ELECTRICAL DATA:**		
1.	Power Supply (3 Phase + N)	V, Hz	460 (±10%) 60 (±5%)
2.	Absorbent pump (DE)	kW(A)	7.5 (20.0)
3.	Refrigerant pump	kW(A)	1.5 (5.0)
4.	Vacuum pump	kW(A)	0.75 (1.8)
5.	Power consumption	kVA	21.5
E	**PHYSICAL DATA (APPROXIMATE, ±10%):**		
1.	Length	Inches	330.0
2.	Width	Inches	140.0
3.	Height	Inches	171.0
4.	Dry Weight	lbs	88627.4
5.	Operating Weight	lbs	122138.3
F	**TUBE METALLURGY:**		
1.	Evaporator		Copper
2.	Absorber		Copper
3.	Condenser		Copper
4.	Hot Water Generator		SS 430Ti

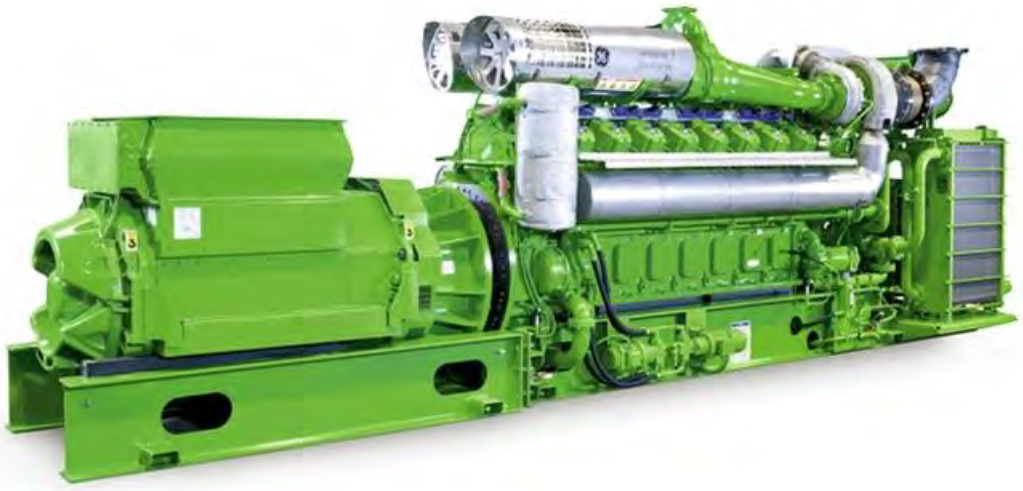
Note: 1. This Selection is valid for Insulated Chiller only.
2. For Non-Insulated Chiller, the Capacity & Heat Source Consumption will vary.
3. Plant room temperature should be from +5°C to +45°C (41°F to 113°F).
4. Please contact Thermax representative/office for Customized Specifications.
5. The Selection is as per ARI 560-2000.

Technical Description
Cogeneration Unit

JMS 616 GS-N.L
with Island Operation

Quaker Peterborough
JMS 612 J01, 4160V

The ratings in the specification are valid for full load operation at a site installation of 195 m and an air intake temperature of T1 < 31C. At T1 > 31C, an output de-rating of 2%/C will occur.



Electrical output	**2656 kWe**
Thermal output	**1375 kW**

Emission values
NOx < 500 mg/Nm³ (5% O2)

0.01 Technical Data (at module)

Fuel gas LHV		kWh/Nm³		9.5		
				100%	**75%**	**50%**
Energy input		kW	[2]	5,860	4,494	3,128
Gas volume		Nm³/h	*)	617	473	329
Mechanical output		kW	[1]	2,745	2,058	1,372
Electrical output		kW el.	[4]	2,656	1,982	1,306
Recoverable thermal output						
~ Intercooler 1st stage		kW	[9]	686	383	144
~ Lube oil (with gearbox)		kW		279	248	211
~ Jacket water		kW		410	361	304
~ Exhaust gas cooled to 364 °C		kW		~	~	~
Total recoverable thermal output		kW	[5]	1,375	992	660
Total output generated		kW total		4,031	2,974	1,966
Heat to be dissipated						
~ Intercooler 2nd stage		kW		183	113	69
~ Lube oil (with gearbox)		kW		~	~	~
~ Surface heat	ca.	kW	[7]	200	~	~
Spec. fuel consumption of engine electric		kWh/kWel.h	[2]	2.21	2.27	2.40
Spec. fuel consumption of engine		kWh/kWh	[2]	2.14	2.18	2.28
Lube oil consumption	ca.	kg/h	[3]	0.55	~	~
Electrical efficiency		%		45.3%	44.1%	41.8%
Thermal efficiency		%		23.5%	22.1%	21.1%
Total efficiency		%	[6]	68.8%	66.2%	62.8%
Hot water circuit:						
Forward temperature		°C		90.0	84.4	79.6
Return temperature		°C		70.0	70.0	70.0
Hot water flow rate		m³/h		69.1	69.1	69.1

*) approximate value for pipework dimensioning
[_] Explanations: see 0.10 - Technical parameters

All heat data is based on standard conditions according to attachment 0.10. Deviations from the standard conditions can result in a change of values within the heat balance, and must be taken into consideration in the layout of the cooling circuit/equipment (intercooler; emergency cooling; ...). In the specifications in addition to the general tolerance of ±8 % on the thermal output a further reserve of +5 % is recommended for the dimensioning of the cooling requirements.

Main dimensions and weights (at module)(with gearbox)

Length	mm	~ 10,000
Width	mm	~ 2,200
Height	mm	~ 2,800
Weight empty	kg	~ 30,900
Weight filled	kg	~ 31,900

Connections

Hot water inlet and outlet [A/B]	DN/PN	100/10
Exhaust gas outlet [D]	DN/PN	600/10
Fuel Gas (at module)	DN/PN	100/10
Water drain ISO 228	G	½"
Condensate drain	DN/PN	65/10
Safety valve - jacket water ISO 228	DN/PN	2x1½"/2,5
Safety valve - hot water	DN/PN	50/16
Lube oil replenishing (pipe)	mm	28
Lube oil drain (pipe)	mm	28
Jacket water - filling (flex pipe)	mm	13
Intercooler water-Inlet/Outlet 1st stage	DN/PN	100/10
Intercooler water-Inlet/Outlet 2nd stage	DN/PN	65/10

Output / fuel consumption

ISO standard fuel stop power ICFN	kW	2,745
Mean effe. press. at stand. power and nom. speed	bar	22.00
Fuel gas type		Natural gas
Based on methane number | Min. methane number	MZ d)	90 | 80
Compression ratio	Epsilon	12
Min. fuel gas pressure for the pre chamber	bar	4.19
Min./Max. fuel gas pressure at inlet to gas train	bar	4 - 8 c)
Allowed Fluctuation of fuel gas pressure	%	± 10
Max. rate of gas pressure fluctuation	mbar/sec	10
Maximum Intercooler 2nd stage inlet water temperature	°C	45
Spec. fuel consumption of engine	kWh/kWh	2.14
Specific lube oil consumption	g/kWh	0.20
Max. Oil temperature	°C	80
Jacket-water temperature max.	°C	95
Filling capacity lube oil (refill)	lit	~ 648

c) Lower gas pressures upon inquiry
d) based on methane number calculation software AVL 3.2 (calculated without N2 and CO2)

0.02 Technical data of engine

Manufacturer		GE Jenbacher
Engine type		J 616 GS-J01
Working principle		4-Stroke
Configuration		V 60°
No. of cylinders		16
Bore	mm	190
Stroke	mm	220
Piston displacement	lit	99.80
Nominal speed	rpm	1,500
Mean piston speed	m/s	11.00
Length	mm	4,894
Width	mm	1,886
Height	mm	2,503
Weight dry	kg	12,500
Weight filled	kg	13,500
Moment of inertia	kgm²	64.96
Direction of rotation (from flywheel view)		left
Radio interference level to VDE 0875		N
Starter motor output	kW	20
Starter motor voltage	V	24

Thermal energy balance

Energy input	kW	5,860
Intercooler	kW	869
Lube oil (with gearbox)	kW	279
Jacket water	kW	410
Exhaust gas cooled to 180 °C	kW	833
Exhaust gas cooled to 100 °C	kW	1,185
Surface heat	kW	103

Exhaust gas data

Exhaust gas temperature at full load	°C [8]	364 / 416 / 468
Exhaust gas mass flow rate, wet	kg/h	14,771 / 10,822 / 7,267
Exhaust gas mass flow rate, dry	kg/h	13,859 / 10,123 / 6,780
Exhaust gas volume, wet	Nm³/h	11,683 / 8,569 / 5,769
Exhaust gas volume, dry	Nm³/h	10,548 / 7,698 / 5,153
Max.admissible exhaust back pressure after y-pipe	mbar	50

Combustion air data

Combustion air mass flow rate	kg/h	14,365 / 10,511 / 7,051
Combustion air volume	Nm³/h	11,116 / 8,134 / 5,456
Max. admissible pressure drop at air-intake filter	mbar	10

Sound pressure level

Aggregate a)	dB(A) re 20µPa	102
31,5 Hz	dB	83
63 Hz	dB	90
125 Hz	dB	96
250 Hz	dB	98
500 Hz	dB	97
1000 Hz	dB	95
2000 Hz	dB	94
4000 Hz	dB	94
8000 Hz	dB	92
Exhaust gas b)	dB(A) re 20µPa	119
31,5 Hz	dB	109
63 Hz	dB	119
125 Hz	dB	128
250 Hz	dB	117
500 Hz	dB	115
1000 Hz	dB	114
2000 Hz	dB	111
4000 Hz	dB	106
8000 Hz	dB	91

Sound power level

Aggregate	dB(A) re 1pW	124
Measurement surface	m²	149
Exhaust gas	dB(A) re 1pW	127
Measurement surface	m²	6.28

a) average sound pressure level on measurement surface in a distance of 1m (converted to free field) according to DIN 45635, precision class 3.
b) average sound pressure level on measurement surface in a distance of 1m according to DIN 45635, precision class 2.
The spectra are valid for aggregates up to bmep=22 bar. (for higher bmep add safety margin of 1dB to all values per increase of 1 bar pressure).
Engine tolerance ± 3 dB

0.02.01 Technical data of gearbox

Manufacturer		EISENBEISS
Type		~
Gearbox ratio		1:1,2
Efficiency	%	99.49
Mass	kg	1,700

0.03 Technical data of generator

Manufacturer		AVK e)
Type		DIG 130 k/4 e)
Type rating	kVA	3,600
Driving power	kW	2,731
Ratings at p.f. = 1,0	kW	2,656
Ratings at p.f. = 0.8	kW	2,634
Rated output at p.f. = 0.8	kVA	3,293
Rated reactive power at p.f. = 0.8	kVar	1,976
Rated current at p.f. = 0.8	A	457
Frequency	Hz	60
Voltage	kV	4.16
Speed	rpm	1,800
Permissible overspeed	rpm	2,250
Power factor (lagging - leading)		0,8 - 1,0
Efficiency at p.f. = 1,0	%	97.3%
Efficiency at p.f. = 0.8	%	96.5%
Moment of inertia	kgm²	110.00
Mass	kg	7,500
Radio interference level to EN 55011 Class A (EN 61000-6-4)		N
Ik'' Initial symmetrical short-circuit current	kA	2.66
Is Peak current	kA	6.77
Insulation class		F
Temperature (rise at driving power)		F
Maximum ambient temperature	°C	40

Reactance and time constants (saturated)

xd direct axis synchronous reactance	p.u.	2.05
xd' direct axis transient reactance	p.u.	0.27
xd'' direct axis sub transient reactance	p.u.	0.17
x2 negative sequence reactance	p.u.	0.17
Td'' sub transient reactance time constant	ms	15
Ta Time constant direct-current	ms	90
Tdo' open circuit field time constant	s	3.10

e) GE Jenbacher reserves the right to change the generator supplier and the generator type. The contractual data of the generator may thereby change slightly. The contractual produced electrical power will not change.

0.04 Technical data of heat recovery

General data - Hot water circuit

Total recoverable thermal output	kW	1,375
Return temperature	°C	70.0
Forward temperature	°C	90.0
Hot water flow rate	m³/h	69.1
Nominal pressure of hot water	PN	10
min. operating pressure	bar	3.5
max. operating pressure	bar	9.0
Pressure drop hot water circuit	bar	1.20
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

General data - Cooling water circuit

Heat to be dissipated	kW	183
Return temperature	°C	45
Cooling water flow rate	m³/h	35
Nominal pressure of cooling water	PN	10
min. operating pressure	bar	0.5
max. operating pressure	bar	5.0
Loss of nominal pressure of cooling water	bar	~
Maximum Variation in return temperature	°C	+0/-5
Max. rate of return temperature fluctuation	°C/min	10

The final pressure drop will be given after final order clarification and must be taken from the P&ID order documentation.

connection variant H

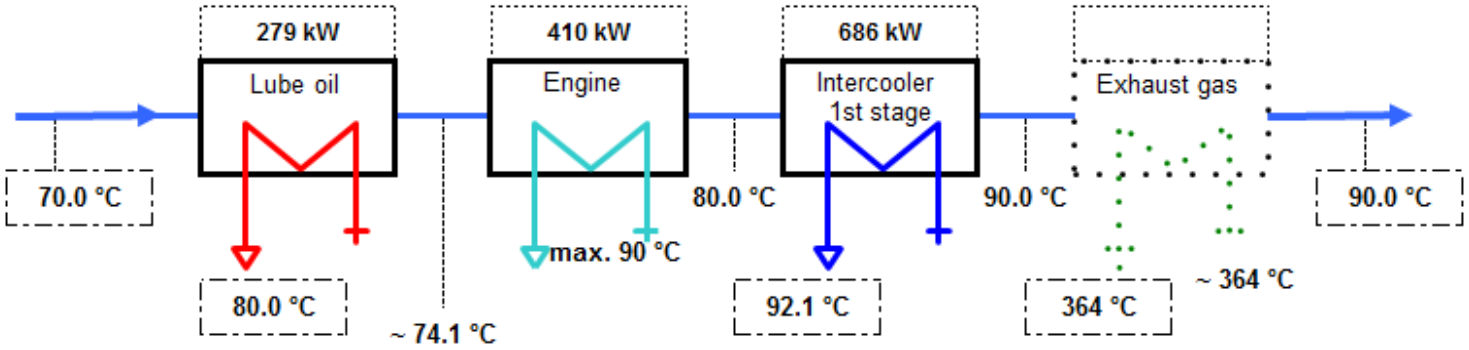
Hot water circuit (calculated with Glykol 50%)

Quaker Peterborough **J 616 GS-J01**

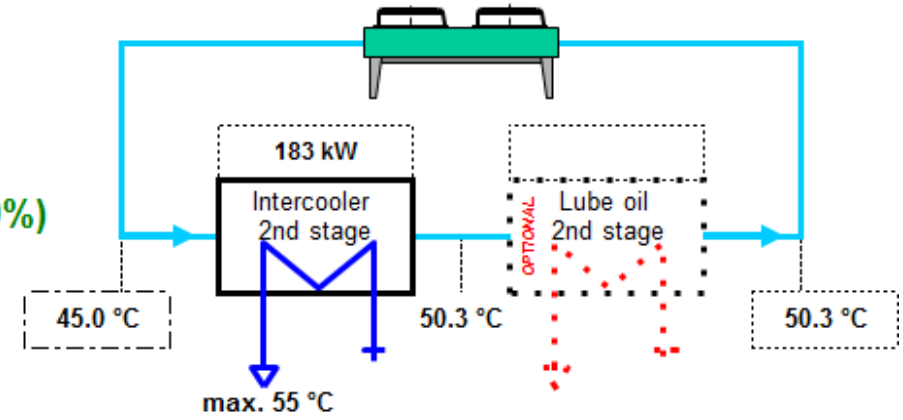
Recoverable thermal output = 1,375 kW

(±8 % tolerance +5 % reserve for cooling requirements)

Hot water flow rate = 69.1 m³/h



Low temperature circuit (calculated with Glykol 50%)



Heat to be dissipated = 183 kW

(±8 % tolerance +5 % reserve for cooling requirements)

Cooling water flow rate = 35.0 m³/h

0.10 Technical parameters

The following “Technical Instruction (TI) of GE JENBACHER” form an integral part of the contract and must be strictly observed:

TI 1100-0110 – Boundary Conditions for GE Jenbacher Gas Engines
TI 1100-0111 – General Conditions – Operation and Maintenance
TI 1100-0112 – Installation of GE Jenbacher Units

These Technical Instructions reference other guides and instructions which can be provided upon request. These instructions should be carefully reviewed by all personnel involved with the application, installation design, installation construction, and overall maintenance of any GE Jenbacher gas engine.

All data in the technical specification are based on engine full load (unless stated otherwise) at specified temperatures as well as the methane number and subject to technical development and modifications. For isolated operations, an output reduction may be applicable per the block load diagram. Before being able to provide exact output numbers, a detailed site load profile needs to be provided (motor starting curves, etc.).

All pressure indications are to be measured and read with pressure gauges (gauge).

(1) At nominal speed and standard reference conditions ICFN per DIN-ISO 3046 and DIN 6271, respectively
(2) As detailed in DIN-ISO 3046 and DIN 6271, respectively, with a tolerance of + 5 %.
Efficiency performance is based on a new unit (immediately upon commissioning). The effects of degradation during normal operation can be mitigated through regular service and maintenance work.
(3) Average value between oil change intervals as per the maintenance schedule, without oil change amount
(4) At p. f. = 1.0 as detailed in VDE 0530 REM / IEC 34.1 with relative tolerances, all direct driven pumps are included
(5) Total output with a tolerance of +/- 8 %
(6) As detailed in above parameters (1) through (5)
(7) Only valid for engine and generator; module and peripheral equipment not considered (at p. f. = 0.8), (guiding value)
(8) Exhaust temperature with a tolerance of +/- 8 %
(9) Intercooler heat on:
*** standard conditions (Vxx)** - If the turbocharger design is done for air intake temperature > 30°C (86°F) w/o de-rating, the intercooler heat of the 1st stage need to be increased by 2%/K starting from 25°C (77°F). Deviations between 25 – 30°C (77 – 86°F) will be covered with the standard tolerance.
*** Hot Country application (Vxxx)** - If the turbocharger design is done for air intake temperature > 40°C (104°F) w/o de-rating, the intercooler heat of the 1st stage need to be increased by 2%/K starting from 35°C (95°F). Deviations between 35 – 40°C (95 – 104°F) will be covered with the standard tolerance.

Definition of output

- ISO-ICFN continuous rated power:
  The Net Break Power that the engine manufacturer declares an engine is capable of delivering continuously, at stated speed, between the normal maintenance intervals and overhauls as required by the manufacturer. Power determined under the operating conditions of the manufacturer's test bench and adjusted to the standard reference conditions.
-
- Standard reference conditions:
  Barometric pressure: 1000 mbar (14.5 psig) or 100m (328ft) above sea level
  Air temperature: 25°C (77°F) or 298 K
  Relative humidity: 30 %

- Volume values at standard conditions (fuel gas, combustion air, exhaust gas)
  Pressure: 1013.25 mbar (14.7 psig)
  Temperature: 0°C (32°F) or 273 K

Output adjustment for turbo charged engines

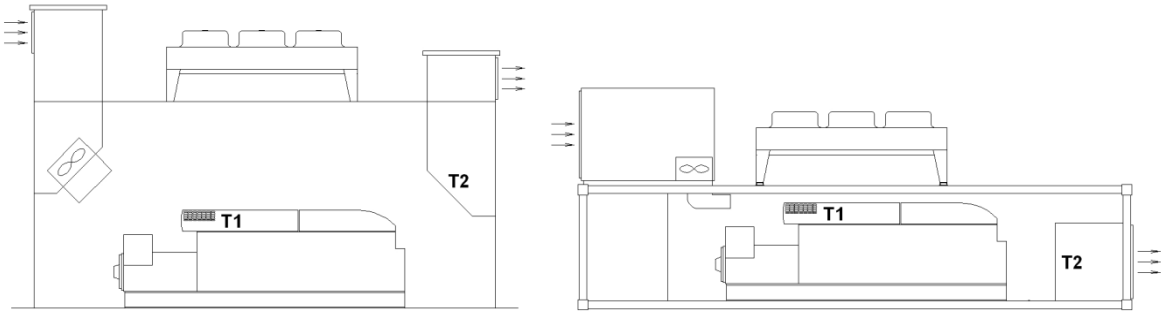
The ratings in this specification are valid for an installation at an altitude 195 m and an air intake temperature of T1 < 31C. At T1 > 31C, an output derating of 2.0%/C will occur.

Radio interference level

The ignition system of the gas engines complies the radio interference levels of CISPR 12 and EN 55011 class B, (30-75 MHz, 75-400 MHz, 400-1000 MHz) and (30-230 MHz, 230-1000 MHz), respectively.

Parameters for the operation of GE Jenbacher gas engines

Maximum room temperature: **50°C (122°F)** (T2) -> engine stop



If the actual methane number is lower than the specified, the knock control responds. First the ignition timing is changed at full rated power. Secondly the rated power is reduced. These functions are carried out by the engine management.

Operation of Voltage and frequency outside of stated limits for the generator as per IEC 60034-1 Zone A will result in a power de-rate up to and including tripping of the equipment.

The generator set fulfills ISO 8528-9 limits for mechanical vibrations.

If possible, railway trucks must not be used for transport (**TI 1000-0046**).

Parameters for the operation of control unit and the electrical equipment

- Relative humidity: 50%
- Maximum temperature: 40°C (104°F).
- **Altitude: < 6560ft (2000m) above the sea level.**

The gas quantity indicated under technical data refers to standard conditions with the given calorific value. Actual volume flow (under operating conditions) must be considered for dimensioning of any the gas compressor and associated fuel system component. These elements will also be affected by:

- Actual gas temperature (reference **TI 1000-0300** for temperature limits)
- Gas humidity (reference **TI 1000-0300** for temperature limits)
- Gas Pressure (page 5 of this specification)

1.00 Scope of supply - module

Design:
The module is built as a compact package. Engine and generator are connected through a coupling and are mounted to the base frame. To provide the best possible isolation from the transmission of vibrations the engine is mounted to the frame by means of anti-vibrational mounts. The remaining vibrations are eliminated by mounting the module on isolating pads (e.g. Sylomer). This, in principle, allows the module to be placed directly on any floor capable of carrying the static load. No special foundation is required. Prevention of sound conducted through solids has to be provided locally.

1.01 Spark ignited gas engine

Four-stroke, air/gas mixture turbocharged, aftercooled, with high performance ignition system and electronically controlled air/gas mixture system.
The engine is equipped with the most advanced

LEANOX® LEAN-BURN COMBUSTION SYSTEM

developed by GE JENBACHER.

1.01.01 Engine design

Engine block
Single-piece crankcase and cylinder block made of special casting; crank case covers for engine inspection, welded steel oil pan.

Crankshaft and main bearings
Drop-forged, precision ground, surface hardened, statically and dynamically balanced; main bearings (upper bearing shell: grooved bearing / lower bearing shell: sputter bearing) arranged between crank pins, drilled oil passages for forced-feed lubrication of connecting rods.

Vibration damper
Maintenance free viscous damper

Flywheel
With ring gear for starter motor and additionally screwed on.

Pistons
Single-piece made of steel, with piston ring carrier and oil passages for cooling; piston rings made of high quality material, main combustion chamber specially designed for lean burn operation.

Connecting rods
Drop-forged, heat-treated, big end diagonally split and toothed. Big end bearings (upper bearing shell: sputter bearing / lower bearing shell: sputter bearing) and connecting rod bushing for piston pin.

Cylinder liner
Chromium alloy gray cast iron, wet, individually replaceable.

Cylinder head
Specially designed and developed for GE JENBACHER-lean burn engines with optimized fuel consumption and emissions; water cooled, made of special casting, individually replaceable; Valve seats, valve guides and spark plug sleeves individually replaceable; exhaust and inlet valves made of high quality material; Pre-chamber with check-valve.

Crankcase breather
Connected to combustion air intake system.

Valve train
Camshaft, with replaceable bushings, driven by crankshaft through intermediate gears, valve lubrication by splash oil through rocker arms.

Combustion air/fuel gas system
Motorized carburetor for automatic adjustment according to fuel gas characteristic. Exhaust driven turbocharger, mixture manifold with bellows, water-cooled intercooler, throttle valve and distribution manifolds to cylinders.

Ignition system
Most advanced, fully electronic high performance ignition system, external ignition control.
MORIS: Automatically, cylinder selective registration and control of the current needed ignition voltage.

Lubricating system
Gear-type lube oil pump to supply all moving parts with filtered lube oil, pressure control valve, pressure relief valve and full-flow filter cartridges. Cooling of the lube oil is arranged by a heat exchanger.

Engine cooling system
Jacket water pump complete with distribution pipework and manifolds.

Exhaust system
Turbocharger and exhaust manifold

Exhaust gas temperature measuring
Thermocouple for each cylinder

Electric actuator
For electronic speed and output control

Electronic speed monitoring for speed and output control
By magnetic inductive pick up over ring gear on flywheel

Starter motor
Engine mounted electric starter motor

1.01.02 Additional equipment for the engine (spares for commissioning)

The initial set of equipment with the essential spare parts for operation after commissioning is included in the scope of supply.

1.01.03 Engine accessories

Insulation of exhaust manifold:
Insulation of exhaust manifold is easily installed and removed

Sensors at the engine:
- Jacket water temperature sensor
- Jacket water pressure sensor
- Lube oil temperature sensor
- Lube oil pressure sensor
- Mixture temperature sensor
- Charge pressure sensor
- Minimum and maximum lube oil level switch
- Exhaust gas thermocouple for each cylinder
- Knock sensors
- Gas mixer / gas dosing valve position reporting.

Actuator at the engine:
- Actuator - throttle valve
- Bypass-valve for turbocharger
- Control of the gas mixer / gas dosing valve

1.01.04 Standard tools (per installation)

The tools required for carrying out the most important maintenance work are included in the scope of supply and delivered in a toolbox.

1.02 Generator-Medium Voltage

The 2-bearing generator consists of the main generator (built as rotating field machine), the exciter machine (built as rotating armature machine) and the digital excitation system.
The digital regulator is powered by an auxiliary winding at the main stator or a PMG system

Main components:

- Enclosure of welded steel construction
- Stator core consist of thin insulated electrical sheet metal with integrated cooling channels.
- Stator winding with 5/6 Pitch
- Rotor consist of shaft with shrunken laminated poles, Exciter rotor, PMG (depending on type) and fan.
- Damper cage
- Excitation unit with rotating rectifier diodes and overvoltage protection
- Dynamically balanced as per ISO 1940, Balance quality G2,5
- Drive end bracket with re greaseable antifriction bearing
- Non-drive end bracket with re grease antifriction bearing
- Cooling IC01 - open ventilated, air entry at non-drive end, air outlet at the drive end side
- Main terminal box includes main terminals for power cables
- Regulator terminal box with auxiliary terminals for thermistor connection and regulator.
- Anti-condensation heater
- 3 PT100 for winding temperature monitoring+3 PT100 Spare
- 2 PT100 for bearing temperature monitoring
- Current transformer for protection and measuring in the star point
- xx/1A, 10P10 15VA, xx/1A, 1FS5, 15VA

Electrical data and features:

- Standards: IEC 60034, EN 60034, VDE 0530, ISO 8528-3, ISO 8528-9
- Voltage adjustment range: +/- 10 % of rated voltage (continuous)
- Frequency: -6/+4% of rated frequency
- Overload capacity: 10% for one hour within 6 hours, 50% for 30 seconds
- Asymmetric load: max. 8% I2 continuous, in case of fault I2 x t = 20
- Altitude: < 1000m
- Permitted generator intake air temperature: 5°C - 40°C
- Max. relative air humidity: 90%
- Voltage curve THD Ph-Ph: <3% at idle operation and <3% at full load operation with linear symmetrical load
- Generator suitable for parallel operating with the grid and other generators
- Sustained short circuit current at 3-pole terminal short circuit: minimum 3 times rated current for 5 seconds.
- Over speed test with 1.2 times of rated speed for 2 minutes per IEC 60034

Digital Excitation system ABB Unitrol 1010 mounted within the AVR Terminal box with following features:

- Compact and robust Digital Excitation system for Continuous output current up to 10 A (20A Overload current 10s)
- Fast AVR response combined with high excitation voltage improves the transient stability during LVRT events.
- The system has free configurable measurement and analog or digital I/Os. The configuration is done via the local human machine interface or CMT1000
- Power Terminals
  3 phase excitation power input from PMG or auxiliary windings
  Auxiliary power input 24VDC
- Excitation output
- Measurement terminals: 3 phase machine voltage, 1 phase network voltage, 1 phase machine current
- Analog I/Os: 2 outputs / 3 inputs (configurable), +10 V / -10 V
- Digital I/O: 4 inputs only (configurable), 8 inputs / outputs (configurable)
- Serial fieldbus: RS485 for Modbus RTU or VDC (Reactive power load sharing for up to 31 GEJ engines in island operation), CAN-Bus for dual channel communication
- Regulator Control modes: Bump less transfer between all modes
  Automatic Voltage Regulator (AVR) accuracy 0,1% at 25°C ambient temperature
  Field Current Regulator (FCR)
  Power Factor Regulator (PF)
  Reactive Power Regulator (VAR)
- Limiters: Keeping synchronous machines in a safe and stable operation area
  Excitation current limiter (UEL min / OEL max)
  PQ minimum limiter
  Machine current limiter
  V / Hz limiter
  Machine voltage limiter
- Voltage matching during synchronization
- Rotating diode monitoring
- Dual channel / monitoring: Enables the dual channel operation based on self-diagnostics and set point follow up over CAN communication. (Option)
- Power System Stabilizer (PSS) is available as option. Compliant with the standard IEEE 421.5-2005 2A / 2B, the PSS improves the stability of the generator over the highest possible operation range.
- Computer representation for power system stability studies: ABB 3BHS354059 E01
- Certifications: CE, cUL certification according UL 508c (compliant with CSA), DNV Class B,

Commissioning and maintenance tool CMT1000 (for trained commissioning/ maintenance personal)

- With this tool the technician can setup all parameters and tune the PID to guarantee stable operation. The CMT1000 software allows an extensive supervision of the system, which helps the user to identify and locate problems during commissioning on site. The CMT1000 is connected to the target over USB or Ethernet port, where Ethernet connection allows remote access over 100 m.
- Main window
  - Indication of access mode and device information.
  - Change of parameter is only possible in CONTROL access mode.
  - LED symbol indicates that all parameters are stored on none volatile memory.
- Set point adjust window
  - Overview of all control modes, generator status, active limiters status and alarms.
  - Adjust set point and apply steps for tuning of the PID.
- Oscilloscope
  - 4 signals can be selected out of 20 recorded channels. The time resolution is 50 ms. Save files to your PC for further investigation.
- Measurement
  - All measurements on one screen.

Routine Test

Following routine tests will be carried out by the generator manufacturer

- Measuring of the DC-resistance of stator and rotor windings
- Check of the function of the fitted components (e.g. RTDs, space heater etc.)
- Insulation resistance of the following components
  Stator winding, rotor winding
  Stator winding RTDs
  Bearing RTDs
  Space heater
- No Load saturation characteristic (remanent voltage)
- Stator voltage unbalance
- Direction of rotation, phase sequence
- High voltage test of the stator windings (2 x U_{nom}. + 1000 V) and the rotor windings (min. 1500 V)

1.03 Module accessories

Base frame
Welded structural steel to mount engine, generator, and jacket water heat exchangers.

High elastic coupling
To couple engine with gear box. The coupling isolates the major subharmonics of engine alternating torque from gear box.

Coupling
With torque limiter to couple gear box with alternator.

Coupling housing
To cover the two couplings

Anti-vibration mounts
Arranged between engine/generator assembly and base frame. Isolating pads (SYLOMER) for placement between base frame and foundation, delivered loose.

Gear box:
Single-stage spur gear with overhead shaft and lube oil system, completely mounted on the base frame. The lube oil heat exchanger is integrated with the warm water circuit.
The gear transmission ratio is 1:1.2

Exhaust gas connection
Connection of exhaust gas turbocharger; including flexible connection to compensate for expansions and vibrations.

Combustion air filter
Dry type air filter with replaceable filter cartridges, including flexible connection to carburetor and service indicator.

Interface panel
The following description represents Jenbacher standards. Options which have been included in our offer are not necessarily listed below.
Totally enclosed sheet steel cubicle with front door, wired to terminals, ready to operate. Cable entry at bottom.

Painting: RAL 7035

Protection: IP 54 external, IP 20 internal (protection against direct contact with live parts)

Design according to IEC 439-1 (EN 60 439-1/1990) and DIN VDE 0660 part 500, respectively.
Ambient temperature 5 - 40 °C (41 - 104 °F), Relative humidity 70%

Dimensions:

- Height: 1300 mm (51 in)
- Width: 1200 mm (47 in)
- Depth: 400 mm (16 in)

Power supply from the starter battery charger.

Power distribution to the engine mounted auxiliaries (power input from the supplier of the auxiliaries power supply):
3 x 600/347 V, 60 Hz, 50 A

Essential components installed in interface panel:

- Strip terminal
- Decentralized input and output cards, connected by a data bus interface to the central engine control of the module control panel.
- Speed monitoring
- Relays, contacts, fuses, engine contact switches to control valves, and auxiliaries.
- Measuring transducer for excitation voltage

Exhaust gas scavenging blower

The exhaust gas scavenging blower is used to scavenge the remaining exhaust gas out of the exhaust gas pipe work, to prevent the appearance of deflagrations.

Function:

Before each start scavenging by blower is done for app. 1 minute (except at black out – start)

Supervisions:

- Scavenging air fan failure
- Scavenging air flap failure

Consisting of:

- Fan
- Exhaust gas flap
- Temperature switch
- Compensator and pipe work

1.03.01 Engine jacket water system

Engine jacket water system
Closed cooling circuit, consisting of:
- Expansion tank
- Filling device (check and pressure reducing valves, pressure gauge)
- Safety valve(s)
- Thermostatic valve
- Required pipework on module
- Vents and drains
- Electrical jacket water pump, including check valve
- Jacket water preheat device

1.03.02 Automatic lube oil replenishing system

Automatic lube oil replenishing system:
Includes float valve in lube oil feed line, including inspection glass. Electric monitoring system will be provided for engine shut-down at lube oil levels "MINIMUM" and "MAXIMUM". Solenoid valve in oil feed line is only activated during engine operation. Manual override of the solenoid valve, for filling procedure during oil changes is included.

Oil drain
By set mounted cock

Pre-lubrication- and aftercooling oil pump:
Mounted on the module base frame; it is used for pre-lubrication and aftercooling of the turbochargers.
Period of operation: Pre-lubrication: 1 minute both pumps
Aftercooling: 15 minutes from engine stop only the **600**/**347** V pump
Consisting of:
- 1 piece oil pump 1500 W, **600**/**347** V
- 1 piece oil pump 1500 W, 24 V
- All necessary vents
- Necessary pipework

1.04 Heat recovery

The heat exchangers are mounted to the engine and/or to the module base frame, complete with interconnecting pipe work.
The connection design of the heat exchangers is determined on a project specific basis. The connection design, temperatures and flow rates are shown on page 10 of this document. Interfaces to the customer circuit are shown as connection points A and B (see page 5).

The exhaust gas heat exchanger is not included in the GE Jenbacher scope of supply.

The insulation of heat exchangers and pipe work is not included in GE Jenbacher scope of supply and should be provided locally if needed.

1.05.01 Gas train <500mbar (CSA approved)

Pre-assembled, delivered loose, CSA 149.1 compliant for installation into gas pipework to the module.

Consisting of:

- **Main gas train:**
  - Shut off valve
  - Gas filter, filter fineness <3µm
  - Adapter with dismount to the pre-chamber gas train
  - Gas admission pressure regulator
  - Pressure gauge with push button valve, 0-500mbar (0-7,25psi)
  - Solenoid valves
  - Gas pressure switch (min.)
  - Leakage detector
  - Gas pressure regulator
  - TEC JET (has to be implemented horizontal)

The gas train complies with DIN - DVGW regulations.
Maximum distance from TEC JET outlet to gas entry on engine, including flexible connections, is 1 m (39,37 in).

- **Pre-chamber gas train:**
  - Ball valve
  - Gas filter, filter fineness <3µm
  - Solenoid valves
  - Pressure regulator
  - Calming distance with reducer
  - Pressure gauge with push button valve, 1-5bar (0-72,5psi)

Pre chamber gas pressure regulator (incl. stabilization section) assembled at the flexible connection pre chamber gas.

1.07 Painting

• Quality:	Oil resistant prime layer Synthetic resin varnish finishing coat	
• Colour:	Engine:	RAL 6018 (green)
	Base frame:	RAL 6018 (green)
	Generator:	RAL 6018 (green)
	Module interface panel:	RAL 7035 (light grey)
	Control panel:	RAL 7035 (light grey)

1.11 Engine generator control panel per module- Dia.ne XT4 incl. Single synchronization of the generator breaker

Dimensions:

- Height: 2200 mm (including 200 mm (8 in) pedestal *)
- Width: 800 -1200mm*)
- Depth: 600 mm *)

Protection class:

- external IP42
- Internal IP 20 (protection again direct contact with live parts)

*) Control panels will be dimensioned on a project specific basis. Actual dimensions will be provided in the preliminary documentation for the project.

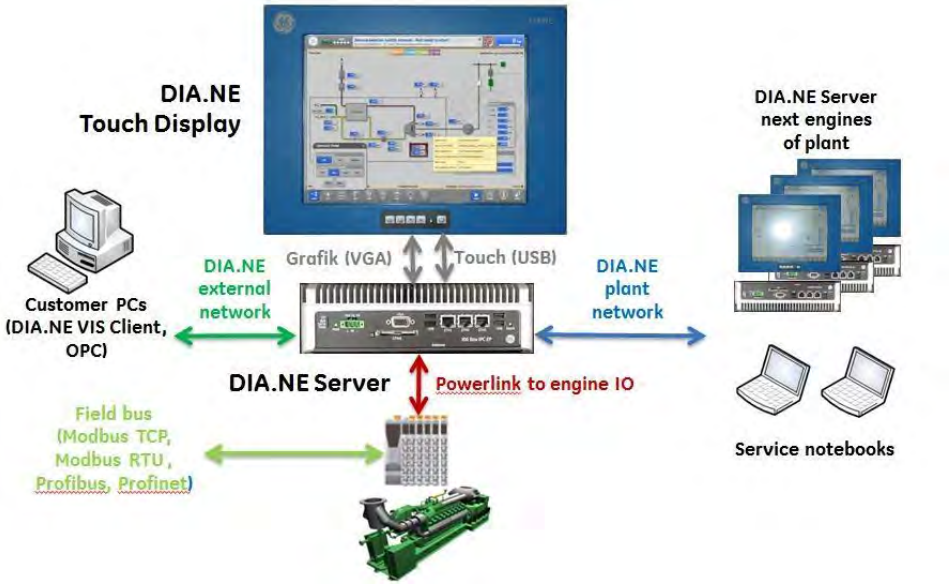
Control supply voltage from starter and control panel batteries: 24V DC

Auxiliaries power supply: (from provider of the auxiliary supply)
3 x **600**/**347** V, **60** Hz

Consisting of:
Motor - Management - System DIA.NE

Setup:

- a) Touch display visualization
- b) Central engine and unit control



Touch Display Screen:

15“ Industrial color graphic display with resistive touch.

Interfaces:

- 24V voltage supply
- VGA display connection
- USB interface for resistive touch

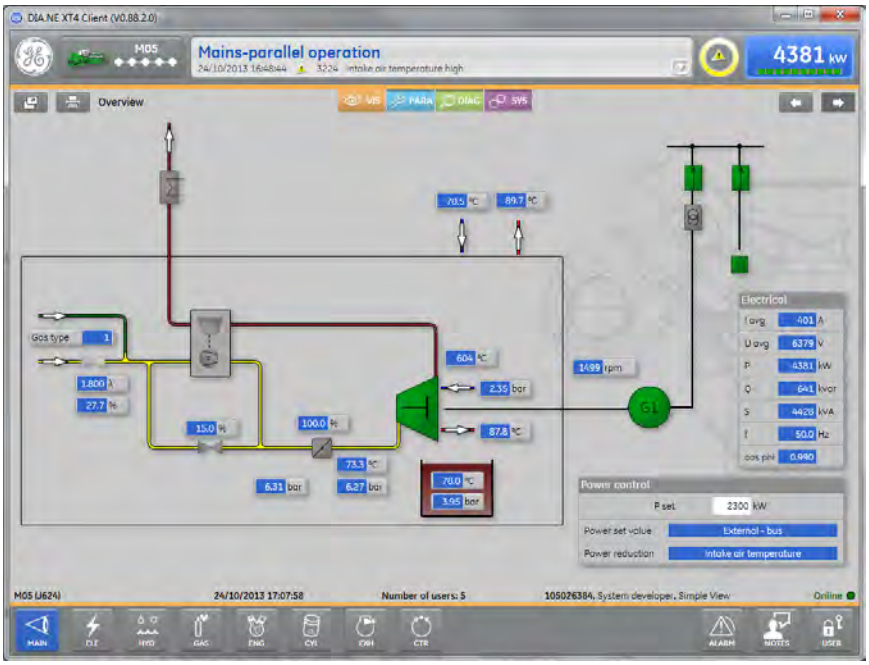
Protection class of DIA.NE XT panel front: IP 65
Dimensions: W x H x D = approx. 410x310x80mm

The screen shows a clear and functional summary of the measurement values and simultaneously shows a graphical summary.

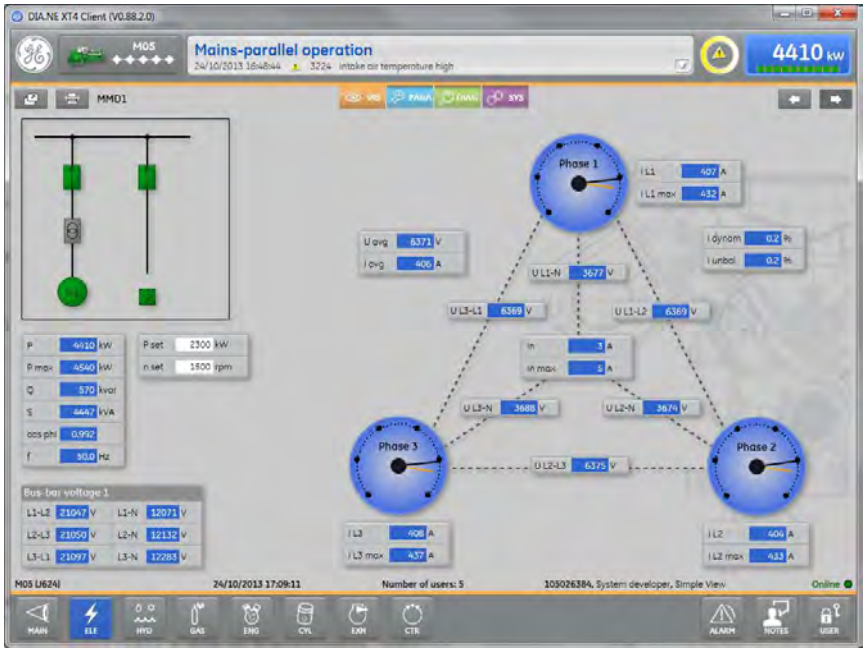
Operation is via the screen buttons on the touch screen
Numeric entries (set point values, parameters…) are entered on the touch numeric pad or via a scroll bar.
Determination of the operation mode and the method of synchronization via a permanently displayed button panel on the touch screen.

Main screens (examples):

Main: Display of the overview, auxiliaries status, engine start and operating data.



ELE: Display of the generator connection with electrical measurement values and synchronization status



OPTION: Generator winding and bearing temperature
Trending
Trend with 100ms resolution

Measurement values:

- 510 data points are stored
- Measurement interval = 100ms
- Raw data availability with 100ms resolution: 24 hours + max. 5.000.000 changes in value at shut down (60 mins per shut down)
- Compression level 1: min, max, and average values with 1000ms resolution: 3 days
- Compression level 2: min, max, and average values with 30s resolution: 32 days
- Compression level 3: min, max, and average values with 10min resolution: 10 years

Messages:
10.000.000 message events

Actions (operator control actions):
1.000.000 Actions

System messages:
100.000 system messages

Central engine and module control:

An industrial PC- based modular industrial control system for module and engine sequencing control (start preparation, start, stop, aftercooling and control of auxiliaries) as well as all control functions.

Interfaces:

- Ethernet (twisted pair) for remote monitoring access
- Ethernet (twisted pair) for connection between engines
- Ethernet (twisted pair) for the Powerlink connection to the control input and output modules.
- USB interface for software updates

Connection to the local building management system according to the GE Jenbacher option list (OPTION)

- MODBUS-RTU Slave
- MODBUS-TCP Slave,
- PROFIBUS-DP Slave (160 words),
- PROFIBUS-DP Slave (190 words),
- ProfiNet
- OPC

Control functions:

- Speed control in idle and in island mode
- Power output control in grid parallel operation, or according to an internal or external set point value on a case by case basis

- LEANOX control system which controls boost pressure according to the power at the generator terminals, and controls the mixture temperature according to the engine driven air-gas mixer
- Knocking control: in the event of knocking detection, ignition timing adjustment, power reduction and mixture temperature reduction (if this feature is installed)
- Load sharing between engines in island mode operation (option)
- Linear power reduction in the event of excessive mixture temperature and misfiring
- Linear power reduction according to CH4 signal (if available)
- Linear power reduction according to gas pressure (option)
- Linear power reduction according to air intake temperature (option)

Multi-transducer to record the following alternator electrical values:
- Phase current (with slave pointer))
- Neutral conductor current
- Voltages Ph/Ph and Ph/N
- Active power (with slave pointer)
- Reactive power
- Apparent power
- Power factor
- Frequency
- Active and reactive energy counter

Additional 0 (4) - 20 mA interface for active power as well as a pulse signal for active energy

The following alternator monitoring functions are integrated in the multi-measuring device:
- Overload/short-circuit [51], [50]
- Over voltage [59]
- Under voltage [27]
- Asymmetric voltage [64], [59N]
- Unbalance current [46]
- Excitation failure [40]
- Over frequency [81>]
- Under frequency [81<]

Lockable operation modes selectable via touch screen:
- "OFF" operation is not possible, running units will shut down immediately;
- "MANUAL" manual operation (start, stop) possible, unit is not available for fully automatic operation.
- "AUTOMATIC" fully automatic operation according to external demand signal:

Demand modes selectable via touch screen:
- external demand off („OFF“)
- external demand on („REMOTE“)
- overide external demand („ON“)

Malfunction Notice list:

Shut down functions e.g.:

- Low lube oil pressure
- Low lube oil level
- High lube oil level
- High lube oil temperature
- Low jacket water pressure
- High jacket water pressure
- High jacket water temperature
- Overspeed
- Emergency stop/safety loop
- Gas train failure
- Start failure
- Stop failure
- Engine start blocked
- Engine operation blocked
- Misfiring
- High mixture temperature
- Measuring signal failure
- Overload/output signal failure
- Generator overload/short circuit
- Generator over/undervoltage
- Generator over/underfrequency
- Generator asymmetric voltage
- Generator unbalanced load
- Generator reverse power
- High generator winding temperature
- Synchronizing failure
- Cylinder selective Knocking failure

Warning functions e.g.:

- Cooling water temperature min.
- Cooling water pressure min.
- Generator winding temperature max.

Remote signals:

(volt free contacts)
1NO = 1 normally open
1NC = 1 normally closed
1COC = 1 change over contact

• Ready for automatic start (to Master control)	1NO
• Operation (engine running)	1NO
• Demand auxiliaries	1NO
• Collective signal "shut down"	1NC

- Collective signal "warning" 1NC

External (by others) provided command/status signals:
- Engine demand (from Master control) 1S
- Auxiliaries demanded and released 1S

Single synchronizing Automatic

For automatic synchronizing of the module with the generator circuit breaker to the grid by PLC- technology, integrated within the module control panel.

Consisting of:
- Hardware extension of the programmable control for fully automatic synchronization selection and synchronization of the module and for monitoring of the generator circuit breaker closed signal.
- Lockable synchronization selection via touch screen with the following selection modes:
  - "MANUAL" Manual initiation of synchronization via touch screen button followed by fully automatic synchronization of the module
  - "AUTOMATIC" Automatic module synchronization, after synchronizing release from the module control
  - "OFF" Selection and synchronization disabled
    Control of the generator circuit breaker according to the synchronization mode selected via touch screen.
  - "Generator circuit breaker CLOSED/ Select" Touch-button on DIA.NE XT
  - "Generator circuit breaker OPEN" Touch-button on DIA.NE XT

Status signals:
Generator circuit breaker closed
Generator circuit breaker open

Remote signals:
(volt free contacts)
Generator circuit breaker closed 1 NO

The following reference and status signals must be provided by the switchgear supplier:

- Generator circuit breaker CLOSED 1 NO
- Generator circuit breaker OPEN 1 NO
- Generator circuit breaker READY TO CLOSE 1 NO
- Mains circuit breaker CLOSED 1 NO
- Mains circuit breaker OPEN 1 NO

Mains voltage 3 x 4160 V or 3x 110V/v3 - other measurement voltages available on request
Bus bar voltage 3 x 4160 V or 3x 110V/v3 – other measurement voltages available on request
Generator voltage 3 x 4160 V or 3x 110V/v3 – other measurement voltages available on request

Voltage transformer in the star point with minimum 50VA and Class 0,5

The following volt free interface-signals will be provided by GE Jenbacher to be incorporated in switchgear:

- CLOSING/OPENING command for generator circuit breaker (permanent contact) — 1 NO + 1 NC
- Signal for circuit breaker undervoltage trip — 1 NO

Maximum distance between module control panel and engine/interface panel:	30m
Maximum distance between module control panel and power panel:	50m
Maximum distance between module control panel and master control panel:	50m
Maximum distance between alternator and generator circuit breaker:	30m

1.11.01 Remote messaging over MODBUS-TCP

Data transfer from the Jenbacher module control system to the customer's on-site central control system via MODBUS TCP using the ETHERNET 10 BASE-T/100BASE-TX protocol TCP/IP.

The Jenbacher module control system operates as a SLAVE unit.
The data transfer via the customer's MASTER must be carried out in cycles.

Data transmitted:
Individual error messages, operational messages, measured values for generator power, oil pressure, oil temperature, cooling water pressure, cooling water temperature, cylinder and collective exhaust gas temperatures.

GE Jenbacher limit of supply:
RJ45 socket at the interface module in the module control cabinet

1.11.06 Remote Data-Transfer with DIA.NE XT4

General
DIA.NE XT4 offers remote connection with Ethernet.

Applications:

1.) DIA.NE XT4 HMI
DIA.NE XT4 HMI is the human-machine-interface of DIA.NE XT4 engine control and visualization system for GE Jenbacher gas engines.
The system offers extensive facilities for commissioning, monitoring, servicing and analysis of the site.
By installation of the DIA.NE XT4 HMI client program it can be used to establish connection to site, if connected to a network and access rights are provided.
The system runs on Microsoft Windows Operating systems (Windows XP, Windows 7, Windows 8)

Function
Functions of the visualization system at the engine control panel can be used remotely. These are among others control and monitoring, trend indications, alarm management, parameter management, and access to long term data recording. By providing access to multiple systems, also with multiple clients in parallel, additional useful functions are available like multi-user system, remote control, print and export functions and data backup.DIA.NE XT4 is available in several languages.

Option - Remote demand/blocking

If the service selectors switch at the module control panel is in pos."Automatic" and the demand-selector switch in pos."Remote", it is possible to enable (demanded) or disable (demand off) the module with a control button at the DIA.NE XT4 HMI
Note:
With this option it makes no sense to have an additional clients demand (via hardware or data bus) or a self-guided operation (via GE Jenbacher master control, grid import /export etc.).

Option - Remote - reset (see TA-No. 1100-0111 chapter 1.7 an d1.9)

Scope of supply
- Software package DIA.NE XT4 HMI Client Setup (Download)
- Number of DIA.NE XT4 HMI - Client user license (Simultaneous right to access of one user to the engine control)

Nr. of license	Access
1	1 Users can be logged in at the same time with a PC (Workplace, control room or at home).
2 - “n“ (Optional)	2- “n” Users can be logged in at the same time with a PC (Workplace, control room or at home). If 2- “n” users are locally connected at Computers from office or control room, then it is not possible to log in from home.

Caution! This option includes the DIA.NE XT4 HMI client application and its license only – NO secured, encrypted connection will be provided by GE Jenbacher! A secured, encrypted connection – which is mandatory – has to be provided by the customer (via LAN connection or customer-side VPN), or can be realized by using option myPlant™.

Customer requirements

- Broad band network connection via Ethernet(100/1000BASE-TX) at RJ45 Connector (ETH3) at DIA.NE XT4 server inside module control panel
- Standard PC with keyboard, mouse or touch and monitor (min. resolution 1024*768)
- Operating system Windows XP, Windows 7, Windows 8
- DirectX 9.0 c compatible or newer 3D display adapter with 64 MB or higher memory

2.) myPlant™

myPlant™ is the GE Jenbacher remote monitoring and diagnostic (RM&D) service

	Offering Feature	Connect	Protect
Asset Management	Online data transfer	✓	✓
	Big Data cloud storage	✓	✓
	Engine status visibility	✓	✓
	Control alarms visibility	✓	✓
	Basic data trends	✓	✓
	Remote access to DIA.NE HMI	-	✓
	Unlimited data trending	-	✓
	Advanced diagnostics	-	✓
Fleet Management	Fleet status on world map	-	✓
	Fleet summaries and reporting	-	✓
Mobility	SMS/Email notifications	-	✓
	Smartphone app	✓	✓

Web application with following features:

- Visualization of the current state of the engine (available, in operation, fault)
- View of various readings of the Gen-set
- Visualization of counts as a trend graph (if plant available online, or by manually entering of the counter readings)
- Trend graph of the performance value (low resolution; only if system available online)

myPlant™ Connect is free of charge for registered customers
myPlant™ Protect is free of charge within the warranty period (limited to 1 year) and is also included as part of any contractual service agreement (CSA).

Scope of supply

- Access to myPlant™
- Connection between plant server and myPlant™ system

Customer requirements

- Permanent Internet line (wired or mobile, (see option 4))
- See technical instruction TA 2300-0008
- Outbound data connectivity (from plant server to Internet) ONLY – INBOUND connections must NOT be allowed!

CAUTION!
It is in the responsibility of the customer to prevent direct access from the Internet to the plant server using technical equipment like firewalls.
GE Jenbacher does not provide such security devices and services as part of this option!

3.) Mobile Internet (OPTION)
Connection Plant - Customer via secured Internet - connection
See also technical instruction **TA 2300 - 0006**

Scope of delivery

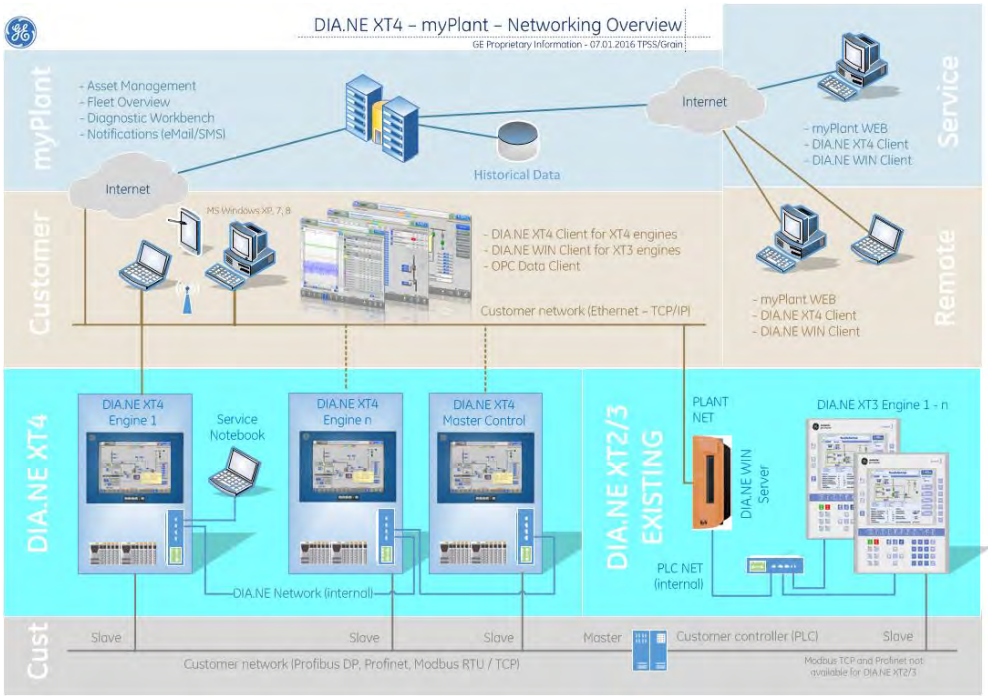
- Mobile Internet router with antenna to connect to the DIA.NE Server XT4

Customer requirements

- SIM card for 3G / 4G

4.) Network overview

For information only!



1.11.14 Generator Overload / Short Circuit Protection

ANSI Function Code 50/51

Digital protection relay, 3-phase, integrated into the module control panel.
Connected to the protective current transformers in the generator star point
Acting on the generator circuit breaker and on the generator de-excitation
Alarm message on the DIA.NE screen

Characteristics / settings:

- Setting for overload: to 1,1 times of the generating set rated current,
- Dependent time characteristic acc. to IEC 60255-151: very inverse, time multiplier setting 0,6.
- Setting for short circuit: to 2,0 times of generating set rated current,
- Independent time characteristic: 300 ms (800 ms when dynamic network support).

1.11.15 Generator Differential Protection

ANSI function code 87

Digital protection relay, 3-phase, integrated into the module control panel.
Connected to the protective current transformers in the generator star point (GEJ scope of supply) and to the protective current transformers in the generator circuit breaker panel (current transformers by client, secondary 1A, optionally: 5A).
Acting on the generator circuit breaker and on the generator de-excitation
Alarm message on the DIA.NE screen

In plants with a unit generator-transformer configuration the protection is realized as generator/transformer differential protection.

1.11.16 Generator Earth Fault Protection (nondirectional)

Digital protection relay, integrated into the module control panel.
Acting on the generator circuit breaker and on the generator de-excitation
Alarm message on the DIA.NE screen

Dependent on the generator grounding method one of the following protection functions is applied:

1) ANSI function code 50N/G
   Detection of the earth fault current e.g. by means of a window-type current transformer (Current transformer by client, secondary 1A, optionally: 5A).
2) ANSI function code 59N/G
   Detection of the residual voltage e.g. by means of the voltage measured across the broken-delta secondary windings of grounded voltage transformers (voltage transformers by client)

1.20.03 Starting system

Starter battery (is not included in GE Jenbacher scope):
4 piece 12 V Pb battery, 200 Ah (according to DIN 72311), complete with cover plate, terminals and acid tester.

Battery voltage monitoring:
Monitoring by an under-voltage relay.

Battery charging equipment:
Capable for charging the starter battery with I/U characteristic and for the supply of all connected D.C. consumers.
Charging device is mounted inside of the module interface panel or module control panel.

- **General data:**
  - Power supply — **3 x 320 - 550 V, 47 - 63 Hz**
  - max. power consumption — 2120 W
  - Nominal D.C. voltage — 24 V (+/-1%)
  - Voltage setting range — 24V to 28,8V (adjustable)
  - Nominal current (max.) — 2 x 40 A
  - Dimensions — 240 x 125 x 125 mm
  - Degree of protection — IP20 to IEC 529
  - Operating temperature — 0 °C - 60 °C
  - Protection class — 1
  - Humidity class — 3K3, no condensation.
  - Natural air convection
  - Standards — EN60950, EN50178
    UL/cUL (UL508/CSA 22.2)

Signalling:

Green Led:	Output voltage > 20,5V
Yellow Led:	Overload, Output Voltage < 20,5V
Red Led:	shutdown

Control accumulator:
- Pb battery 24 VDC/18 Ah

1.20.05 Electric jacket water preheating

Installed in the jacket water cooling circuit, consisting of:
- Heating elements
- Water circulating pump

The jacket water temperature of a stopped engine is maintained between 56°C (133 °F) and 60°C (140°F), to allow for immediate loading after engine start.

1.20.08 Flexible connections

Following flexible connections per module are included in the GE Jenbacher -scope of supply:

No. Connection	Unit	Dimension	Material
2 Warm water in-/outlet	**DN/PN**	**100/10**	Stainless steel
1 Exhaust gas outlet	**DN/PN**	**600/10**	Stainless steel
1 Fuel gas inlet	**DN/PN**	**100/16**	Stainless steel
2 Intercooler in-/outlet	**DN/PN**	**65/10**	Stainless steel
2 Lube oil connection	**mm**	**28**	Hose

Seals and flanges for all flexible connections are included.

2.00 Electrical Equipment

Totally enclosed floor mounted sheet steel cubicle with front door wired to terminals. Ready to operate, with cable entry at bottom. Naturally ventilated.

Protection:	IP 42 external IP 20 internal (protection against direct contact with live parts)	

Design according to EN 61439-2 / IEC 61439-2 and ISO 8528-4.
Ambient temperature 5 - 40 °C (41 - 104 °F), 70 % Relative humidity

Standard painting:	Panel:	RAL 7035
	Pedestal:	RAL 7020

2.02 Grid monitoring device

Standard without static Grid Code - 60Hz alternator

Function:
For immediate disconnection of the generator from the grid in case of grid failures.

Consisting of:
- High/low voltage monitoring
- High/low frequency monitoring
- Specially adjustable independent time for voltage and frequency monitoring
- Vector jump monitoring or df/dt monitoring for immediate disconnection of the generator from the grid for example at short interruptions
- Indication of all reference dimensions for normal operation and at the case of disturbance over LCD and LED
- Adjusting authority through password protection against adjusting of strangers

Scope of supply:
Digital grid protection relay with storage of defect data, indication of reference dimensions as well as monitoring by itself.

Grid protection values:

Parameter	Parameter limit	Max time delay[s]	**Comments**
59-61Hz			Do work normal
f<[ANSI 81U]	59Hz	0,5	Load reduction with 10%/HZ below 59Hz!
f<<[ANSI 81U]	58.5Hz	0,1	
f>[ANSI 81O]	61,5Hz	0,1	Load reduction with 30%/HZ above 61Hz!
U<[ANSI 27]	90%	1	Load reduction with 1%P /%U below 95%
U<<[ANSI 27]	80%	0,2	Load reduction with 1%P /%U below 95%
U>[ANSI 59]	110%	30	Load reduction with 1%P /%U above 105%
U>>[ANSI 59]	115%	0,2	Load reduction with 1% P/%U above 105%
Df/dt [ANSI 81R] **Or** **Vector shift** [ANSI 78]	2Hz/s, 5 Periods Or 8° -3pol		Cos phi range: 0,8ind (overexcited) - 1

2.12 Gas warning device

Function:
The gas warning device continuously monitors the radiated air in the engine room and warns against gases which are injurious to persons' health and against explosive gas concentrations.
The measuring head (catalytic sensor) is attached on the covering or nearby the ground, dependent upon the gas source.

Scope of supply:
- Alarm unit voltage: 24VDC
- 2 Gas sensor(s)

2.13 Smoke warning device

Function:
The smoke warning device in combination with the optical smoke detector (installed in the control room) and the thermal smoke detector (installed in the engine room) provide extensive early warning signal.

Design:
The device has an optical display for alarm and operation.
The smoke warning device is installed in a plastic housing.

Scope of supply:
- Alarm unit voltage: 24 VDC
- 2 Smoke detector(s)

3.70 Control Strategy and Options

Control Strategy -

- Grid Parallel with KW Control – Real Power Load Control of the Generator set will be either via a 4-20mA input from the customer representing a unit KW load setpoint or a KW load setpoint entered on the Diane XT4 screen. Upon breaker closure, the unit will ramp to the setpoint at a maximum rate of (Rated Unit KW) / 180 seconds.

- Grid Parallel with PF Control – Reactive Power Load Control of the Generator set will be either via a 4-20mA input from the customer representing a unit Power Factory setpoint or a Power Factor setpoint entered on the Diane XT4 screen. Upon breaker closure, the unit will maintain the setpoint.

- Grid Parallel with Import/Export Control - Load Control via an Import/Export KW level entered on the Diane XT4 screen. Required will be a customer 4-20mA signal representing the Site KW (Imported and/or Exported Power) that is to be controlled. Upon breaker closure, the unit will ramp to a load that will drive the KW value represented by the 4-20mA input signal to the level entered on Customer Import/Export Setpoint entered in the Diane XT4 screen. Once at the setpoint, the unit will raise and lower load to maintain this value. If the generator load required to maintain this setpoint drops below the minimum load level of the generator set, the unit 52G circuit breaker will be opened.

- Grid Parallel with Single Unit Island Operation (Auto Re-sync) - While Grid connected, the unit load can be adjusted via its KW control setpoint or designated option. In the event of a loss of utility, the unit will be able to continue operating locally without utility power however a separate system must shed load so that the engine is not overloaded, as per GE Jenbacher TI 2108-0031. When utility power is restored, the unit is provided with an automatic re-synchronization feature which will sync the unit back to the utility. This feature works for single units only, if multiple units are anticipated, please refer to GE Jenbacher.

- Island Mode Operations with Blackout Starting – Island Operations with Black start capability will allow the engine to start and run without utility being present. The engine will be able to start the engine on battery power, close the generator breaker against a dead bus, and operate independently of a utility power source. The customer must ensure that there is sufficient fuel gas and pre-chamber gas at pressure in the event of a Type 6 engine so configured. The engine will start without the normal confirmation of engine block temperature or operation of a circulating AC water pump. It will be required of the operators that once the engine is connected to the generator bus, power to the engine auxiliaries be restored. Load Management is expected to be limited by the operators to the limits of the engine, as per GE Jenbacher TI 2108-0031. This system will work in conjunction with a GE Jenbacher Master Synchronizing Control (see appropriate Spec Section) if so equipped. If this is a single unit and synchronization with the utility after assuming operations is required, a *Grid Parallel with Single Unit Island Operations* option will be required.

Per Unit Customer Enclosure Controls - Diane XT4 System will be provided with the following additional features to operate a customer enclosure

- Ventilation Fan control Option 1 - Customer Ventilation Fan control based on container internal temperature. Signal is based on a customer provide PT100 inside the container. A 4-20mA signal is provided for use by a customer provided VFD. Discrete IO is provided for starting and feedback signals to the VFD. It is assumed that the customer MCC will provide starter motor protection.

- Ventilation Fan Control Option 2 - Discrete IO is provided to demand operation of customer container ventilation fans. Start/Stop signals for each fan are provided. It is assumed that the customer MCC will provide starter motor protection and that the customer provides any temperature sequencing and control

- Ventilation System Louver Control - Electrical and Control features are provided for louver opening and closing based on engine operation and compartment temperature. 4 Louver driver contacts are provided

Per Unit Balance of Plant Controls – Hot Water Loop Panel Controls and Software to include:

- Hot Water Pump (Panel Control Parts and SW Only) - The option will add specific contact output and feedback input to/from an MCC for the Hot Water Pump. This will include relays and software.

- Hot Water Monitoring (Panel Control Parts and SW Only) - This option will monitor 3 hot water loop switches, flow, pressure and temperature. This option includes hardwired relays added to the trip loop, and internal software

- Hot Water Return Temperature Control (Panel Parts and SW Only) - This feature will provide all necessary controls to operate a 3 Way temperature control valve. The customer will provide a PT100 as a feedback signal and the Diane will provide a 4-20mA Analog Output to a customer provided valve. Control and Display Software are also provided.

- Emergency Hot Water Temperature Control (Panel Parts and SW Only) - This feature will provide all necessary controls to operate a 3 Way temperature control valve. The customer will provide a PT100 as a feedback signal and the Diane will provide a 4-20mA Analog Output to a customer provided valve. Control and Display Software are also provided.

- Emergency Hot Water Pump Control (Panel Parts and SW Only) - The option will add specific contact output and feedback input to/from an MCC for the Emergency Cooling System Pump. This will include relays and software.

- Emergency Hot Water Loop Pressure (Panel Parts and SW Only) - This feature will provide an discrete input and associated software for the Emergency Cooling Loop system pressure.

Per Unit Balance of Plant Controls – Intercooler Loop Panel Controls and Software to include:

- IC Temperature Control (Panel Parts and SW Only) - This feature will provide all necessary controls to operate a 3 Way temperature control valve in the IC Loop if Not Required by Site Conditions. The Diane will provide a 4-20mA Analog Output to a customer provided valve and will utilize mixture temperature as a feedback input. Control and Display Software are also provided.

- Intercooler Pump Control (Panel Control Parts and SW Only) - The option will add specific contact output and feedback input to/from an MCC for the Intercooler Water Pump. This will include relays and software.

Per Unit Balance of Plant Controls – Radiator Panel Controls and Software to include:

- Dual Circuit GMM Radiator Control (Panel Parts and SW Only) - This feature will provide controls for a customer provided 6 fan Güntner Motor Management (GMM) 2 circuit radiator. The MCC control signals (DO/DI), and GMM control signals (4-20mA, DI and DO signals) will be provided.

3.71 Vibration Switch

A structural Vibration Switch will be installed on the package base frame to detect excessive vibrations. A signal we will sent to the control panel to indicate an alarm condition.

4.00 Delivery, installation and commissioning

4.01 Carriage
According to contract.

4.02 Unloading
Unloading, moving of equipment to point of installation, mounting and adjustment of delivered equipment on intended foundations is not included in GE Jenbacher scope of supply.

4.03 Assembly and installation
Assembly and installation of all GE Jenbacher -components is not included in GE Jenbacher scope of supply.

4.04 Storage
The customer is responsible for secure and appropriate storage of all delivered equipment.

4.05 Start-up and commissioning
Start-up and commissioning with the GE Jenbacher start-up and commissioning checklist is not included.
Plants with island operation require internet connection.

4.06 Trial run
After start-up and commissioning, the plant will be tested in an 8-hour trial run. The operating personnel will be introduced simultaneously to basic operating procedures.
Is not included in GE Jenbacher scope of supply.

4.07 Emission measurement (exhaust gas analyser)
Emission measurement by GE Jenbacher personnel, to verify that the guaranteed toxic agent emissions have been achieved (costs for measurement by an independent agency will be an extra charge).

5.01 Limits of delivery

Electrical
- Module:
  - At terminals of module interface panel
  - At terminals of generator terminal box
    (screwed glands to be provided locally)
- Module control panel:
  At terminal strips
- Auxiliaries:
  At terminals of equipment which is supplied separately

Warm water
- At inlet and outlet flanges on module
- At inlet and outlet flanges of the exhaust gas heat recovery system

Low temperature water
At inlet and outlet flanges at module

Exhaust gas
At outlet flange of exhaust gas connection
At inlet and outlet flanges of the exhaust gas heat recovery system

Combustion air
The air filters are set mounted

Fuel gas
- At inlet and outlet flanges of gas train
- At inlet flange of gas pipework on module
- At outlet flange of the pre-chamber gas train
- At inlet flange of pre-chamber gas pipework on module
- At connection for boost pressure compensation on module
- At connection for boost pressure compensation on gas pressure regulator of the pre-chamber gas train

Lube oil
At lube oil connections on module

Draining connections and pressure relief
At module

Condensate
At condensate drain on exhaust gas heat exchanger

Insulation
Insulation of heat exchangers and pipework is not included in our scope of supply and must be provided locally.

First filling
The first filling of module, (lube oil, engine jacket water, anti-freeze, anti-corrosive agent, battery acid) is not included in our scope of supply.

The composition and quality of the used consumables are to be strictly monitored in accordance with the "Technical Instructions" of GE JENBACHER.

Suitable bellows and flexible connections **must be provided locally** for all connections.
Cables from the module must be flexible.

5.02 Factory tests and inspections

The individual module components shall undergo the following tests and inspections:

5.02.01 Engine tests
Carried out as combined Engine- and Module test according to DIN ISO 3046 at GE Jenbacher test bench.
The following tests are made at 100%, 75% and 50% load, and the results are reported in a test certificate:
- Engine output
- Fuel consumption
- Jacket water temperatures
- Lube oil pressure
- Lube oil temperatures
- Boost pressure
- Exhaust gas temperatures, for each cylinder

5.02.02 Generator tests
Carried out on test bench of the generator supplier.

5.02.03 Module tests
The engine will be tested with natural gas (methane number 94). The performance data achieved at the test bench may therefore vary from the data as defined in the technical specification due to differences in fuel gas quality.
Carried out as combined Engine- and Module test commonly with module control panel at GE Jenbacher test bench, according to ISO 8528, DIN 6280. The following tests are made and the results are reported in a test certificate:
Visual inspection of scope of supply per specifications.
- Functional tests per technical specification of control system.
  - Starting in manual and automatic mode of operation
  - Power control in manual and automatic mode of operation
  - Function of all safety systems on module
- Measurements at 100%, 75% and 50% load:
  - Frequency
  - Voltage
  - Current
  - Generator output

- Power factor
- Fuel consumption
- Lube oil pressure
- Jacket water temperature
- Boost pressure
- Mixture temperature
- Exhaust emission (NOx)

The module test for operating frequenzy 50 Hz and 6,3-6,6kV / 10,5kV-11kV will be carried out with the original generator, except it is not possible because of the delivery date. Then a test generator will be used for the module test.
To prove characteristics of the above components, which are not tested on the test bench by GE JENBACHER, the manufacturers' certificate will be provided.

5.03 Documentation

Preliminary documentation 60 days after receipt of a technically and commercially clarified order:

- Module drawing 1)
- Technical diagram 1)
- Drawing of control panel 3)
- List of electrical interfaces 2)
- Technical specification of control system 2)
- Technical drawing auxiliaries (if included in GE Jenbacher-limit of delivery) 1)

At delivery:

- Wiring diagrams 3)
- Cable list 3)

At start-up and commissioning (or on clients request):

- Operating and maintenance manual 4)
- Spare parts manual 4)
- Operation report log 4)

G3520H

GAS ENGINE SITE SPECIFIC TECHNICAL DATA
CNL Chalk River Site

GENSET APPLICATION

ENGINE SPEED (rpm):	1500	RATING STRATEGY:	HIGH RESPONSE
COMPRESSION RATIO:	12.1	RATING LEVEL:	CONTINUOUS
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	CAT LOW PRESSURE WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 2 INLET (°F):	118		
AFTERCOOLER - STAGE 1 INLET (°F):	192	**SITE CONDITIONS:**	
JACKET WATER OUTLET (°F):	210	FUEL:	TCPL Pipeline Nat Gas
ASPIRATION:	TA	FUEL PRESSURE RANGE(psig): (See note 1)	2.0-5.0
COOLING SYSTEM:	JW+OC+1AC, 2AC+GB	FUEL METHANE NUMBER:	94.5
CONTROL SYSTEM:	ADEM4 W/ IM	FUEL LHV (Btu/scf):	910
EXHAUST MANIFOLD:	DRY	ALTITUDE(ft):	500
COMBUSTION:	LOW EMISSION	MAXIMUM INLET AIR TEMPERATURE(°F):	104
NOx EMISSION LEVEL (g/bhp-hr NOx):	1.0	STANDARD RATED POWER:	3448 bhp@1500rpm
ANCILLARY LOAD (ekW):	51	POWER FACTOR:	1.0
SET POINT TIMING:	22	VOLTAGE(V):	4160-13800

				MAXIMUM RATING	SITE RATING AT MAXIMUM INLET AIR TEMPERATURE		
RATING		**NOTES**	**LOAD**	**100%**	**100%**	**75%**	**50%**
GENSET POWER	(WITH ANCILLARY LOAD, WITH GEARBOX)	(2)(3)	ekW	2428	2428	1821	1214
GENSET POWER	(WITH ANCILLARY LOAD, WITH GEARBOX)	(2)(3)	kVA	2428	2428	1821	1214
ENGINE POWER	(WITHOUT GEARBOX, WITHOUT FAN)	(3)	bhp	3448	3448	2619	1791
INLET AIR TEMPERATURE			°F	104	104	104	104
GENERATOR EFFICIENCY		(2)	%	97.2	97.2	96.6	95.5
GENSET EFFICIENCY	(ISO 3046/1)	(4)(5)	%	43.5	43.5	42.0	39.2
THERMAL EFFICIENCY		(4)(6)	%	41.2	41.2	42.6	45.4
TOTAL EFFICIENCY		(4)(7)	%	84.7	84.7	84.6	84.6

ENGINE DATA							
GENSET FUEL CONSUMPTION	(ISO 3046/1)	(8)	Btu/ekW-hr	7850	7850	8127	8708
GENSET FUEL CONSUMPTION	(NOMINAL)	(8)	Btu/ekW-hr	8121	8121	8407	9008
ENGINE FUEL CONSUMPTION	(NOMINAL)	(8)	Btu/bhp-hr	5720	5720	5846	6105
AIR FLOW (@inlet air temp, 14.7 psia)	(WET)	(9)	ft3/min	6641	6641	4989	3402
AIR FLOW	(WET)	(9)	lb/hr	28035	28035	21061	14360
FUEL FLOW (60ºF, 14.7 psia)			scfm	361	361	280	200
INLET MANIFOLD PRESSURE		(10)	in Hg(abs)	135.0	135.0	102.2	70.8
EXHAUST TEMPERATURE - ENGINE OUTLET		(11)	°F	735	735	796	894
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(12)	ft3/min	15122	15122	11957	8814
EXHAUST GAS MASS FLOW	(WET)	(12)	lb/hr	28986	28986	21799	14888
MAX INLET RESTRICTION		(13)	in H2O	14.46	14.46	10.24	7.49
MAX EXHAUST RESTRICTION		(13)	in H2O	20.08	20.08	11.64	5.77

EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)	(14)(15)	g/bhp-hr	1.00	1.00	1.00	1.00
CO	(14)(15)	g/bhp-hr	1.53	1.53	1.47	1.43
THC (mol. wt. of 15.84)	(14)(15)	g/bhp-hr	2.27	2.27	2.37	2.30
NMHC (mol. wt. of 15.84)	(14)(15)	g/bhp-hr	0.32	0.32	0.33	0.32
NMNEHC (VOCs) (mol. wt. of 15.84)	(14)(15)(16)	g/bhp-hr	0.25	0.25	0.26	0.25
HCHO (Formaldehyde)	(14)(15)	g/bhp-hr	0.21	0.21	0.21	0.22
CO2	(14)(15)	g/bhp-hr	399	399	406	415
EXHAUST OXYGEN	(14)(17)	% DRY	9.7	9.7	9.4	8.9

HEAT REJECTION							
LHV INPUT		(18)	Btu/min	328638	328638	255166	182269
HEAT REJ. TO JACKET WATER (JW)		(19)	Btu/min	33938	33938	29362	24391
HEAT REJ. TO ATMOSPHERE	(INCLUDES GENERATOR)	(19)	Btu/min	7991	7991	7050	6153
HEAT REJ. TO LUBE OIL (OC)		(19)	Btu/min	12742	12742	11487	9949
HEAT REJECTION TO EXHAUST (LHV TO 248°F)		(19)	Btu/min	62731	62731	52933	43000
HEAT REJ. TO A/C - STAGE 1 (1AC)		(19)(21)	Btu/min	25708	25708	14676	5403
HEAT REJ. TO A/C - STAGE 2 (2AC)		(19)(21)	Btu/min	16697	16697	11828	6620
HEAT REJECTION FROM GEARBOX (GB)		(19)	Btu/min	1155	1155	877	600
PUMP POWER		(20)	Btu/min	859	859	859	859

COOLING SYSTEM SIZING CRITERIA				
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(22)	Btu/min	84303	84303
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (2AC+GB)	(22)	Btu/min	20280	20280
HEAT REJECTION TO EXHAUST (LHV TO 248°F)	(22)	Btu/min	69005	69005
A cooling system safety factor of 0% has been added to the cooling system sizing criteria.				

MINIMUM HEAT RECOVERY				
TOTAL JACKET WATER CIRCUIT (JW+OC+1AC)	(23)	Btu/min	65160	65160
TOTAL STAGE 2 AFTERCOOLER CIRCUIT (2AC+GB)	(23)	Btu/min	16959	16959
HEAT REJECTION TO EXHAUST(LHV TO 248°F)	(23)	Btu/min	50897	50897

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1, adjusted for fuel, site altitude and site inlet air temperature. 100% rating at maximum inlet air temperature is the maximum engine capability for the specified fuel at site altitude and maximum site inlet air temperature. Maximum rating is the maximum capability at the specified aftercooler inlet temperature for the specified fuel at site altitude and reduced inlet air temperature. Lowest load point is the lowest continuous duty operating load allowed. No overload permitted at rating shown.

PREPARED BY: Joe van Schaick, Toromont Cat

For notes information consult page three.

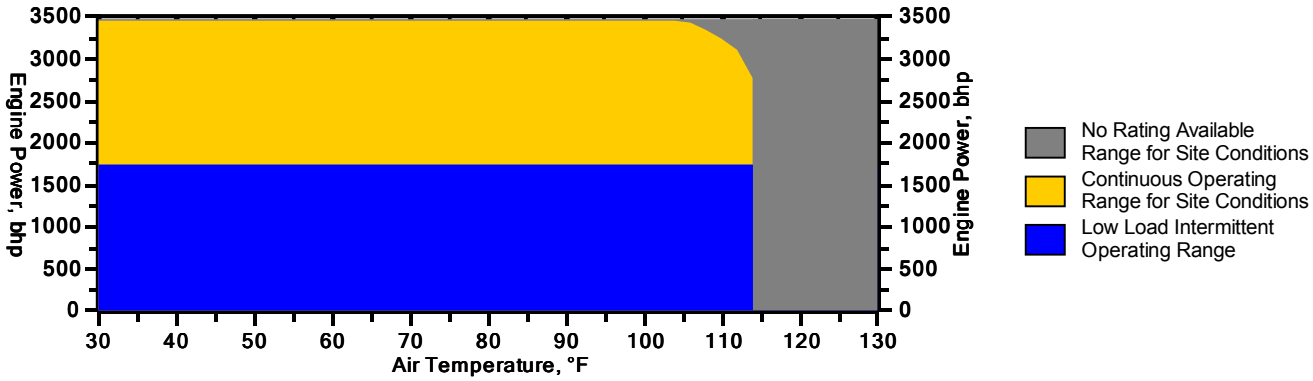
Data generated by Gas Engine Rating Pro Version 6.07.01

*****WARNINGS ISSUED FOR THIS RATING CONSULT PAGE 3*****

Ref. Data Set EM0517-04-001, Printed 25Jun2018

Engine Power vs. Inlet Air Temperature

Data represents temperature sweep at 500 ft and 1500 rpm



NOTES

1. Fuel pressure range specified is to the engine fuel control valve. Additional fuel train components should be considered in pressure and flow calculations.

2. Generator efficiencies, power factor, and voltage are based on standard generator. [Genset Power (ekW) is calculated as: ((Engine Power (bkW) - Gearbox Power (bkW)) x Generator Efficiency) - Ancillary Load (ekW)], [Genset Power (kVA) is calculated as: (((Engine Power (bkW) - Gearbox Power (bkW)) x Generator Efficiency) - Ancillary Load (ekW)) / Power Factor]

3. Rating is with two engine driven water pumps. Tolerance is (+)3, (-)0% of full load. All derates are applied without pumps , then pump power is subtracted to obtain final rating.

4. Efficiency represents a Closed Crankcase Ventilation (CCV) system installed on the engine.

5. Genset Effieciency published in accordance with ISO 3046/1.

6. Thermal Efficiency is calculated based on energy recovery from the jacket water, lube oil, 1st stage aftercooler, and exhaust to 248ºF with engine operation at ISO 3046/1 Genset Efficiency, and assumes unburned fuel is converted in an oxidation catalyst.

7. Total efficiency is calculated as: Genset Efficiency + Thermal Efficiency. Tolerance is ±10% of full load data.

8. ISO 3046/1 Genset fuel consumption tolerance is (+)5, (-)0% at the specified power factor. Nominal genset and engine fuel consumption tolerance is ± 1.5% of full load data at the specified power factor.

9. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.

10. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.

11. Exhaust temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.

12. Exhaust flow value is on a "wet" basis. Flow is a nominal value with a tolerance of ± 6 %.

13. Inlet and Exhaust Restrictions are maximum allowed values at the corresponding loads. Increasing restrictions beyond what is specified will result in a significant engine derate.

14. Emissions data is at engine exhaust flange prior to any after treatment.

15. NOx tolerance's are ± 18% of specified value. All other emission values listed are higher than nominal levels to allow for instrumentation, measurement, and engine-to-engine variations. They indicate the maximum values expected under steady state conditions. Fuel methane number cannot vary more than ± 3. THC, NMHC, and NMNEHC do not include aldehydes

16. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ

17. Exhaust Oxygen level is the result of adjusting the engine to operate at the specified NOx level. Tolerance is ± 0.5.

18. LHV rate tolerance is ± 1.5%.

19. Heat rejection values are representative of site conditions. Tolerances, based on treated water, are ± 10% for jacket water circuit, ± 50% for atmosphere, ± 20% for lube oil circuit, ± 10% for exhaust, ± 5% for aftercooler circuit, and ± 5% for Gearbox.

20. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.

21. Aftercooler heat rejection is nominal for site conditions and does not include an aftercooler heat rejection factor. Aftercooler heat rejection values at part load are for reference only.

22. Cooling system sizing criteria represent the expected maximum circuit heat rejection for the ratings at site, with applied plus tolerances. Total circuit heat rejection is calculated using formulas referenced in the notes on the standard tech data sheet with the following qualifications. Aftercooler heat rejection data (1AC & 2AC) is based on the standard rating. Jacket Water (JW), Oil Cooler (OC), and Gearbox (GB) heat rejection values are based on the respective site or maximum column. Aftercooler heat rejection factors (ACHRF) are specific for the site elevation and inlet air temperature specified in the site or maximum column, referenced from the table on the standard data sheet

23. Minimum heat recovery values represent the expected minimum heat recovery for the site, with applied minus tolerances. Do not use these values for cooling system sizing.

WARNING(S):
1. Continuous operation at rated power above 40C(104F) ambient air temperatures may contribute to faster degradation of generator insulation. Consult TMI for degradation curves.

Constituent	Abbrev	Mole %	Norm
Water Vapor	H2O	0.0000	0.0000
Methane	CH4	96.3200	96.3200
Ethane	C2H6	1.7300	1.7300
Propane	C3H8	0.1300	0.1300
Isobutane	iso-C4H1O	0.0100	0.0100
Norbutane	nor-C4H1O	0.0200	0.0200
Isopentane	iso-C5H12	0.0000	0.0000
Norpentane	nor-C5H12	0.0000	0.0000
Hexane	C6H14	0.0000	0.0000
Heptane	C7H16	0.0000	0.0000
Nitrogen	N2	0.8000	0.8000
Carbon Dioxide	CO2	0.9900	0.9900
Hydrogen Sulfide	H2S	0.0000	0.0000
Carbon Monoxide	CO	0.0000	0.0000
Hydrogen	H2	0.0000	0.0000
Oxygen	O2	0.0000	0.0000
Helium	HE	0.0000	0.0000
Neopentane	neo-C5H12	0.0000	0.0000
Octane	C8H18	0.0000	0.0000
Nonane	C9H20	0.0000	0.0000
Ethylene	C2H4	0.0000	0.0000
Propylene	C3H6	0.0000	0.0000
TOTAL (Volume %)		100.0000	100.0000

Fuel Makeup:	TCPL Pipeline Nat Gas
Unit of Measure:	English

Calculated Fuel Properties

Caterpillar Methane Number:	94.5
Lower Heating Value (Btu/scf):	910
Higher Heating Value (Btu/scf):	1010
WOBBE Index (Btu/scf):	1198
THC: Free Inert Ratio:	54.87
Total % Inerts (% N2, CO2, He):	1.79%
RPC (%) (To 905 Btu/scf Fuel):	100%
Compressibility Factor:	0.998
Stoich A/F Ratio (Vol/Vol):	9.51
Stoich A/F Ratio (Mass/Mass):	16.48
Specific Gravity (Relative to Air):	0.577
Fuel Specific Heat Ratio (K):	1.313

CONDITIONS AND DEFINITIONS

Caterpillar Methane Number represents the knock resistance of a gaseous fuel. It should be used with the Caterpillar Fuel Usage Guide for the engine and rating to determine the rating for the fuel specified. A Fuel Usage Guide for each rating is included on page 2 of its standard technical data sheet.

RPC always applies to naturally aspirated (NA) engines, and turbocharged (TA or LE) engines only when they are derated for altitude and ambient site conditions.

Project specific technical data sheets generated by the Caterpillar Gas Engine Rating Pro program take the Caterpillar Methane Number and RPC into account when generating a site rating.

Fuel properties for Btu/scf calculations are at 60F and 14.696 psia.

Caterpillar shall have no liability in law or equity, for damages, consequently or otherwise, arising from use of program and related material or any part thereof.

FUEL LIQUIDS

Field gases, well head gases, and associated gases typically contain liquid water and heavy hydrocarbons entrained in the gas. To prevent detonation and severe damage to the engine, hydrocarbon liquids must not be allowed to enter the engine fuel system. To remove liquids, a liquid separator and coalescing filter are recommended, with an automatic drain and collection tank to prevent contamination of the ground in accordance with local codes and standards.

To avoid water condensation in the engine or fuel lines, limit the relative humidity of water in the fuel to 80% at the minimum fuel operating temperature.

WARNING(S)

1. Continuous operation at rated power above 40C(104F) ambient air temperatures may contribute to faster degradation of generator insulation. Consult TMI for degradation curves.

Carrier

United Technologies

VECTOR™ 8100

High capacity, efficient energy management, no diesel emissions. The next generation of cold storage solutions.

PERFORMANCE SPECIFICATIONS

VECTOR™ 8100

The Vector 8100 system is the new direction in financially and environmentally sustainable cold storage solutions. This all-electric unit eliminates the noise, emissions, and fuel consumption associated with traditional diesel cold storage units. The Vector 8100 system offers high reliability, next-generation efficiency savings, and an energy management system that adjusts to changes in a facility's electrical supply.

Next generation components for best-in-class reliability and performance. Exclusive high efficiency microchannel condenser coil, low noise vortex suppression condenser fans, high efficiency electric scroll compressor, and damage-resistant composite skins.

High performance system featuring a cool-only refrigeration system that eliminates the compressor shaft seal and many brazed joints, significantly reducing the chance of refrigerant leaks. Electric heating produces maximum heating and quick defrosts regardless of the outdoor ambient temperature.

TRU Demand™ energy management logic monitors and efficiently regulates power draw to save energy costs. The maximum current draw may also be adjusted to regulate power draw from electrical infrastructure.

Built-in brown out protection keeps the unit running during low voltage conditions by monitoring current draw and automatically adjusting its operation. In the event of an outage, stagger starting logic avoids a massive draw on the grid by preventing multiple units from starting simultaneously when the power returns.

APX™ Control System features multi-language capability, keypad lockout to prevent unauthorized changes or tampering, IntelliSet™ commodity profiling and economy option, integrated data recorder, integrated diagnostics, hour meters, and USB port.

Environmentally sustainable system with no diesel engine emissions, a lower carbon footprint, and an extremely quiet solution for operations with residential neighbors sensitive to diesel engine noise.

Condenser Dimensions
76.4" x 85.7" x 22.8"
(1,940 x 2,176 x 579 mm)

Evaporator Dimensions
66.3" x 45.2" x 8.2"
(1,684 x 1,149 x 280 mm)

Body Opening
66.8" x 46.0" (1,696 x 1,168 mm)

Approximate Weight
1,150 lb. (520 kg) including electric standby
Battery: 50 lb. (23 kg)

Cooling Capacity
Ambient at 100°F (38°C)

Evaporator Return Air Temp.	Electric Operation	
	Btuh	Watts
35°F (2°C)	60,000	17,585
0°F (-18°C)	35,000	10,260
-20°F (-29°C)	24,000	7,035

Evaporator Airflow
Applied system performance:
3,100 cfm (5,270 m³/hr)

Standard Features Include:

Electric operation
- 460V/3PH/60Hz
- Automatic phase reversal

Fully hermetic electric scroll compressor
Refrigerant R-404A, 14lbs (6.3 kg)
TRU-Demand™ high energy efficiency
- Electronic expansion valve
- Compressor economizer system
- Electronic suction modulation
- Brazed plate heat exchanger
- Automatic start/stop power saver

Electric heating and defrost system
APX™ Control System
- IntelliSet™ with ProductShield™
- DataLink™ data recorder
- Information dashboard
- Multilingual graphical display
- Pretrip and Virtual Tech diagnostics
- Integrated USB port

APX™ CONTROL SYSTEM

Standard Features continued:

High efficiency microchannel condenser
- Maintenance free AC fan motors
- V-Force™ vortex suppression fans
- Condenser coil hail/bug guard

TurboAir™ evaporator management
Durashell™ 2 composite doors
- Single latch release

Installation package
Screw-post battery terminals

Accessories and Options:

Open trailer door indicator and shutdown switches
Evaporator drain line extensions
Remote light bar
Remote temperature probes
Unit impact protection bumpers
Microprocessor impact protection bumper
40-amp auxiliary load battery charger
Flex Power™ dual voltage standby
Door locks
Chrome grille/stainless latch package
Custom color paint
AutoFresh™ air exchange
DataTrak™ remote communications

Specifications are subject to change without notice.
Warranty: Product warranty and limitations are outlined in Form 62-11671.
This warranty applicable only in North America. Consult your Carrier Transicold representative for warranty coverage elsewhere. Form 62-11805.

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Athens, GA 30601 USA
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Ejercito Nacional 253-A Piso 5
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United Technologies

Carrier Transicold Division
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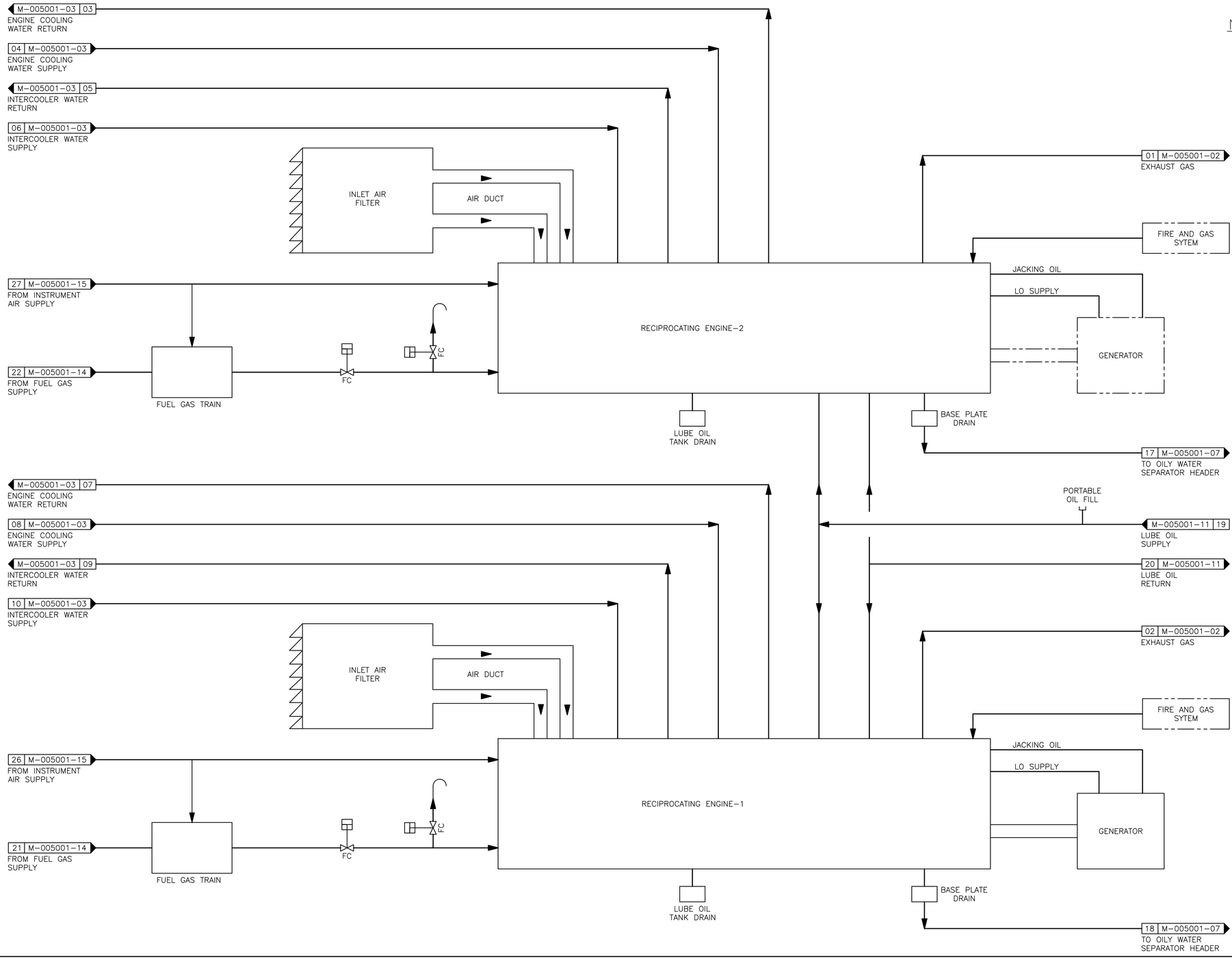
Syracuse, NY 13221 USA

www.trucktrailer.carrier.com

APPENDIX 2D

- Tri-generation Facility Process Flow Diagram, Reciprocating Engine



NOTES

1. ENGINE COOLING WATER LOOP INCLUDES JACKET WATER, 1ST STAGE INTERCOOLER AND ENGINE OIL COOLER.

ISSUE	DATE	DESCRIPTION
C	09/13/2018	FOR CLIENT REVIEW
B	09/10/18	ISSUED FOR INTERNAL REVIEW
A	07/27/18	PRELIMINARY

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	B. CURRY
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

NYCEDC
NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM RECIPROCATING ENGINE

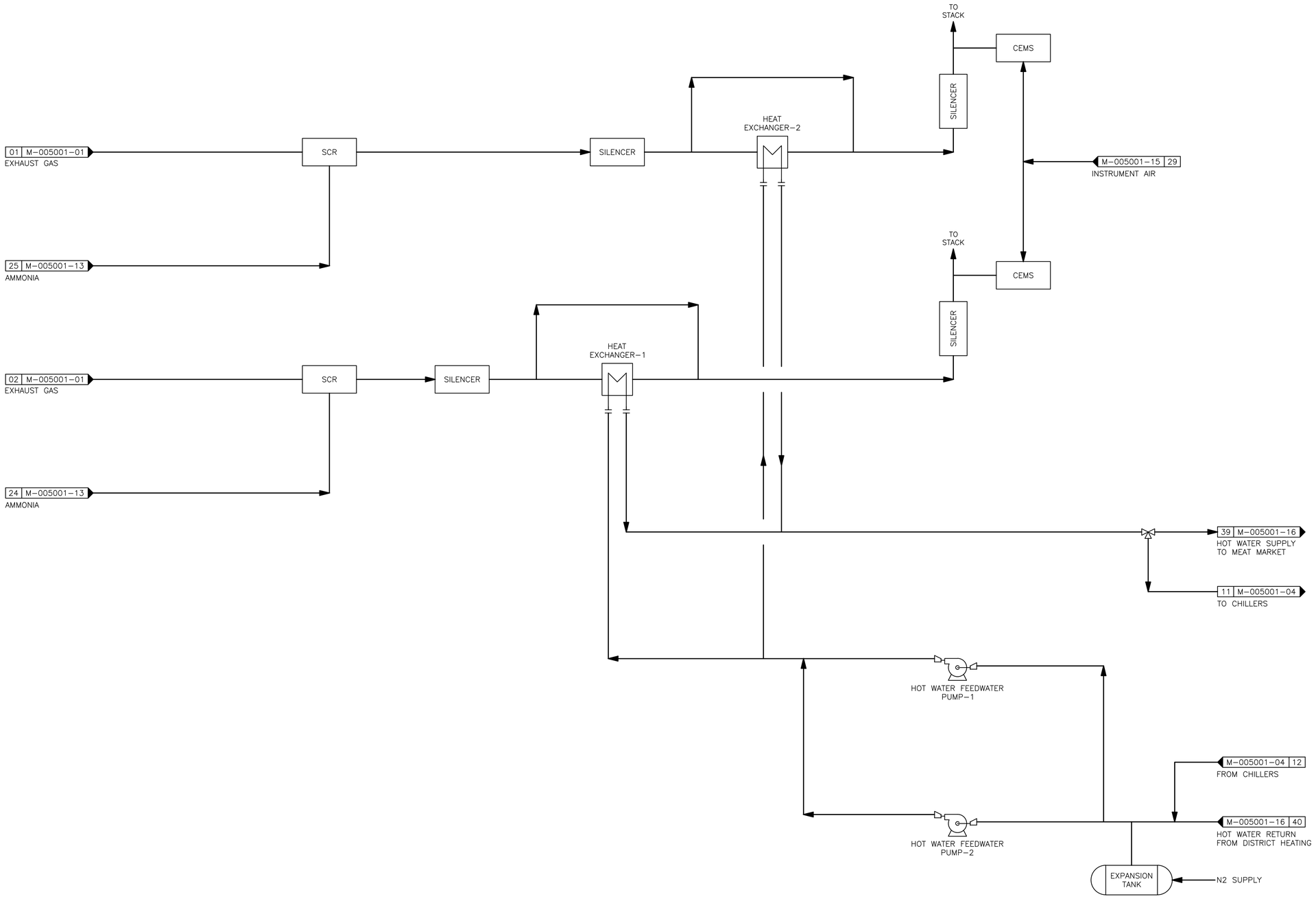
0 1" 2"

FILENAME M-005001-01.dwg

SCALE AS NOTED

SHEET M-00□001-01

9/12/2018 9:41:56 AM, jbrzys



ISSUE	DATE	DESCRIPTION
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B	09/10/2018	ISSUED FOR INTERNAL REVIEW
A	07/27/2018	PRELIMINARY

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	B. CURRY
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

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HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY PROCESS FLO□ DIAGRAM E□HAUST GAS AND HIGH TEMPERATURE HOT □ ATER SYSTEM

0 1" 2"

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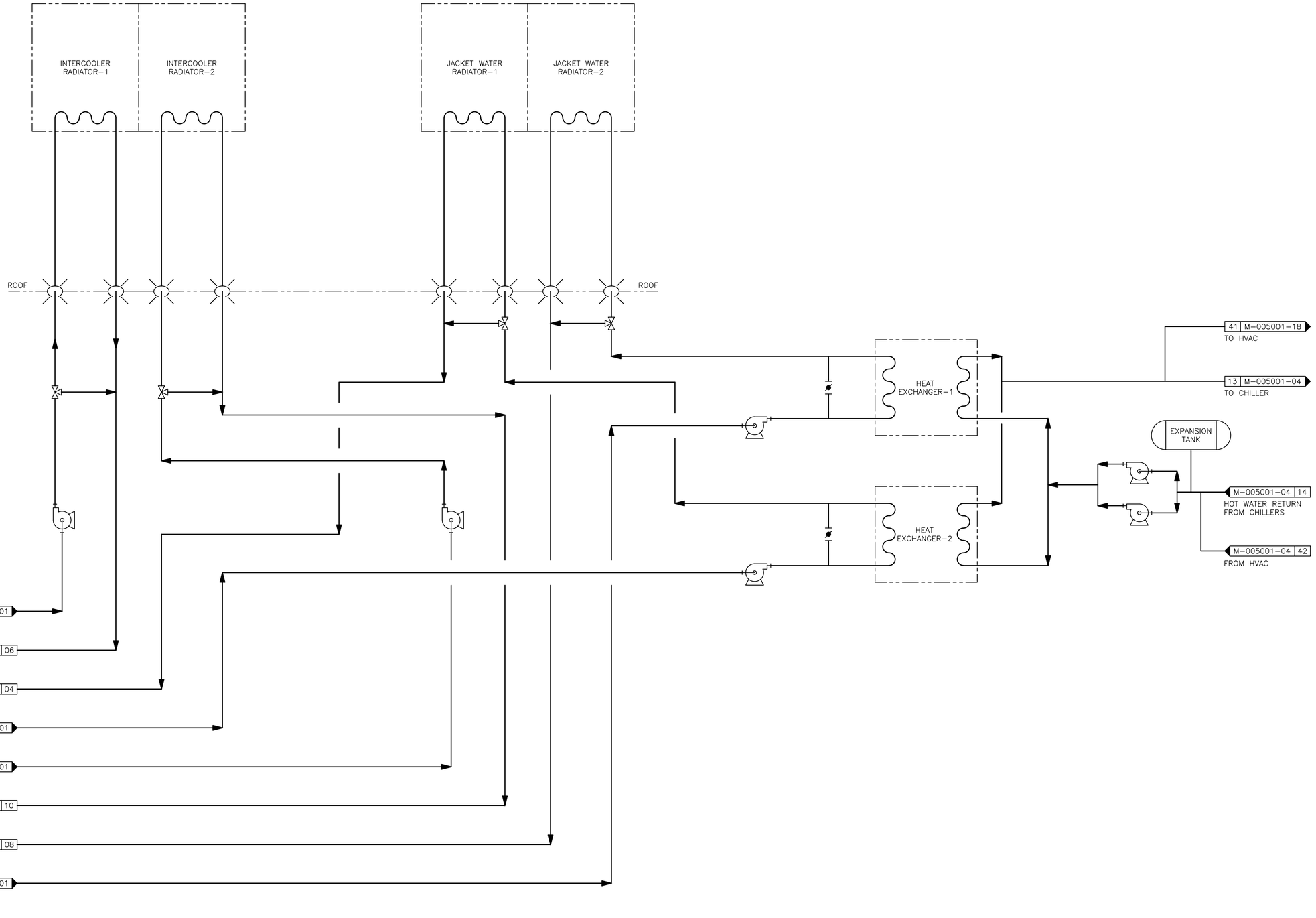

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PROCESS FLO□ DIAGRAM
LO□ TEMPERATURE HOT □ ATER SYSTEM

0 1" 2"

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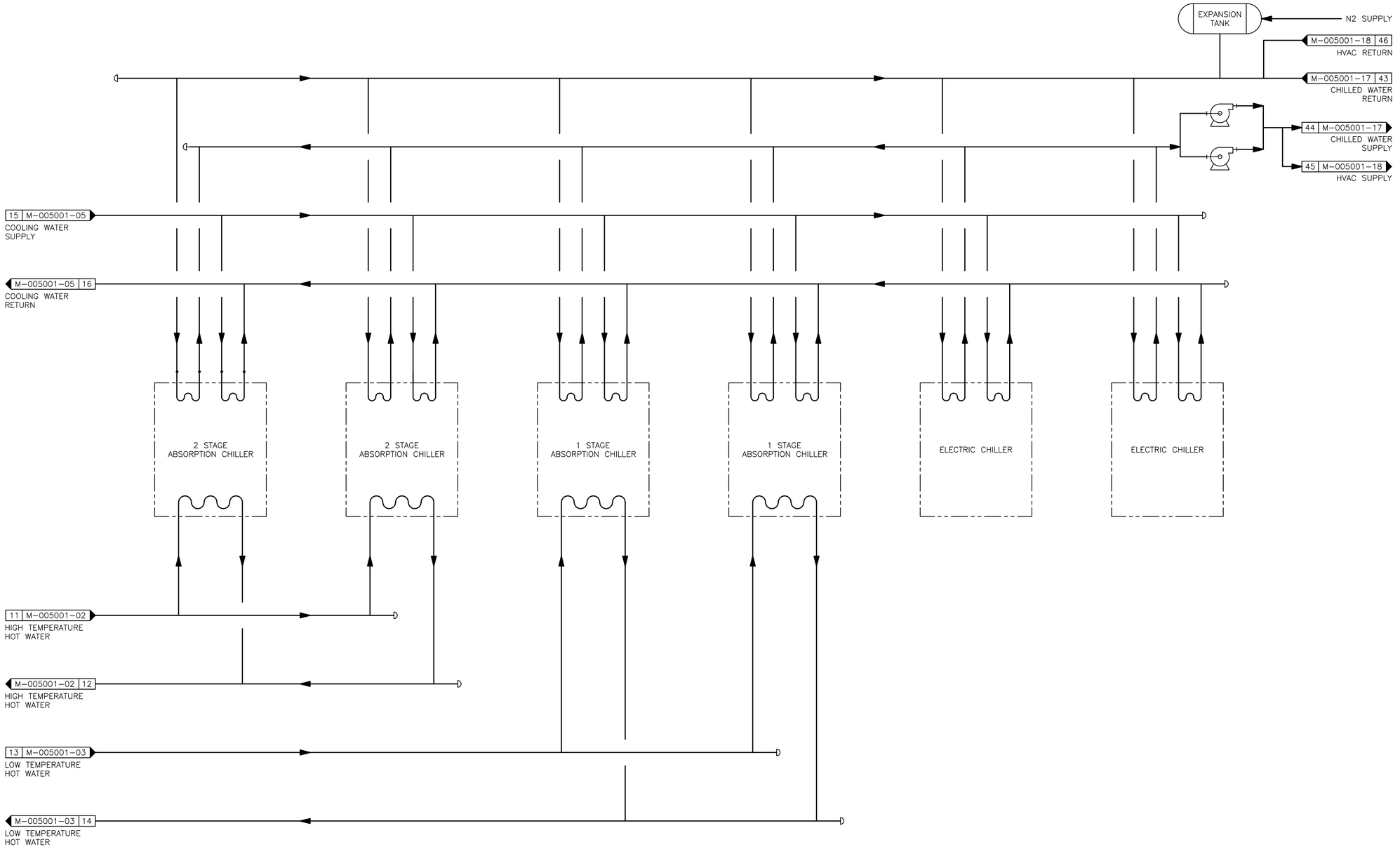

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PROCESS FLO□ DIAGRAM CHILLED □ ATER SYSTEM

0 1" 2"

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SCALE AS NOTED

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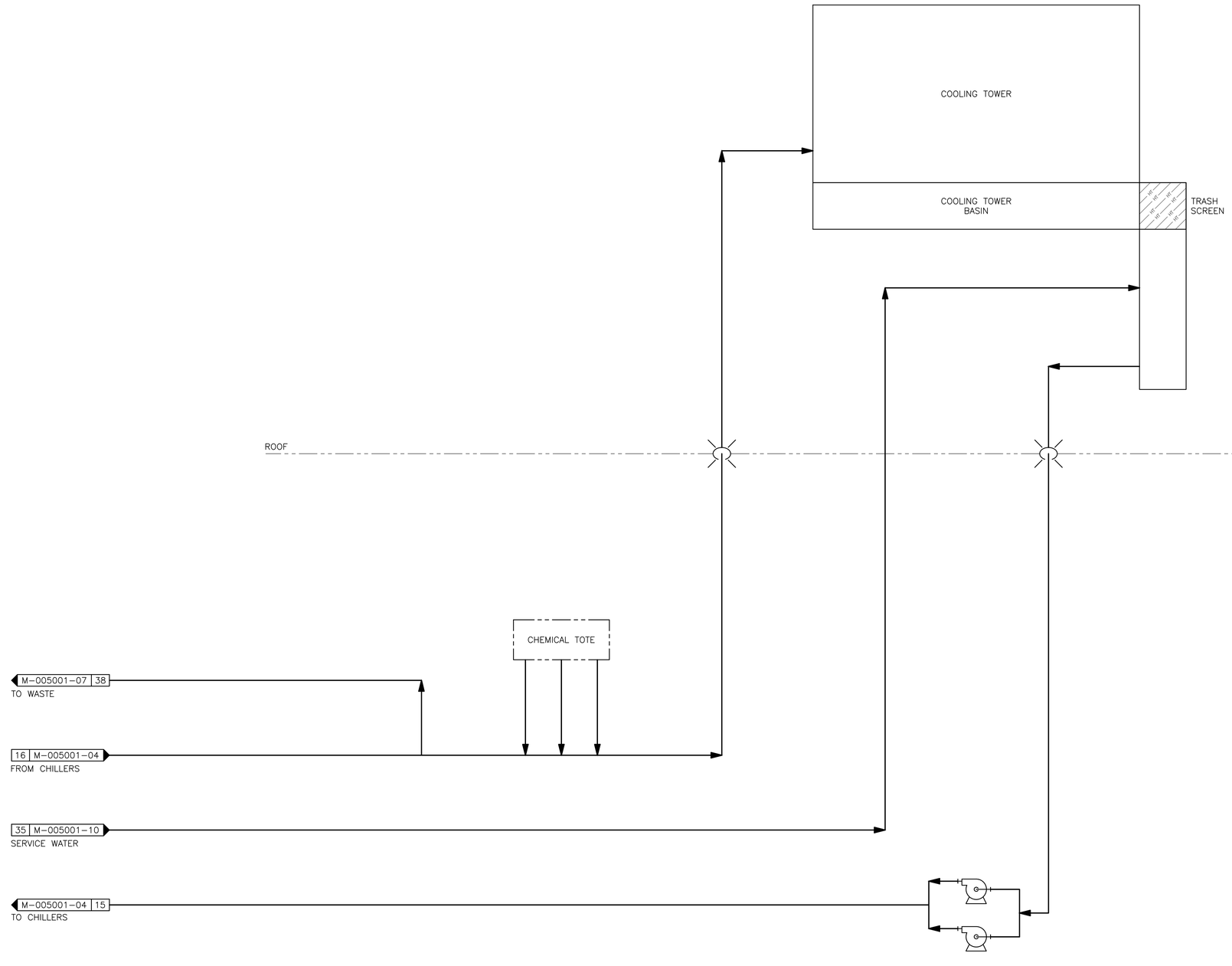

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PROCESS FLO□ DIAGRAM COOLING TO□ ER CIRCULATING □ ATER

0 1" 2"

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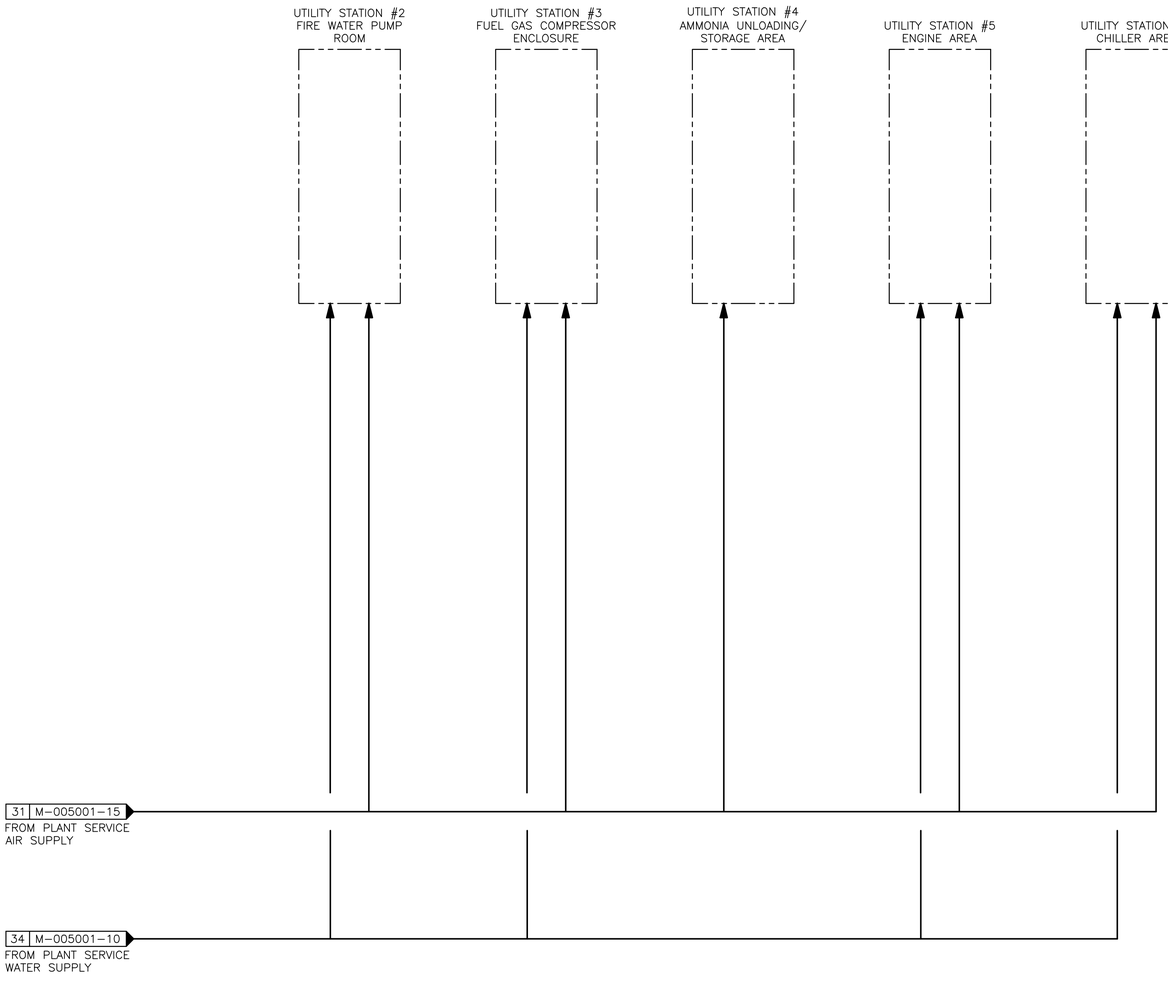

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
SERVICE □ ATER □AIR UTILITY

0 1" 2"

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SCALE AS NOTED

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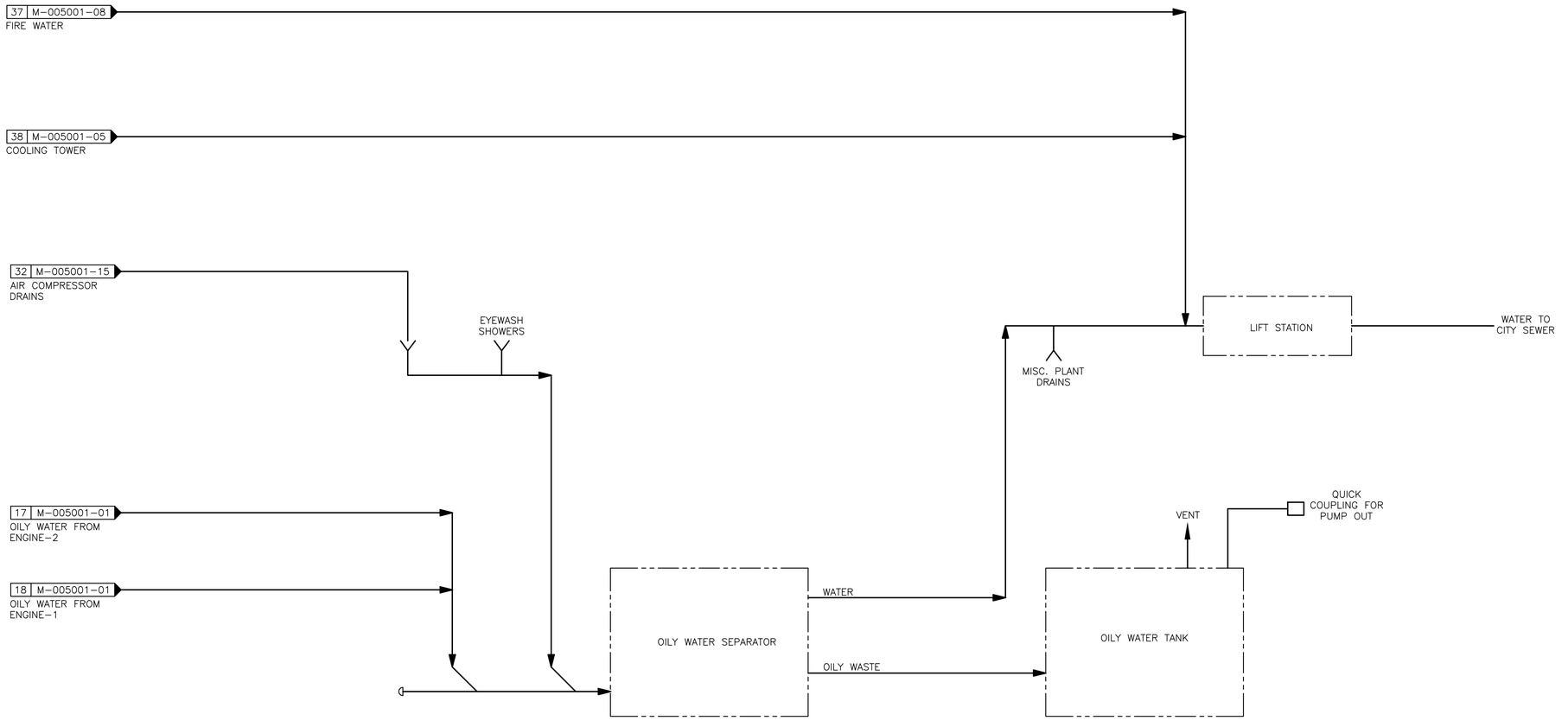

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
□ASTE □ATER

0 1" 2"

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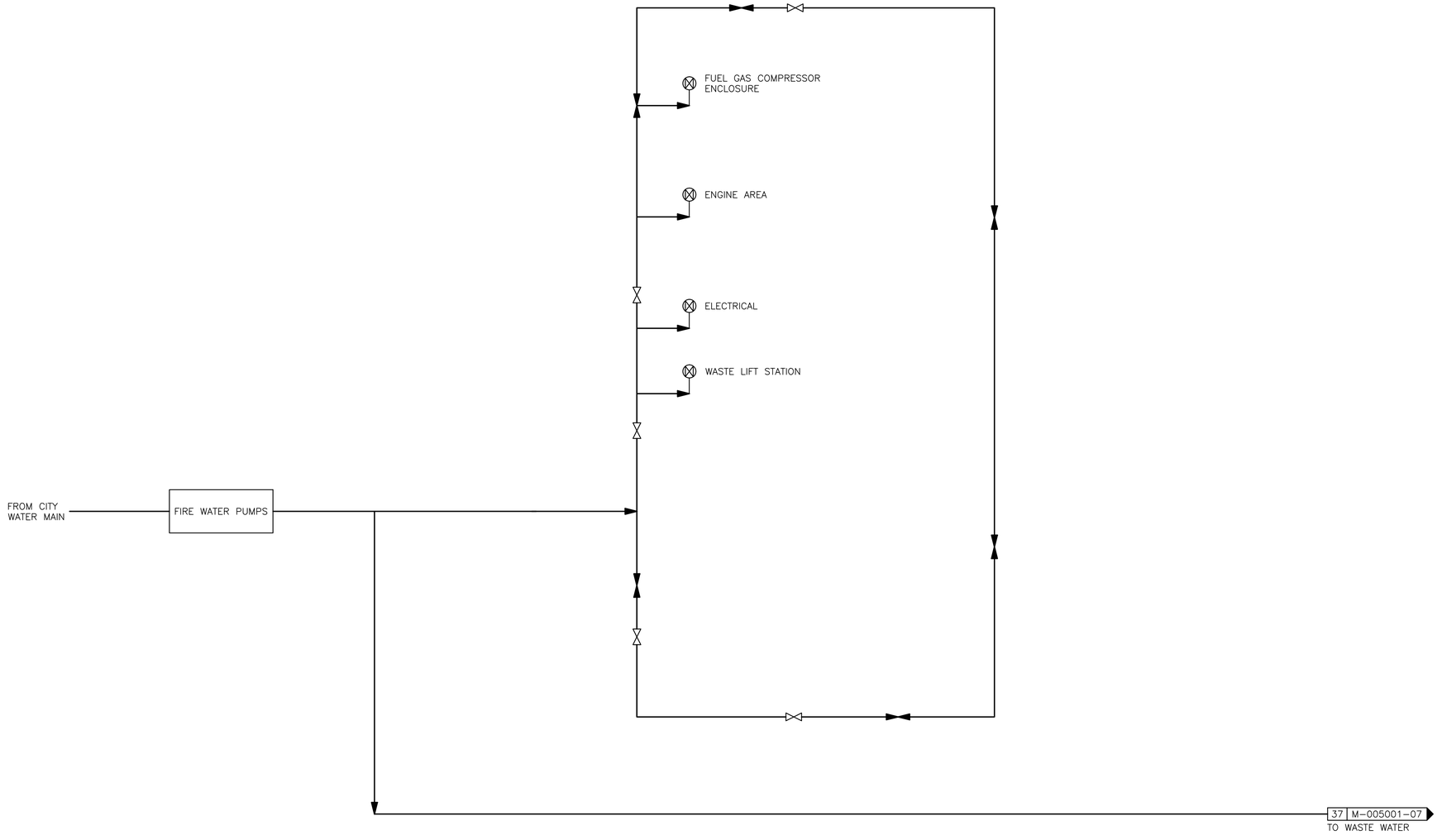

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PROCESS FLO□ DIAGRAM
FIRE PROTECTION □ ATER

0 1" 2"

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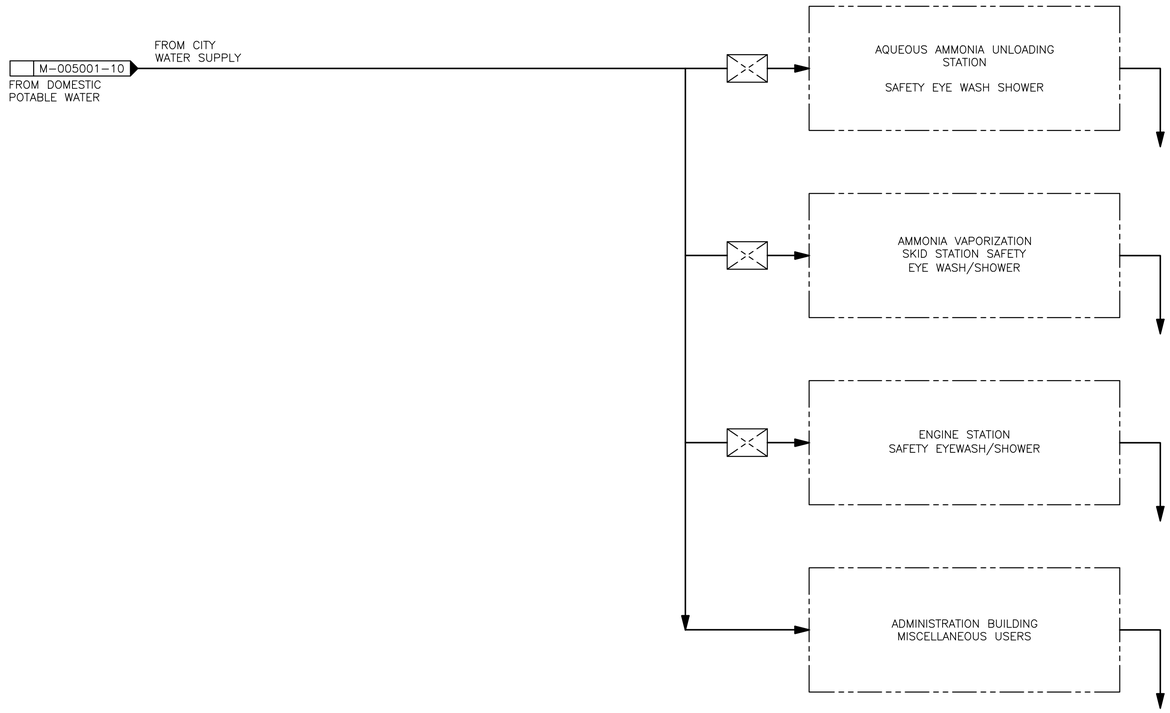

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
DOMESTIC □ ATER □POTABLE□

0 1" 2"

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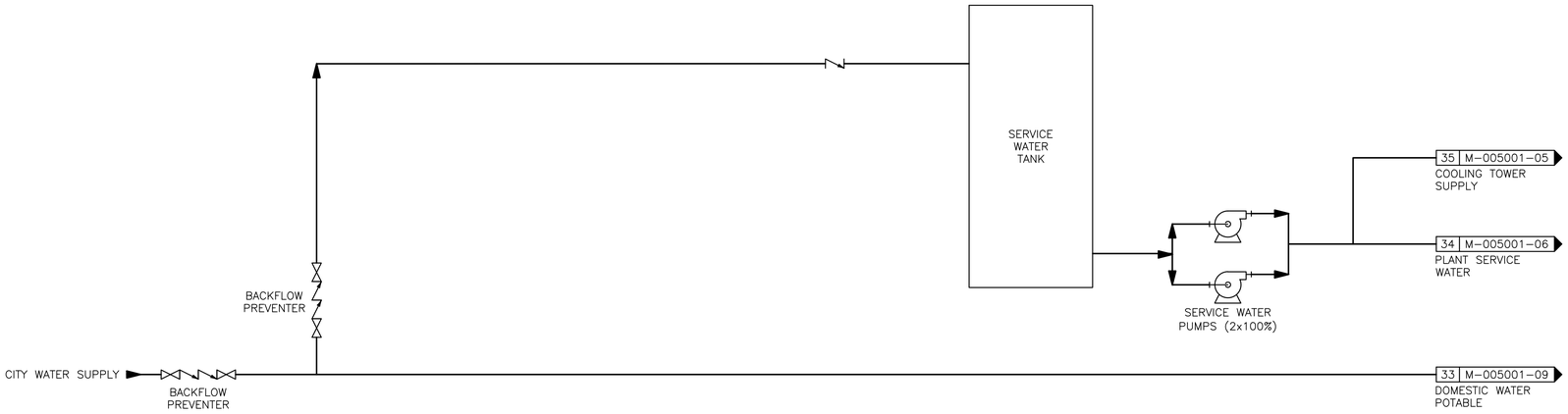

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
□ATER SUPPLY AND STORAGE

0 1" 2"

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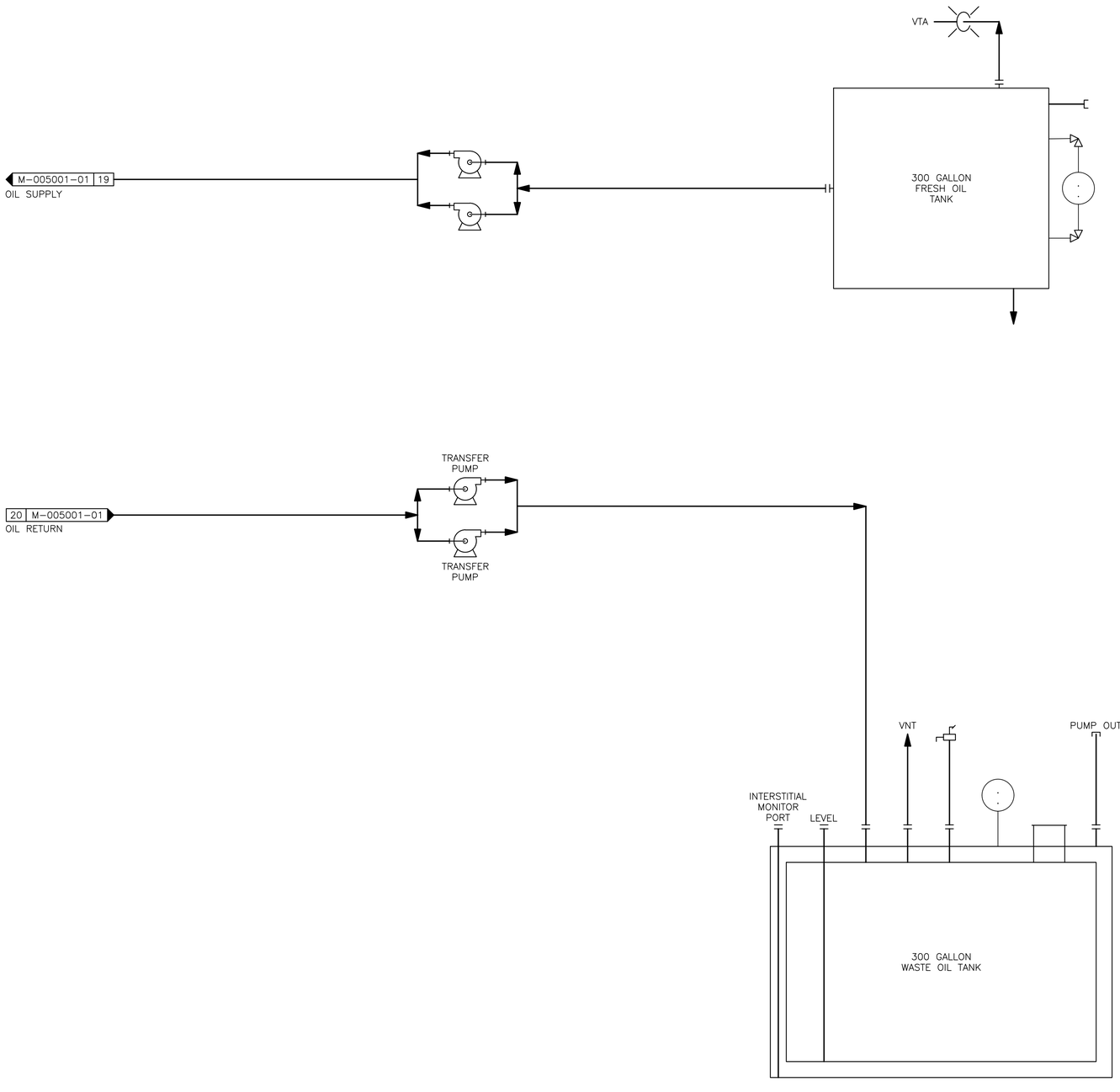

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
ENGINE OIL - FRESH AND □ ASTE

0 1" 2"

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SCALE AS NOTED

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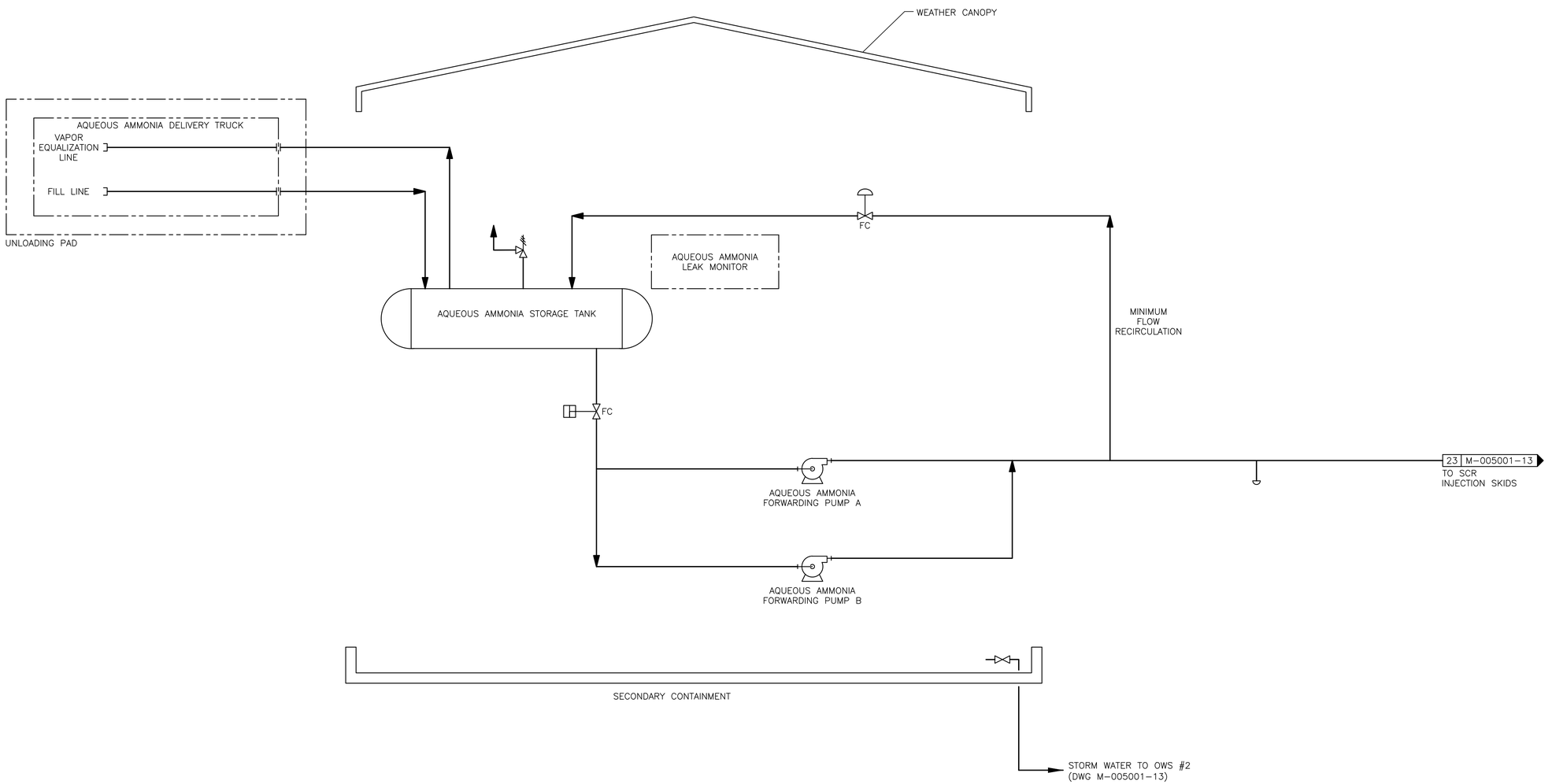

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PROCESS FLO□ DIAGRAM
A□UEOUS AMMONIA

0 1" 2"

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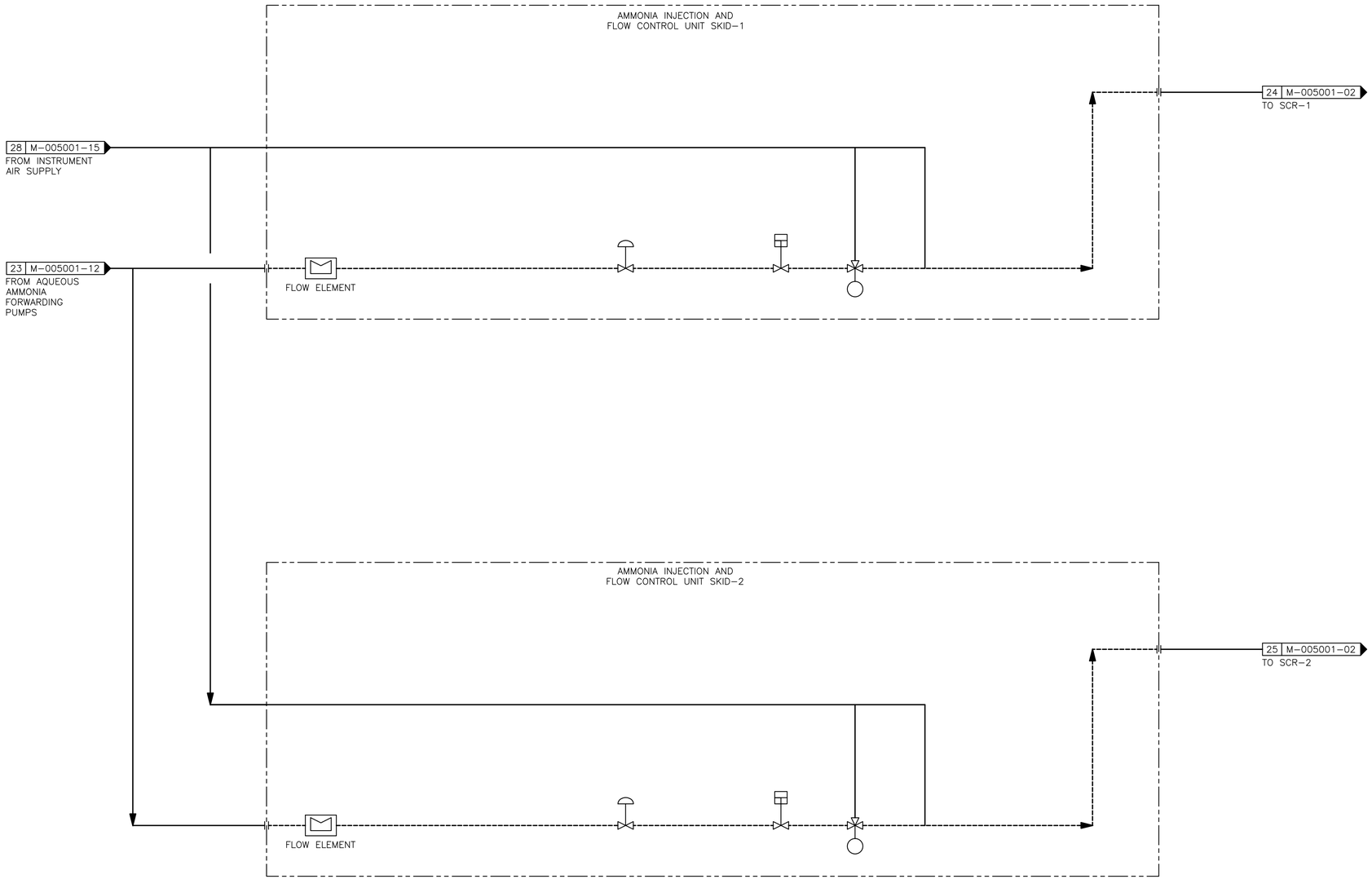

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM SCR

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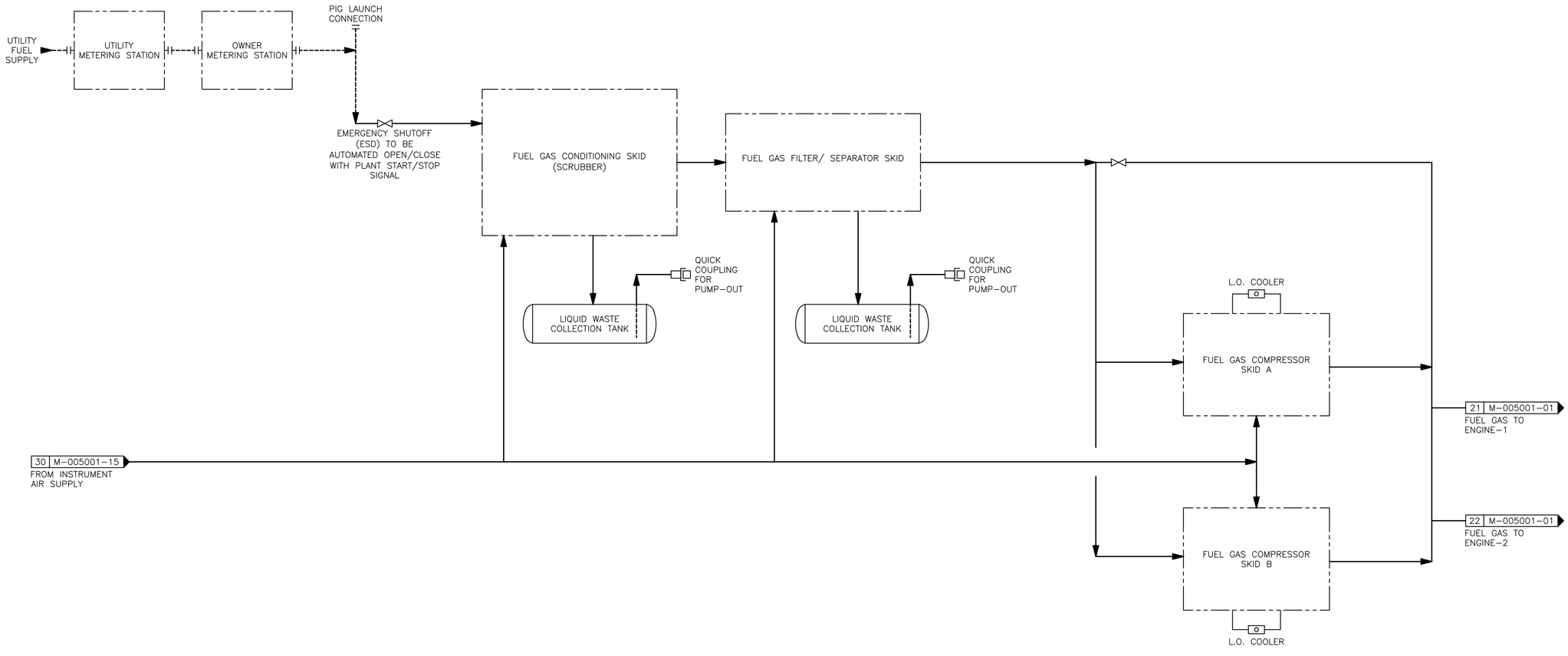

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM FUEL GAS

0 1" 2"

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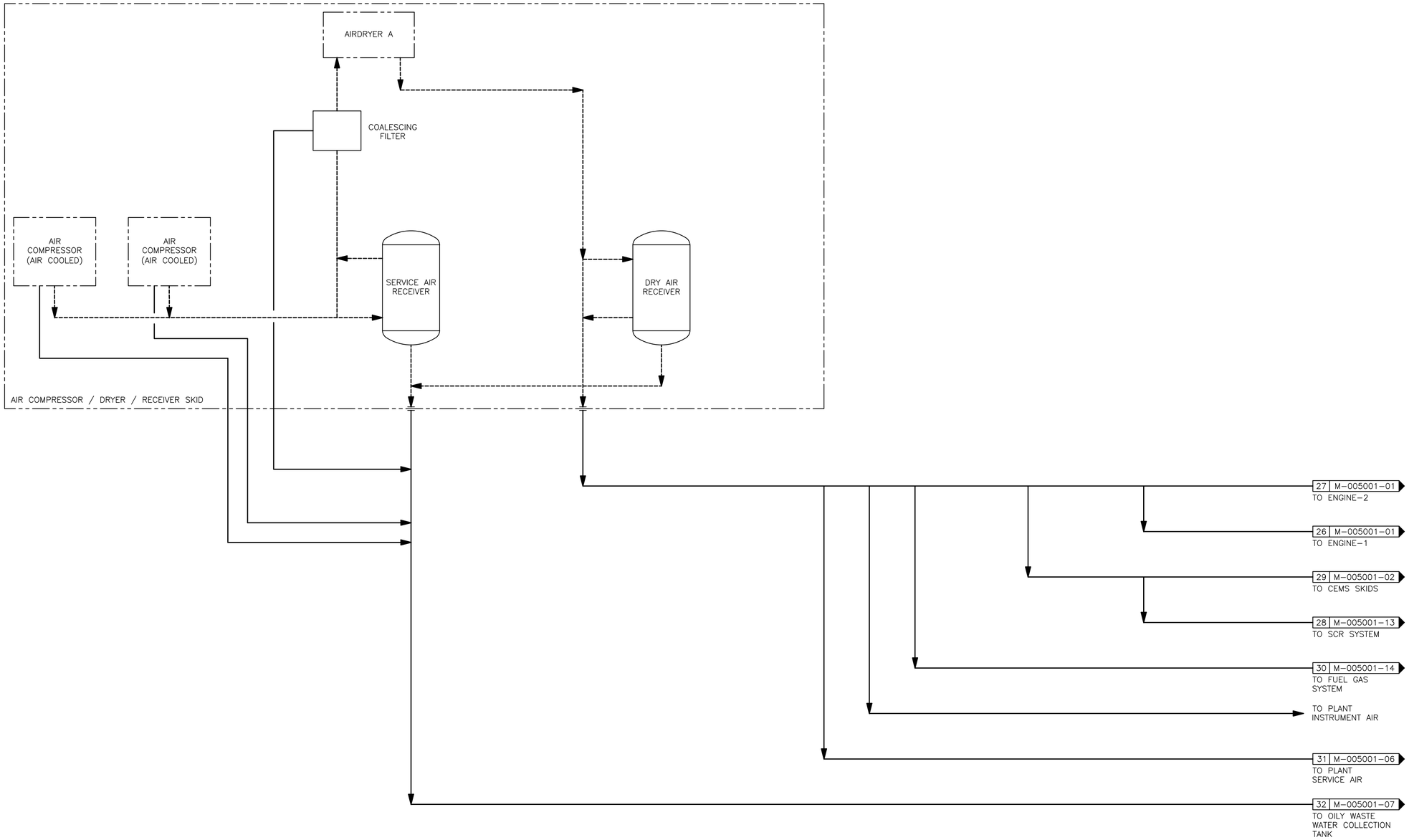

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
PLANT SERVICE AND INSTRUMENT AIR

0 1" 2"

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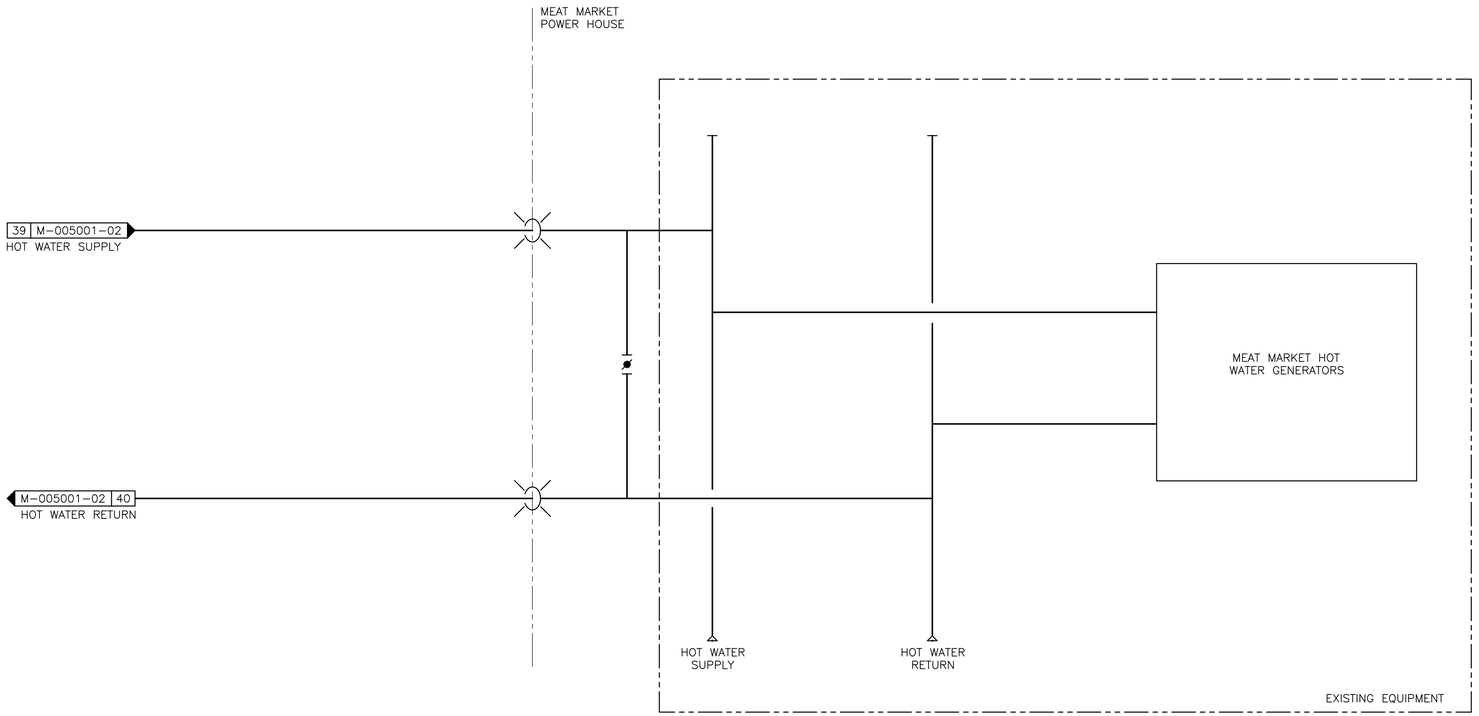

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
HOT □ ATER DISTRIBUTION

0 1" 2"

FILENAME M-005001-16.dwg
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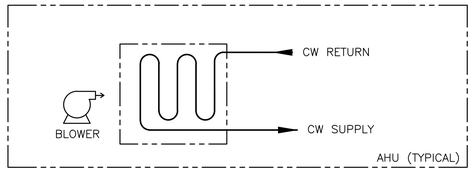

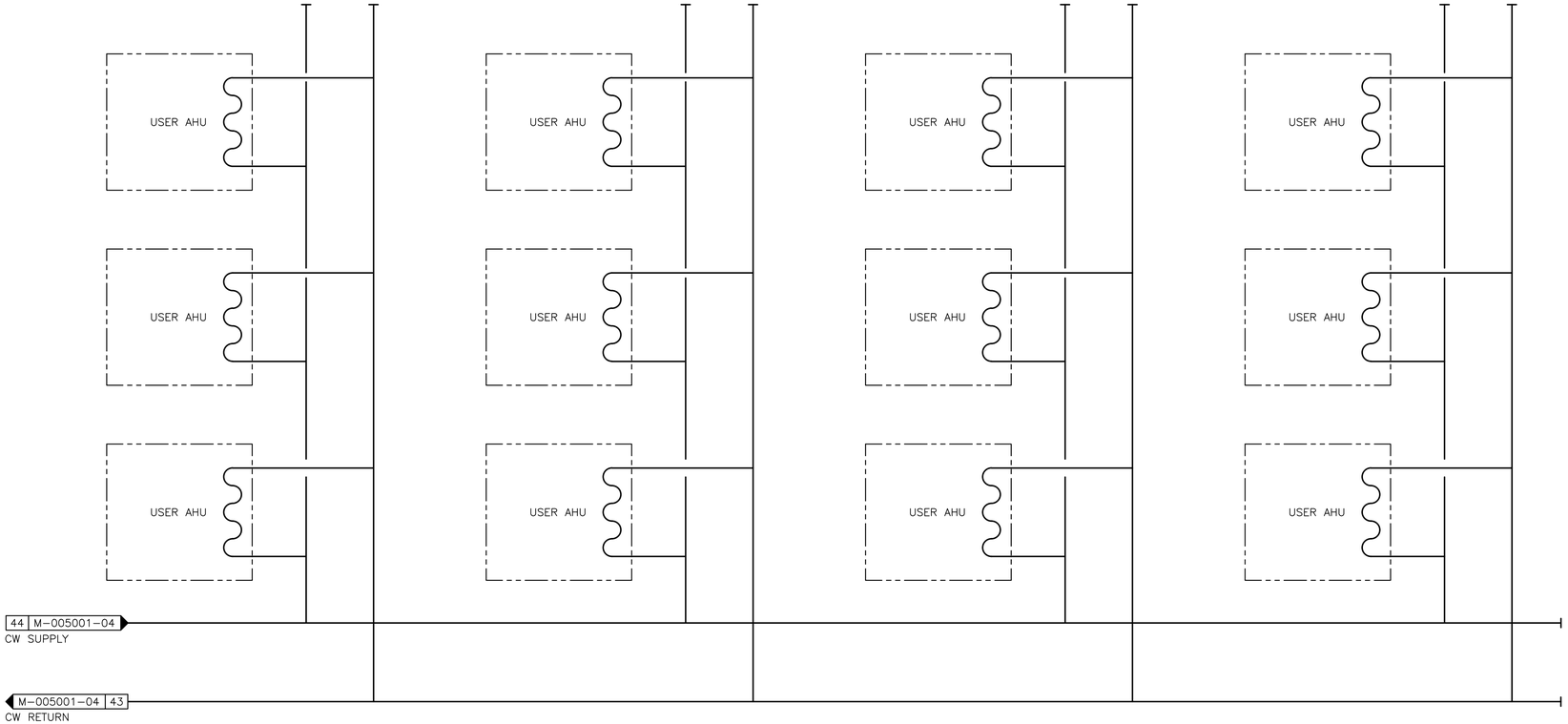

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TRI-GENERATION FACILITY

PROCESS FLO□ DIAGRAM
CHILLED □ ATER DISTRIBUTION

0 1" 2"

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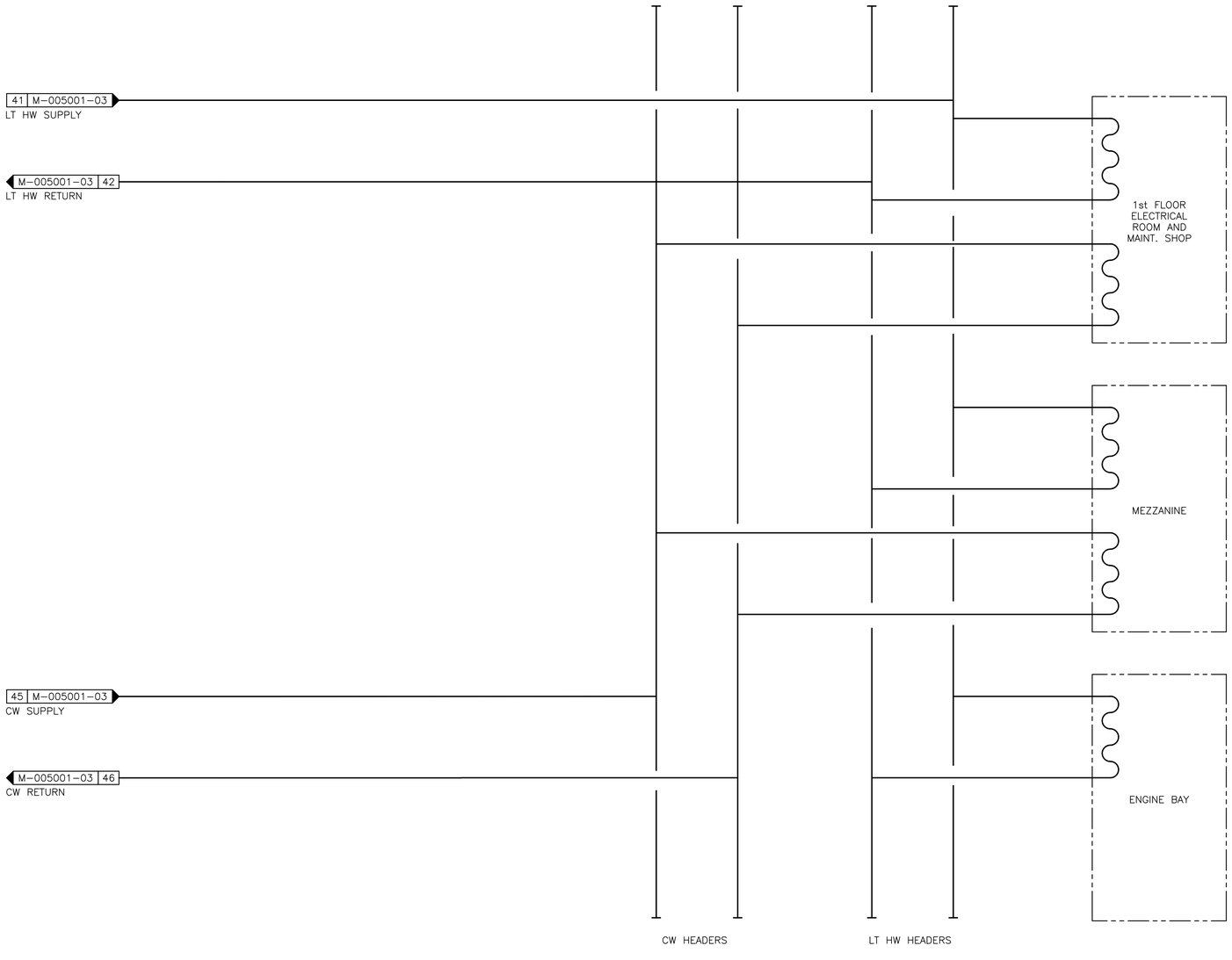

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TRI-GENERATION BUILDING

PROCESS FLO□ DIAGRAM
HVAC

0 1" 2"

FILENAME M-005001-18.dwg
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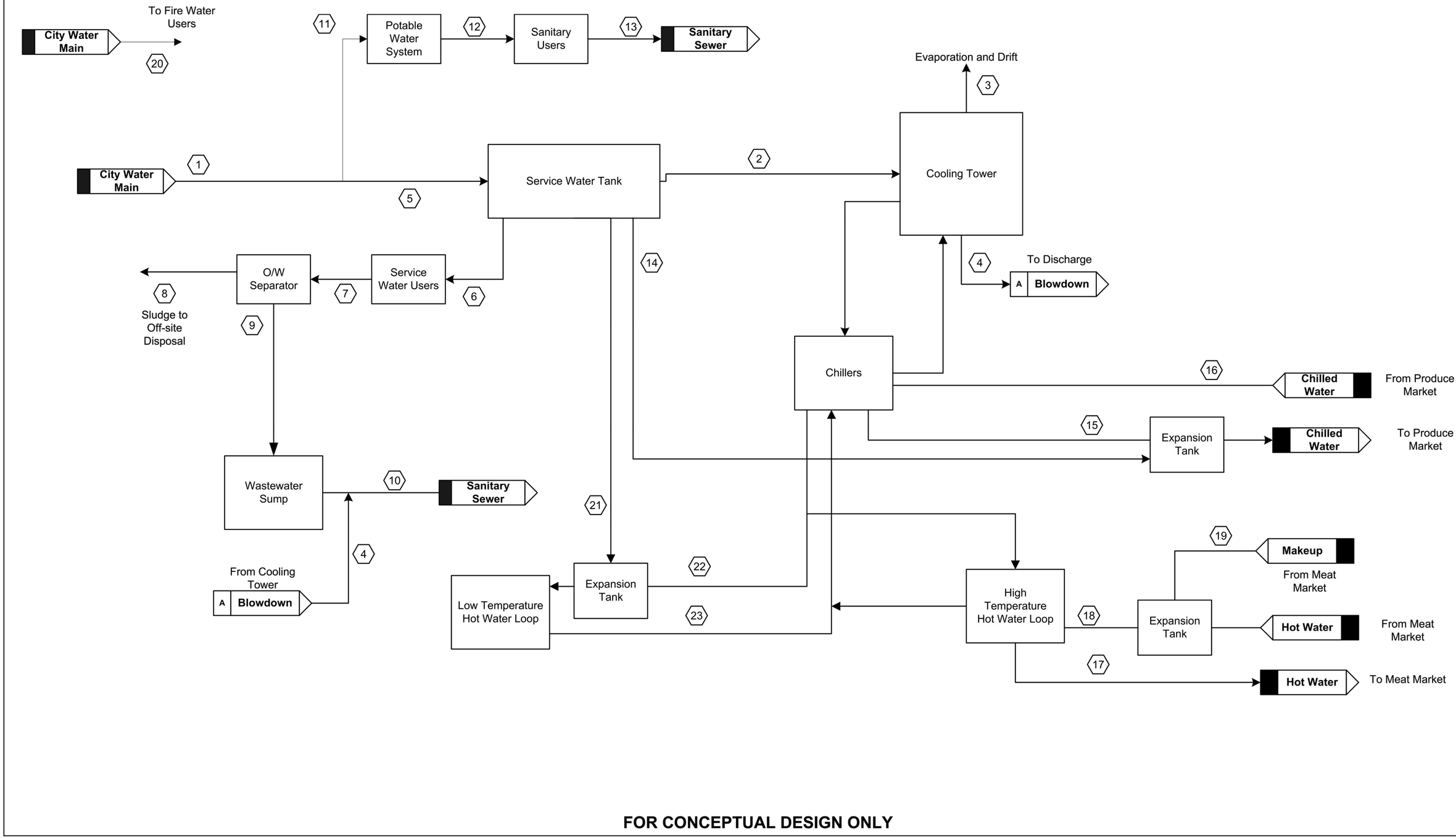
APPENDIX 2E

- Tri-generation Facility Water Mass Balances



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PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	J. PRUSAKIEWICZ
CHECKED	D. MITAS
APPROVED	
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TRI-GENERATION FACILITY

□ATER MASS BALANCE

0 1" 2"

FILENAME 10029617_0WB_M0500-1

SCALE AS NOTED

SHEET M0□00-1

9/12/2018 11:28:31 AM, jbrzys

WATER BALANCE STREAM FLOW RATE TABLE

WATER BALANCE CASE DESCRIPTION	CASE 1 AVG. DAY
HDR HEAT BALANCE #	
FUEL	Natural Gas
PLANT OUTPUT	- MW
AMBIENT TEMP, °F	-
RELATIVE HUMIDITY	-

STREAM NO.	STREAM DESCRIPTION	Flow Rate (GPM)	NOTES
1	Water Supply	89	
2	Cooling Tower Makeup	78	Note 4
3	Cooling Tower Evaporation and Drift	65	Note 5
4	Cooling Tower Blowdown	13	
5	Influent Supply to Service/Fire Water Storage Tank	10	
6	Service Water Users	10	Note 6
7	Oil-Water Separator Influent	10	
8	OWS Sludge to Off-Site Disposal	0	Note 3
9	Oil-Water Separator Effluent	10	
10	Wastewater Discharge to Sanitary Sewer	23	Note 9
11	Potable Water Supply to Users	1	Note 7
12	Sanitary Waste to Drains	1	
13	Sanitary Waste to City	1	
14	Makeup to Chilled Water Loop Expansion Tank	0	Note 3
15	Chilled Water Supply to Produce Market	3,360	
16	Chilled Water Return from Produce Market	3,360	
17	Hot Water Supply to Meat Market	120	
18	Hot Water Return from Meat Market	120	
19	Makeup to Hot Water Loop	0	Note 10
20	Fire Water Users	0	Note 3
21	Makeup to Low Temp Hot Water Loop Expansion Tank	0	Note 3
22	Low Temp Hot Water Return	298	
23	Low Temp Hot Water Supply	298	

NOTES:

1. Water flow rates are based on conceptual design and assumed water quality conditions for the plant configuration shown on Sheet 1 and are shown in gpm unless otherwise specified.
2. Design based on tri-gen plant heat balances performed by HDR.
3. Normally no flow.
4. Cooling tower cycles of concentration estimated to be 6 based on city water supply and dilution effects of recycling water to the cooling tower basin.
5. Cooling Tower Drift estimated to be 0.0005% of circulating water flow.
6. Service water usage estimated at 10 gpm.
7. Potable water usage (daily average) calculated based on 5 full-time employees per day.
8. Flow rates represent the daily average flow rates and do not represent instantaneous maximum demand.
9. Wastewater discharge is the sanitary sewer.
10. Makeup to system is assumed to be from Meat Market.

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TRI-GENERATION FACILITY

□ ATER MASS BALANCE

0 1" 2"

FILENAME 10029617_0WB_M0500-2

SCALE AS NOTED

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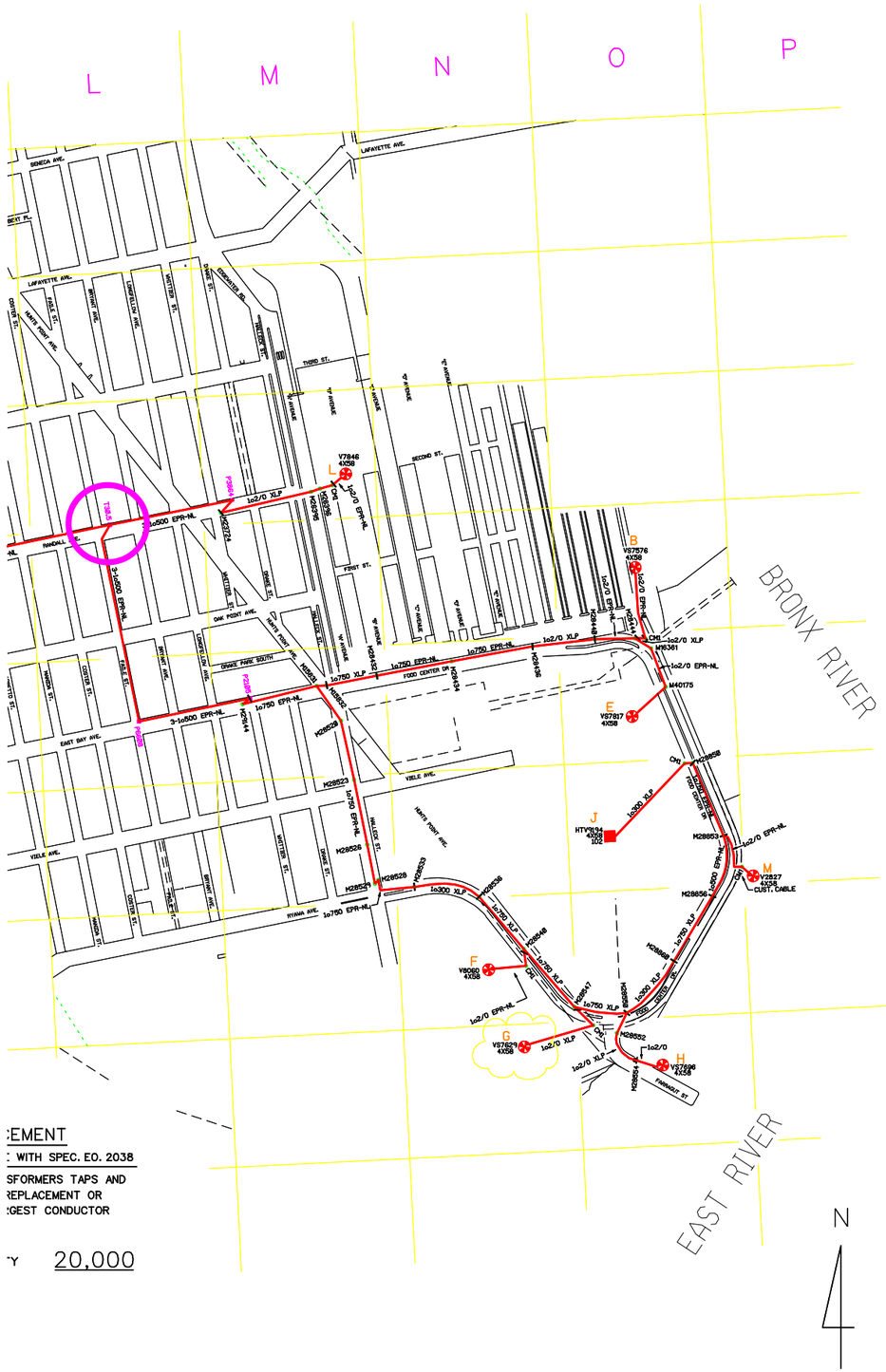
APPENDIX 2F

- Proposed Sectionalization Information for Con Edison

4X58



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:GEST CONDUCTOR

'Y 20,000

	V OR TM NO	LOCATION	NOTE	AREA	EQUIP
A		MOTTHAVENSUBSTATION 12A BRUCKNER BLVD. & 144TH ST		5G	
B	VS 7576 X	200 FOOD CENTER DR. E/O HALLECK ST 4X58 ISOL. NWK.: ----------> 4X61 VS-7822 : ----------> 4X62 VS7747 460 VOLTS	2 5	6D	1000 F S-T
C	V 7627 X	MANHATTAN BEER NO. 977-989 E. 149 ST. E.S. 2ND SLY DOOR AT GRADE COMPT. NO. 2 WED. TECH 4X58 ISOL. NWK.: ----------> 4X62 V-7748 : ----------> 4X61 V-7806 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC FOR ACCESS CALL (212) 993-8500	1 2 5	5H	1000 F I
D	V 7749 X	NO. 1848 E. 149 ST. W.S. NLY DOOR AT GRADE 4X58 ISOL. NWK.: ----------> 4X61 V-7807 : ----------> 4X59 V-7628	2 5	4H	1000 F S-T
E	VS 7817 X	DAITCH CRYSTALS DAIRIES INC. FOOD CENTER DR. EXT. E/O HALLECK ST. ELY SDWK. GRTG. 4X58 ISOL. NWK.: ----------> 4X62 VS-7631 : ----------> 4X61 VS-7752 460 VOLTS	2 5	5O	2500 F S-T
F	V 8868 X	FULTON FISH MARKET RYAWA AVE. (FOOD CENTER RD.) ELY SDWK. GRTG. 4X58 <---------- ----------> 4X61 V7820 V8868 SPOT NW X 4X62 ----------> 4X59 V7753 <---------- V7698 460 VOLTS		3N	2500 F S-T
G	VS 7629 X	CITY OF NY PRISON BARGE 1 HALLECK ST S/O RYAWA ST. COMPT. #2 CENT VAULT ON PRIV. PROP. 4X58 ISOL. NWK.: ----------> 4X62 VS-7815 : ----------> 4X59 FOR 24HR ACCESS 718-579-8341 V-7758 460 VOLTS	2 5	2N	2500 F S-T
H	VS 7696 X	VITA FOODS N/S FARRAGUT ST S/O FOOD CENTER DR CENT SDWK.GRTG. 4X58 ISOL NW : ----------> 4X59 VS-7757 : ----------> 4X62 VS-7682 460 VOLTS	2 5	2O	2500 F S-T
J	HTV 9194 X 182	HUNTS POINT CO-OP MARKET EAST BAY AVE. EXT. W.S. NLY ENCL. AT GRADE NORMAL RESTORATION BETWEEN MON. & FRI. 7AM-5PM CUSTOMER SUBSTATION 4X61 <---- HTV ----> 4X62 184 181 4X58 <---- ----> 4X59 182 183	7	4O	H.T.
K	VS 7832 X	NY ORGANIC FERTILIZER CO. SLUDGE PROCESSING FACILITY 400 TRUXTON ST. S/O OAK POINT AVE. ISOL NWK. 4X58 ----------> 4X59 VS7835 : ----------> 4X60 VS7848 SLY UNIT ON PRIVATE PROP. 460 VOLTS	2 5	4J	2500 F S-T
L	V 7846 X	HUNTS POINT TERMINAL MARKET SECOND ST. AND AVE. "B" ELY UNIT 4X58 <---- ----> 4X59 V-7842 SPOT NWK. 4X62 <---- ----> 4X61 V-7831 V-7850 ----------> 4X60 VS-7848 460 VOLTS		7M	2000 F S-T
M	V 2827 X	ANHEUSER-BUSCH 500 FOOD CENTER DR. E/O HALLECK ST WLY UNIT ISOL. NWK. : ----------> 4X59 V2612 4X58 <----------: : ----------> 4X62 V2586 CUSTOMER CONTACT 24HR. DANIEL DAHLSTROM 619-717-1791 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC 480 VOLTS	1 2 5	4O	2500 F I

TYPICAL M&S PLATE DIMENSIONS:

NOTES:

7. INSPECTION OF P.I.'s ON CUSTOMERS PREMISES REQUIRED, PRIOR TO RESTORING FEEDER TO SERVICE, IF AN OPEN PHASE FAULT OCCURS BETWEEN THE CUSTOMER AND THE LOCATION WHERE TRACING CURRENT IS APPLIED AND THERE IS NO TRANSFORMER SOLIDLY CONNECTED BETWEEN THE FAULT AND THE CUSTOMER.

NOTES:

1. PROTECTOR WHICH MUST BE OPENED MANUALLY AND RESTORED TO AUTOMATIC OPERATION.
2. INSPECTION OF NETWORK PROTECTOR FOR BLOWN FUSES REQUIRED ALTHOUGH FEEDER CLEARS AUTOMATICALLY WITHIN ONE MINUTE AFTER OPENING.
5. ISOLATED NETWORK - SEE SPEC. EO-4007 FOR OPERATION.

REVISION:
Z16-C9817-0000, WR#3306893: PICK UP OFF TEMP 2500KVA TRANSFORMER IN VS-7629 VIA L&C REMOVAL IN VS-7629. REPLACED ON ISO 2500KVA NETWORK PROTECTOR IN V-7629 WITH NEW 2500KVA SUBMERSIBLE TYPE. REBANDED V-7629 TO VS-7629. (LJA)

CONSOLIDATED EDISON CO. OF N.Y.INC.
WESTCHESTER CUSTOMER SERVICES

M & R BUREAU

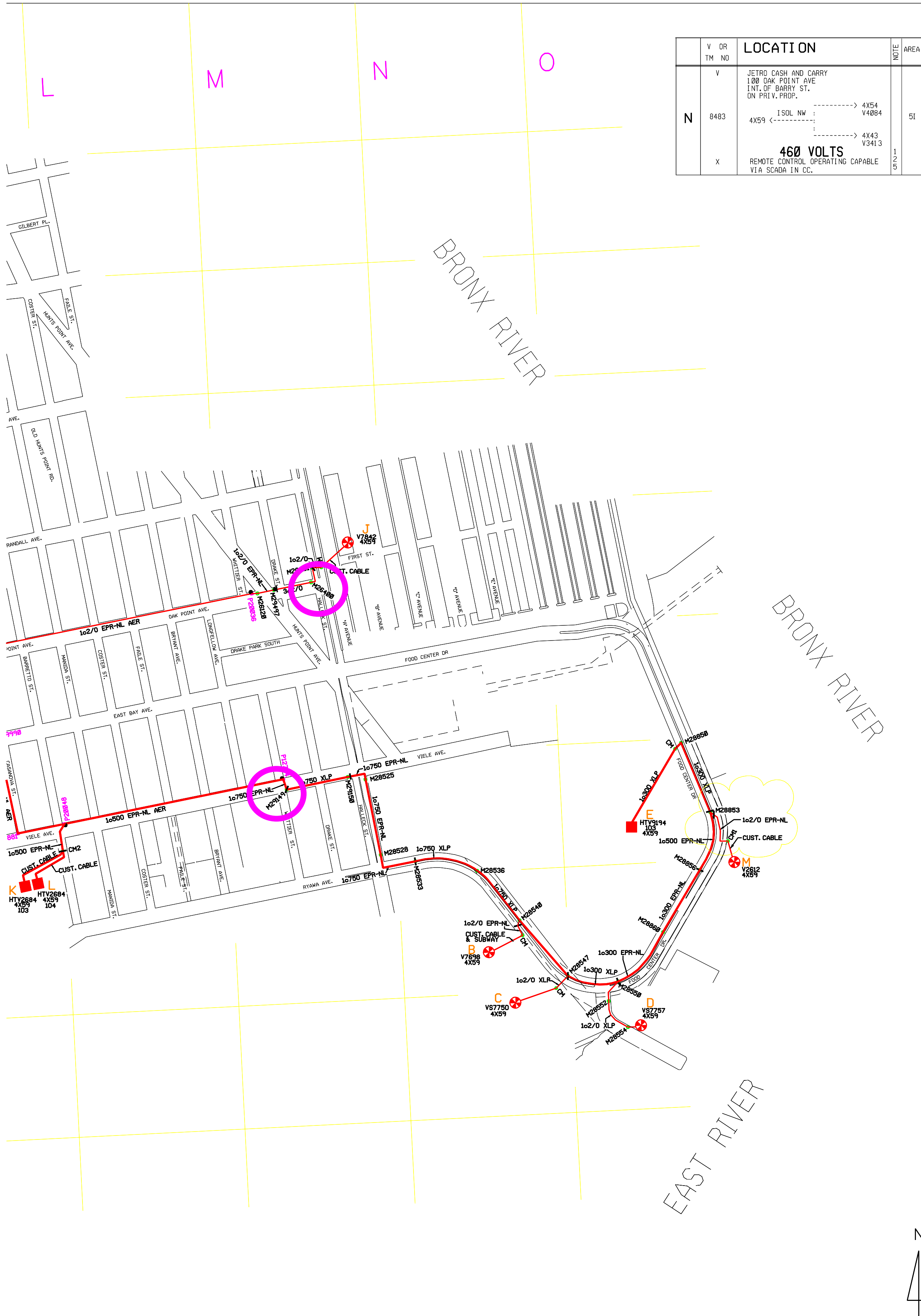
CONNECTED TO: 5/02/2016

FEEDER
13,200 VOLTS

4X58

CENTRAL BRONX NETWORK

SCALE 1"=400'



TYPICAL M&S PLATE DIMENSIONS:

4X59

	V OR TM NO	LOCATION	NOTE	AREA	EQUIP
N	V 8483 X	JETRO CASH AND CARRY 100 OAK POINT AVE INT. OF BARRY ST. ON PRIV. PROP. ISOL NW : ----------> 4X54 V4084 4X59 <-----------: ----------> 4X43 V3413 **460 VOLTS** REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC.	1 2 5	5I	2500 F I

	V OR TM NO	LOCATION		AREA	EQUIP
A		MOTTHAVEN SUBSTATION		5G	
B	V 7698 X	FULTON FISH MARKET FOOD CENTER DR E/O HALLECK ST 3RD ELY UNIT SDWK. GRTG. 4X59 <-------- --------> 4X61 V7698 \ / V7820 SPOT NW X 4X58 /:\ 4X62 V8060 <-------- : --------> V7753 **460 VOLTS**		3N	2500 F S-T
C	VS 7750 X	CITY OF NEW YORK PRISON BARGE 1 HALLECK ST S/O RYAWA AVE 24 HR ACCESS TEL 718-579-8341 COMPT. #1 WESTERLY VAULT ON PRIVATE PROPERTY ----------> 4X62 VS7815 ISOL : 4X59 <----------X ----------> 4X58 VS7629 **460 VOLTS**	2 5	20	2500 F S-T
D	VS 7757 X	VITA FOODS N/S FARRAGUT ST S/O FOOD CENTER DR WLK SDWK. GRTG. ----------> 4X58 VS7696 ISOL : 4X59 <----------X ----------> 4X62 VS7582 **460 VOLTS**	2 5	20	2500 F S-T
E	HTV 9194 X 103	HUNTS POINT CO-OP MARKET EAST BAY AVE. EXT. W.S. NLY ENCL. AT GRADE NORMAL RESTORATION BETWEEN MON. & FRI. 7AM-5PM CUSTOMER SUBSTATION 4X61 <---- -----> 4X62 104 : HTV : 101 :-----------: 4X58 <---- -----> 4X59 102 103 **CUST. SUBSTATION**	7	40	H.T.
H	VS 7835 X	NY ORGANIC FERTILIZER CO. SLUDGE PROCESSING FACILITY 400 TRUXTON ST. ----------> 4X60 VS7840 ISOL NWK : 4X59 <----------X ----------> 4X58 VS7832 S/O OAK POINT AVE. 2ND NLY UNIT ON PRIV. PROP. **460 VOLTS**	2 5	5J	2500 F S-T
J	V 7842 X	HUNTS POINT TERM. MKT. E/O HALLECK ST. OPP OAK POINT AVE. SUBSTATION NO. 3 FIRST ST. & AVE "D" 4X59 <----------:----------> 4X58 V7846 \ / SPOT NET. / \ 4X62 <----------:----------> 4X61 V7850 V7831 ----------> 4X60 VS7848 ELY TRANS. ENC. AT GRADE ELY UNIT **460 VOLTS**		6M	2000 F S-T
K	HTV 2684 X 103	HUNTS POINT SEWAGE TREATMENT PLANT 1200 RYAWA AVE. W/O BARRETTO ST. WLY. UNIT ON PRIV. PROP. 4X47A<----- ----->4X47B 101 : : 102 : HTV : 4X59A<-----:----------:----->4X59B 103 : : 104 4X43 <----- -----> 4X56 105 106	7		HTV
L	HTV 2684 X 104	HUNTS POINT SEWAGE TREATMENT PLANT 1200 RYAWA AVE. W/O BARRETTO ST. WLY. UNIT ON PRIV. PROP. 4X47A<----- ----->4X47B 101 : : 102 : HTV : 4X59A<-----:----------:----->4X59B 103 : : 104 4X43 <----- -----> 4X56 105 106	7		HTV
M	V 2612 X	ANHEUSER BUSCH 500 FOOD CENTER DR. E/O HALLECK ST CLY UNIT ----------> 4X58 V2827 ISOL. NW. : 4X59 <----------: ----------> 4X62 V2586 CUSTOMER CONTACT 24HR. DANIEL DAHLSTROM 619-717-1791 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC **480 VOLTS**	1 2 5	40	2500 F I

NOTES:

7. INSPECTION OF PTS ON CUSTOMERS PREMISES REQUIRED PRIOR TO RESTORING FEEDER TO SERVICE, IF AN OPEN PHASE FAULT OCCURS BETWEEN THE CUSTOMER AND THE LOCATION WHERE TRACING CURRENT IS APPLIED AND THREE IS NO TRANSFORMER SOLIDLY CONNECTED BETWEEN THE THE FAULT AND THE CUSTOMER.

NOTES:

1. PROTECTOR WHICH MUST BE OPENED MANUALLY AND RESTORED TO AUTOMATIC OPERATION
2. INSPECTION OF NETWORK PROTECTOR FOR BLOWN FUSES REQUIRED ALTHO FEEDER CLEARS AUTOMATICALLY WITHIN ONE MINUTE AFTER OPENING.
5. ISOLATED NETWORK. SEE SPEC E.O. 4007 FOR OPERATION

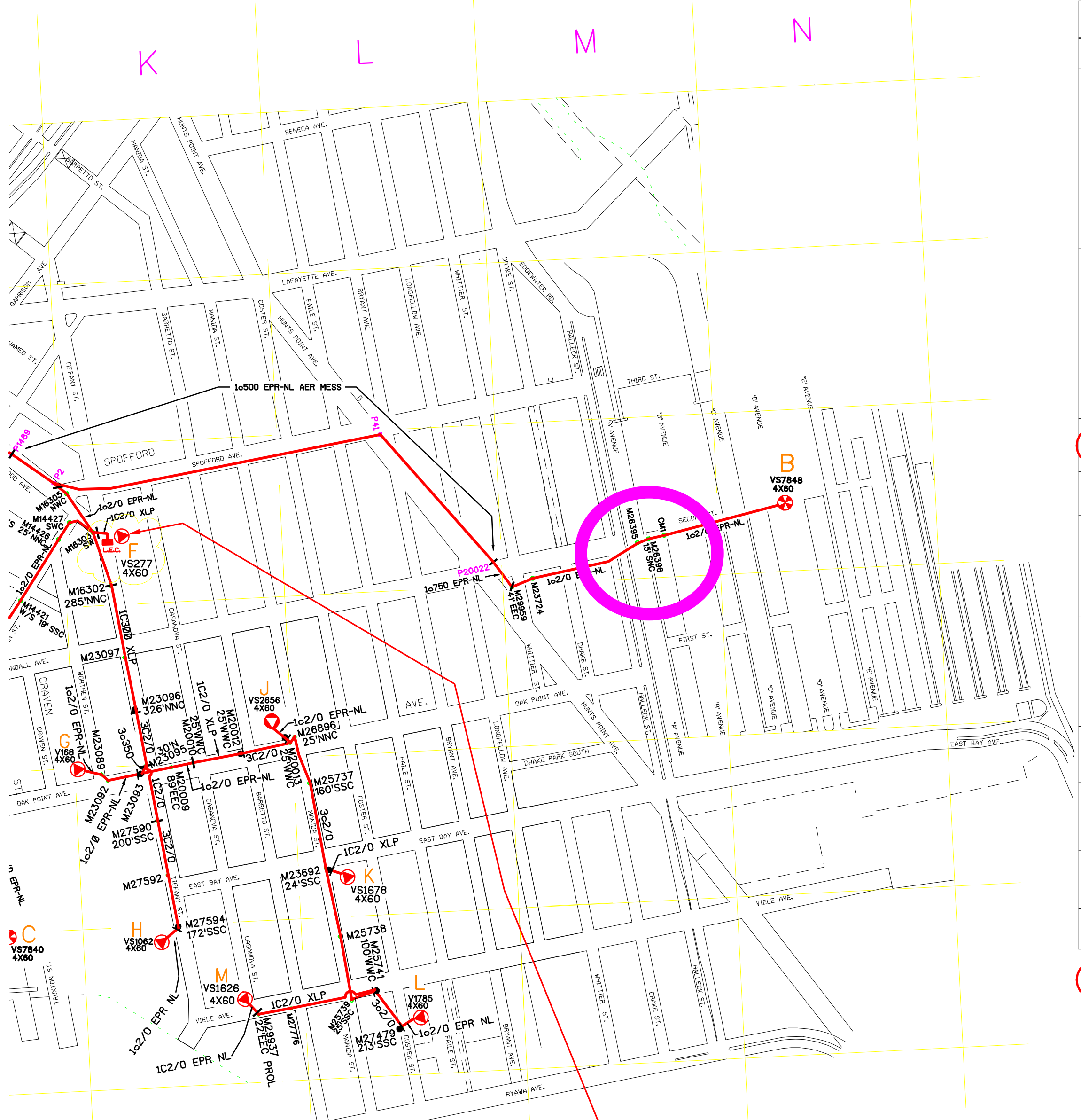
REVISION:
FOOD CENTER DR.
M28853 TO CM1
ADD MISSING CABLE TEXT.

CONSOLIDATED EDISON CO. OF N.Y. INC.
BRONX DISTRICT

FEEDER
13,200 VOLTS
4X59
CENTRAL BRONX NETWORK
SCALE 1"= 400'

M & R BUREAU | CORRECTED TO: 6/27/2016

4X60



	V OR TM NO	LOCATION	NOTE	AREA	EQUIP
A		MOTTHAVEN SUBSTATION SW-41B		5G	
B	VS 7848 X	HUNTS POINT TERMINAL MARKET HALLECK ST. AVENUE 'D' SUBSTATION #4 4X60 <---- SPOT NWK. ----> 4X58 V-7846; 4X62 V-7850 <---- ----> 4X59 V-7842; ----------> 4X61 V-7831; ELY TRANSF. ENCL. AT GRADE ELY UNIT **460 VOLTS**		7N	2000 F S-T
C	VS 7840 X	N.Y. ORGANIC FERTILIZER CO. SLUDGE PROCESSING FACILITY 400 TRUXTON ST. ----------> 4X58 VS-7832; ISOL NWK. 4X60 <---------X; ----------> 4X59 VS-7835; S/O OAK POINT AVE. 2ND SLY ON P.P. COMPT. #2 **460 VOLTS**	25	4J	2500 F S-T
F	VS 277 X	TIFFANY ST. ES. 224' SSC. SPOFFORD AVE. DRIVEWAY GRTG.		7K	500/560 F S
G	V 168 X	NO. 501 - 21 WORTHEN ST SDWK. GRTG.		6J	500 F S
J	VS 2656 X	# 1243-55 OAK POINT AVE. ----------> 4X54 VS2429; SPOT NW 4X60 <----------; ----------> 4X44 V2540; ELY. SDWK. GRTG.		6K	1000 F S
H	VS 1062 X	# 331-81 TIFFANY ST. ----------> 4X56 VS2286; SPOT NW 4X60 <----------; ----------> 4X44 VS2354; SLY. SDWK. GRTG.		4K	500/560 F S
K	VS 1678 X	MANIDA ST. E/S 48' SSC EAST BAY AVE. SDWK. GRTG. STREET FEED ONLY		5L	500/560 F S
M	VS 1626 X	CASANOVA ST. WS. 28' NNC VIELE AVE. SDWK. GRTG. STREET FEED ONLY		4K	500/560 F S
L	V 1785 X	# 250 COSTER ST. SDWK. GRTG.		4L	500/ 560 F S
N	VS 1255 X	E. 156 ST. N/O SOUTHERN BLVD. 42' EEC SDWK. GRTG.		8I	1000/ 1120 F S

◌ = OFF TEMP

OFF TEMP
UNIT VS-277
L/O E17-14019-000X
DATE 03-28-2017

LEC
LOC VS-277
L/O E17-14019-000X
DATE 03-28-2017

CABLE REPLACEMENT

CE ALL CABLE IN ACCORDANCE WITH SPEC. EO. 2038

WITH THE EXCEPTION OF TRANSFORMERS TAPS AND T SPURS, CABLES USED FOR REPLACEMENT OR ORCEMENT SHALL BE THE LARGEST CONDUCTOR FOR THE EXISTING DUCT.

L CONNECTED K.V.A. CAPACITY 8,500

N

TYPICAL M&S PLATE DIMENSIONS: 850' 1138'

NOTES:
7. INSPECTION OF P.Ts. ON CUSTOMERS PREMISES REQUIRED, PRIOR TO RESTORING FEEDER TO SERVICE. IF AN OPEN PHASE FAULT OCCURS BETWEEN THE CUSTOMER AND THE LOCATION WHERE TRACING CURRENT IS APPLIED AND THERE IS NO TRANSFORMER SOLIDLY CONNEDTED BETWEEN THE FAULT AND THE CUSTOMER.
15. AMORPHOUS STEEL CORED TRANSFORMER. UPON REMOVAL NOTIFY ENGINEERING.

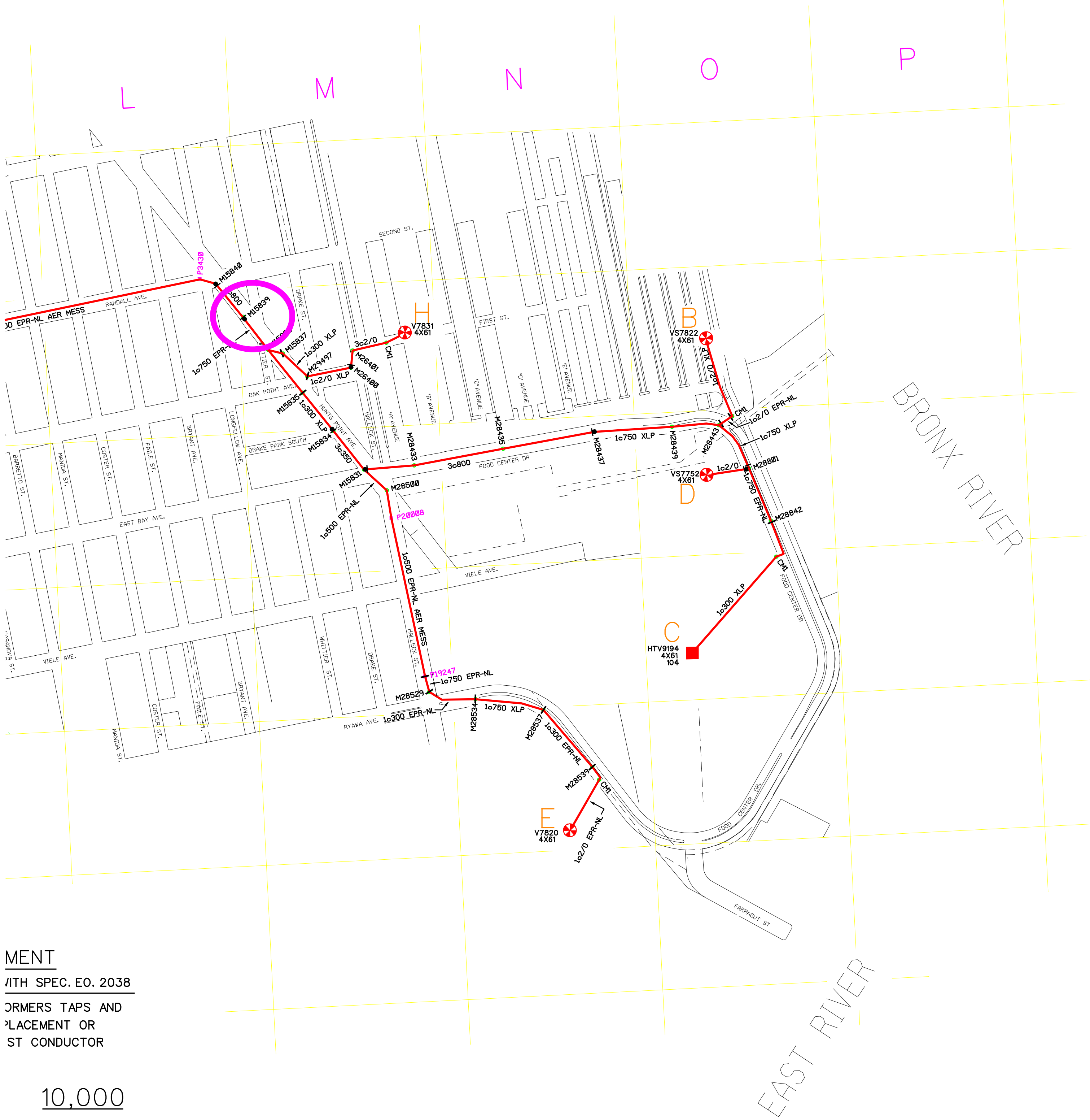
NOTES:
3. INCLUDE AS ONE IN RADIAL CUSTOMER COUNT.
4. TO BE OPERATED AS DIRECTED IN ACCORDANCE WITH PARAGRAPH 5-39 REVISION OF SEPT.1969 OF GENERAL INSTRUCTIONS GOVERNING WORK ON SYSTEM ELECTRICAL EQUIPMENT

REVISION:
E17-14019-000X, WR#3841242:
DROP OFF TEMP 500KVA TRANSFORMER VS-277 VIA L.E.C INSTALLATION IN VS-277. (L.A)

FEEDER 13,200 VOLTS **4X60**
CENTRAL BRONX NETWORK
SCALE 1"=400'

CONSOLIDATED EDISON CO. OF N.Y.INC.
WESTCHESTER CUSTOMER SERVICES
M & R BUREAU
CORRECTED TO: 3/29/2017

4X61



MENT

/ITH SPEC. EO. 2038

ORMERS TAPS AND
PLACEMENT OR
ST CONDUCTOR

10,000

	V OR TM NO	LOCATION	NOTE	AREA	EQUIP
A		MOTTHAVENSUBSTATION 31A BRUCKNER BLVD. & 144TH ST		5G	
B	VS 7822 X	200 FOOD CENTER DR E/O HALLECK ST TRANSF. ENCL. AT GRADE ELY UNIT ----------> 4X58 ISOL. NWK.: VS-7576 4X61 <----------: ----------> 4X62 VS7747 460 VOLTS	2 5	60	1000 F S-T
C	HTV 9194 X 104	HUNTS POINT CO-OP MARKET EAST BAY AVE. EXT. W.S. NLY ENCL. AT GRADE NORMAL RESTORATION BETWEEN MON. & FRI. 7AM-5PM CUSTOMER SUBSTATION 4X61 <---- -----> 4X62 104 : HTV : 101 :-----------: 4X58 <---- -----> 4X59 102 103	7	40	H.T.
D	VS 7752 X	DAITCH CRYSTAL DIARY FOOD CENTER DR. EXT. E/O HALLECK ST. WLY SDWK. GRTG. ----------> 4X62 ISOL. NWK.: VS-7631 4X61 <----------: ----------> 4X58 VS-7817 460 VOLTS	2 5	50	2500 F S-T
E	V 7820 X	FULTON FISH MARKET FOOD CENTER DR E/O HALLECK ST 2ND ELY SDWK. GRTG. 4X61 <-------- --------> 4X59 V7820 \ / V7698 SPOT NW X 4X58 /:\ 4X62 V8060 <-------- : --------> V7753 **FUSES IN V7820** **TEMPORARILY REMOVED.** 460 VOLTS		3N	2500 F S-T
F	V 7807 X	1040 E. 149 ST. 2ND ELY DOOR AT GRADE ----------> 4X62 ISOL. NWK.: V-7628 4X61 <----------: ----------> 4X58 V-7749	2 5	4H	1000 F S-T
G	V 7806 X	MANHATTAN BEER #997-989 E. 149 ST. E.S. NLY DOOR AT GRADE COMPT.#4 WED TECH ----------> 4X62 ISOL NW : V-7748 4X61 <----------: ----------> 4X58 V-7627 FOR ACCESS CALL (212) 993-0500 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC	1 2 5	5H	1000 F I
H	V 7831 X	HUNTS POINT TERMINAL MARKET E/O HALLECK ST. OPP. OAK POINT AVE. SUBSTATION #1 4X61 <---- ----> 4X60 V-7831 : : VS-7848 : SPOT NWK. : 4X62 <---:-----------: V-7850 : : 4X58 <---- ----> 4X59 V-7846 V-7842 1 ST. 8. AVE.'B' WLY TRANS./ENCL. AT GRACE ELU UNIT 460 VOLTS		6M	2000 F S-T

N

TYPICAL M&S PLATE DIMENSIONS: 1197' 946'

SCALE 1"=400'

NOTES:

7. INSPECTION OF P.Ts. ON CUSTOMERS PREMISES REQUIRED, PRIOR TO RESTORING FEEDER TO SERVICE, IF AN OPEN PHASE FAULT OCCURS BETWEEN THE CUSTOMER AND THE LOCATION WHERE TRACING CURRENT IS APPLIED AND THERE IS NO TRANSFORMER SOLIDLY CONNEDTED BETWEEN THE FAULT AND THE CUSTOMER.

NOTES:

1. PROTECTOR WHICH MUST BE OPENED MANUALLY AND RESTORED TO AUTOMATIC OPERATION.
2. INSPECTION OF NETWORK PROTECTOR FOR BLOWN FUSES REQUIRED ALTHOUGH FEEDER CLEARS AUTOMATICALLY WITHIN ONE MINUTE AFTER OPENING.
5. ISOLATED NETWORK - SEE SPEC. EO-4007 FOR OPERATION.

REVISION:

F15-9692-1X
UPDATE ASSOCIATE

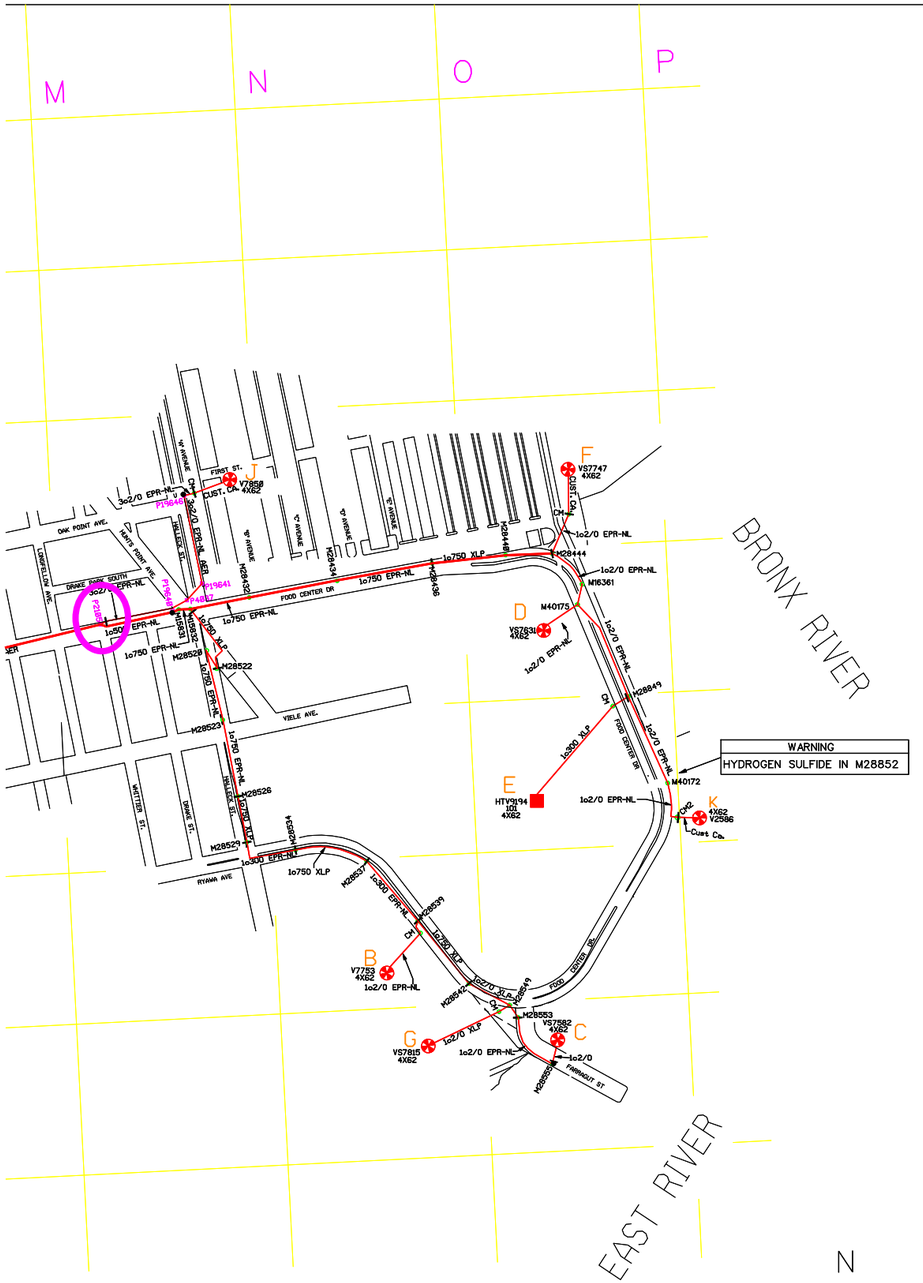
CONSOLIDATED EDISON CO. OF N.Y.INC.
WESTCHESTER CUSTOMER SERVICES

FEEDER 4X61
13,200 VOLTS
CENTRAL BRONX NETWORK

M & R BUREAU

CORRECTED TO: 1/14/2016

4X62



WARNING
HYDROGEN SULFIDE IN M28852

	V OR TM NO	LOCATION	NOTE	AREA	EQUIP
A		MOTTHAVENSUBSTATION 43A BRUCKNER BLVD. & 144TH ST		5G	
B	V 7753 X	FULTON FISH MARKET FOOD CENTER RD E/O HALLECK ST. 1 ELY UNIT 4X62 <-------- --------> 4X58 V7753 \ / V8060 SPOT NW X 4X61 /:\ 4X59 V7820 <-------- : --------> V7698 SDWK. GRTG. 460 VOLTS		3N	2500 F S-T
C	VS 7582 X	VITA FOODS N/S FARRAGUT ST S/O FOOD CENTER DR ELY SDWK. GRTG. ----------> 4X58 ISOL : VS7696 4X62 <----------X : : ----------> 4X59 VS7757 460 VOLTS	SN2	20	2500 F S
D	VS 7631 X	DAITCH CRYSTAL DAIRIES INC. FOOD CENTER DR EXT. E/O HALLECK ST. CENT. SDWK. GRTG. ----------> 4X61 ISOL : VS7752 4X62 <----------X : : ----------> 4X58 VS7817 460 VOLTS	SN2	50	2500 F S
E	HTV 9194 X 101	HUNTS POINT CO-OP MARKET FOOD CENTER DR. EXT. W.S. NLY ENCL. AT GRADE NORMAL RESTORATION BETWEEN MON. & FRI. 7AM-5PM CUSTOMER SUBSTATION 4X61 <---- ----> 4X62 101 : HTV : 101 :----------: : : 4X58 <---- ----> 4X59 102 103	7	40	H.T.
F	VS 7747 X	200 FOOD CENTER DR E/O HALLECK ST TRANSF. ENCL. AT GRADE CENTER UNIT ----------> 4X61 ISOL : VS7822 4X62 <----------X : : ----------> 4X58 VS7576 460 VOLTS	SN2	60	1000 F S-T
G	VS 7815 X	CITY OF NEW YORK PRISON BARGE 1 HALLECK ST. S/O RYAWA AVE 24 HR ACCESS TEL 718-579-8341 ELY COMPT #3 VAULT ON PRIVATE PROPERTY ----------> 4X58 ISOL : VS7629 4X62 <----------X : : ----------> 4X59 VS7750 460 VOLTS	SN2	20	2500 F S-T
J	V 7850 X	HUNTS POINT MARKET HALLECK ST. N/O OAK POINT AVE. PRIVATE PROPERTY 4X62 <-------- --------> 4X60 \ / VS7848 SPOT NW / \ 4X58 <-------- --------> 4X59 V7846 : V7842 : : --------> 4X61 460 VOLTS V7831		6M	2500 F S-T
K	V 2586 X	ANHEUSER BUSCH 500 FOOD CENTER DR. E/O HALLECK ST ELY UNIT ----------> 4X58 ISOL NW: V2827 4X62 <----------X : : ----------> 4X59 V2612 CUSTOMER CONTACT 24HR. DANIEL DAHLSTROM 619-717-1791 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC 480 VOLTS	1 2 3	4O	2500 F I
L	V 7748 X	MANHATTAN BEER #977-989 E.149 ST. S. 2ND NLY DOOR T GRADE COMP #3 WED TECH ----------> 4X58 V7627 ISOL NW : 4X62 <----------X : : ----------> 4X61 V7886 FOR ACCESS CALL (212) 993-0500 REMOTE CONTROL OPERATING CAPABLE VIA SCADA IN CC	1 2 5	5H	1000 F I
M	V 7628 X	#1040 E.149 ST. ELY DOOR AT GRADE STREET FEED ONLY ----------> 4X61 ISOL : V7807 4X62 <----------X : : ----------> 4X58 V7749	1 2 5	4H	1000 F I

CABLE REPLACEMENT

REPLACE ALL CABLE IN ACCORDANCE WITH SPEC. EO. 2038

3.3 WITH THE EXCEPTION OF TRANSFORMERS TAPS AND SHORT SPURS, CABLES USED FOR REPLACEMENT OR REINFORCEMENT SHALL BE THE LARGEST CONDUCTOR SIZE FOR THE EXISTING DUCT.

N

TYPICAL M&S PLATE DIMENSIONS:

NOTES:
14. VACUUM RECLOSER SWITCH MUST BE RESET AFTER FEEDER OPERATION
15. AMORPHOUS STEEL CORED TRANSFORMER UPON REMOVAL NOTIFY ENGINEERING
7. INSPECTION OF PTS ON CUSTOMERS PREMISES REQUIRED PRIOR TO RESTORING FEEDER TO SERVICE, IF AN OPEN PHASE FAULT OCCURS BETWEEN THE CUSTOMER AND THE LOCATION WHERE TRACING CURRENT IS APPLIED AND THERE IS NO TRANSFORMER SOLIDLY CONNECTED BETWEEN THE FAULT AND THE CUSTOMER

NOTES:
3. INCLUDE AS ONE IN RADIAL CUSTOMER COUNT
4. TO BE OPERATED AS DIRECTED IN ACCORDANCE WITH PARAGRAPH 5-39 REVISION OF SEPT. 1989 OF GENERAL INSTRUCTIONS GOVERNING WORK ON SYSTEM ELECTRICAL EQUIPMENT
9. AIR TYPE SWITCHES LOAD BREAK TOOL REQUIRED

REVISION:
Z16-09517-OOOX, WR#3306893e
REMOVE OFF TEMP ANNOTATION ON 2500KVA TRANSFORMER V-7629 (FDR.4X58) & REBADGE UNIT V-7629 TO VS-7629 AT COLUMN NOTE "G". (L.A)

CONSOLIDATED EDISON CO. OF N.Y. INC.
BRONX DISTRICT

M & R BUREAU

FEEDER
13,200 VOLTS
4X62
CENTRAL BRONX NETWORK
SCALE 1"= 400'

CORRECTED TO: 5/02/2016

Hunts Point MicroGrid Concept Discussion

Project:	Hunts Point Resiliency
Participants:	Louise Yeung, Bobby McFadden, Ke Wei, Eric Soto, Kevin Bishop, Kai Wu, Travers Dennis, Roe Rodrigo, Franz (?), Albert Stolz, Dan Mitas, Julie Stein
Date:	Thursday May 10, 2018

Conference Call Summary

The intent of the conference call was to review the current concept for microgrid sectionalization to support a Hunts Point area microgrid with key personnel at Con Edison. Specifically, the intent was to share updated switch locations following a meeting held on January 31, 2018 with Con Edison for a technical discussion on sectionalization. The conference call included a discussion by participants of the following information:

- Brief overview of the Hunts Point area microgrid was provided, including overall project goals and proposed switch locations.
- Con Edison requested clarification on the installation method for the new switches. HDR identified desirable locations, but not specific technologies or installation locations. HDR requested input from Con Edison on standard sectionalization designs that would be acceptable to Con Edison.
- Con Edison inquired about the plan for ownership. As part of the current proposal, sectionalizing switches would be designed, procured, installed, and operated by Con Edison. Compensation for these system improvements would be addressed as part of the interconnection agreement.
- Con Edison noted that the proposed switch locations will isolate several existing customers. The project team compiled an affected customer list and EDC will be pursuing authorization for this project with all affected customers. There is particular concern that the Department of Corrections' facility located within the microgrid footprint may present difficulties.
- Con Edison noted that CHP is a requirement to qualify for offset tariffs that allow for generation when the grid is available. Further, a billing structure for the project would require an aggregation of current accounts. Con Edison noted that there may be ramifications to future service work in the Hunts Point area if multiple customer accounts are aggregated into a single premises within the microgrid footprint. The project team will investigate appropriate billing structures and will propose a preferred structure as part of the continued conceptual design.
- Con Edison described the general method used to install new sectionalization switches. After a desirable location is identified, the subject feeder cable is intercepted at an existing vault. Switches are located in a new vault and conduit is added to connect to the existing vault. The intercepted feeder is routed to and returned from the new switch location.
- Con Edison offered to review available cost data and provide a generic estimate for purchasing and installing sectionalizing switches.
- Controls interface between the microgrid controller, Con Edison distribution operations, and related new equipment were briefly discussed without addressing specific functional needs. Remote control and indication will be required at the sectionalizing switches and remote control by the microgrid controller is anticipated. Use of Con Edison's standard SCADA system infrastructure was discussed. HDR will propose controls as part of establishing the

design basis for further Con Edison review.

- Con Edison is installing wireless communications rather than fiber for new remote terminal units (RTUs).
- Acceptable sectionalizing switch design was briefly discussed without arriving at specific guidance. Con Edison may require two series switching devices to achieve assurance of isolation. Con Edison will further investigate this concept internally for future information sharing with the project team.
- Existing standby generation operations were discussed. No existing standby generation assets are currently capable of paralleled operation with either the utility grid or the proposed microgrid generator. No alteration to this operating methodology is planned for the existing standby systems.
- Utility system load flow analysis was discussed. Utility studies will be a topic for future discussions, likely closer to the point where an official request for interconnection is made. Utility studies and system limitations are not considered a critical risk to project feasibility at this point.

Next Steps

- HDR will continue development of the microgrid design based upon the assumptions summarized below. The design will include a one-line diagram showing the switching concept and a sequence of operation document identifying islanding and parallel operation requirements and control/communications requirements. (Immediate.)
- EDC will proceed with customer outreach to develop a mechanism for microgrid formation. (Immediate.)
- Con Edison to provide rough cost information for new sectionalizing switches based on the existing sectionalizing switch installations in this region. (Short term.)
- HDR recommends that a follow-on discussion be scheduled for review of the conceptual design in early July. (Short term.)
- Con Edison to internally assess the sectionalization switch concept for later integration into the microgrid design. (Medium term.)

Design Assumptions Summary

Based on discussions to date and previously shared information, the sectionalization design will proceed with the following assumed structure:

- Con Edison has no significant technical issue with the proposed sectionalization locations; as the design advances more detailed information about specific switch locations and technologies will continue to be discussed.
- Con Edison sees no initial issue with the intended project structure for switch installation (that is, Con Edison design/procurement/installation/operation funded by the CHP project through the interconnect agreement).
- Con Edison will provide RTU requirements for communication with the switches and is amenable to remote control of the switches by the microgrid controller.
- Con Edison will internally develop switch requirements to integrate with the microgrid technical requirements at a later date.

Hunts Point Resiliency Project

Food Center Drive Area Microgrid Sectionalization (Draft)

Introduction

The following is a discussion of the revised approach for development of a microgrid in the Hunts Point Food Center Drive (FCD) area. In the previous approach for the Hunts Point Resiliency Project, an expandable, pilot microgrid project that encompassed only the Produce Market was considered as a means of distributing back-up electrical power generated by a simple cycle combustion turbine during emergencies when the Con Edison grid is out of service. Since this time, the Pilot Project has been revised to include the installation of a combined heat and power (CHP) facility with a net electrical output of 5.2 MW in lieu of a simple cycle combustion turbine. The CHP facility would operate continuously to generate electricity for export to the Con Edison grid and would recover waste heat from the engine generators to produce hot water for use at the Meat Market and chilled water for export to the Produce Market. To satisfy the resiliency requirements of the overall project, the CHP facility could provide back-up electrical generation to the Produce Market. In addition, ,given the proposed configuration, other facilities such as the Meat Market or other critical loads that are connected to the microgrid could also be served within the capabilities of the generation and the coincident load during outages of the Con Edison grid.

Deployment of a FCD area-wide solution is technically feasible, but will introduce several design and operational challenges related to sectionalizing of the microgrid. As discussed below, some of these challenges may be solved with hardware additions, but others may require administrative solutions.

System Description

The FCD area is currently provided with power from five separate Con Edison primary feeds originating from the Mott Haven Substation. Each primary feeder supplies several transformers at a number of Con Edison vaults. Generally, these transformers are interconnected as a spot network on the low voltage side. Every spot network feeds a number of individual customer meters at 480V. The locations of network connections for each feeder are shown on Con Edison feeder maps included as Attachments 1 through 5. Networks that are owned and maintained by Con Edison are shown as red circles. Connections to customer-owned networks or high tension services are shown as red squares.

During normal operation of the CHP facility, the generation output will be connected to the Con Edison system in accordance with their high tension service guidelines. No additions are required to the Con Edison system to facilitate this kind of connection. However, in an emergency when the Con Edison grid is not available, the CHP output must be separated from the bulk Con Edison system and retain a connection to the Produce Market through a microgrid. In the FCD area microgrid, this separation would occur in the Con Edison primary feeders at locations upstream of the Produce Market load connections. The existing distribution system in the FCD area currently does not have any devices suitable for providing this separation. As such, there are no localized means of sectionalizing the FCD area from the bulk Con Edison electrical grid.

Development of a new area microgrid will require installation of these sectionalizing devices. Based on discussions to date, Con Edison owns and operates a number of switching devices in other primary

feeder networks and is amenable to performing system improvements to install sectionalizing devices in the FCD area. The final location of these devices will determine the size and composition of the FCD area microgrid.

Potential Constraints

There are several constraints that limit the locational options for the sectionalizing switches required to create the FCD area microgrid and the isolation of existing Con Edison customers:

- The minimum scope of the FCD area microgrid is to provide power to the Produce Market. The total critical load of the facilities connected to the microgrid must not exceed the capacity of the CHP generators.
- The intent of the FCD area microgrid is to isolate critical commercial facilities without impacting the nearby residential distribution or non-critical commercial customers. In accordance with Con Edison criteria, no interruption of feeders to 120V network locations such as residential customers is allowed.
- Spot networks have cross-ties between all the feeders on the low voltage side and use network protectors to prevent power from flowing between the feeders. Con Edison's draft microgrid guidance document (EO-2161) does not allow a network protector to separate out-of-sync systems and does not allow for more frequent operation of the network protector to support the microgrid. Con Edison staff confirmed that use of network protectors as microgrid interconnection devices would require review by Con Edison and upgrades to the currently installed control systems. At this juncture, it is assumed that all feeders connected to a spot network must be provided with switches on the primary side to provide sectionalization for microgrid functions. Network protectors or low voltage isolations cannot be used for sectionalization. In past conversations with Con Edison, a vault-mounted switchgear has been discussed as an acceptable means of providing isolation. It is assumed that the vault-mounted switchgear would be installed and maintained by Con Edison. Control of the sectionalization switches has not been defined at this time, but remote Con Edison control would be acceptable for this project.
- Con Edison's draft microgrid guidance document (EO-2161) does not allow the microgrid to reduce availability of service to any Con Edison customer. In discussions with Con Edison, the concept of isolating customers within the microgrid area such that they are cut off from both the Con Edison grid and the microgrid was a concern. However, it should be noted that the proposed CHP generation source is not believed to be capable of sustaining all Con Edison customers in the FCD area. At this time, no switches have been included that would result in customer blackout by isolation from the microgrid. However, an acceptable means of load control will be required and will be developed through further discussions with Con Edison.

Proposed Locations of Microgrid Interconnection Devices

Microgrid boundaries have been proposed based on review of Con Edison feeder maps and the M&S plate for the Hunts Point area. The intent of this review was to propose sectionalization locations that satisfy the goals and constraints described above. The feeder maps were consulted to identify where customers within the proposed microgrid boundary receive power. The M&S plate was consulted to further understand what low voltage customers would be impacted by selected switch locations. Attachments 1 through 5 are mark-ups of the feeder maps showing existing Con Edison locations where

sectionalization appears most advantageous. Attachment 6 provides an aerial view of the Hunts Point area showing the locations of the sectionalization switches and information on affected low voltage customers. Attachment 7 shows similar information as the aerial view in Attachment 6, but it is overlaid on Con Edison's M&S plate.

The magenta circles shown in Attachments 1 through 5 identify the proposed locations for installation of automatic switches to sectionalize feeders in accordance with the above requirements. Final locations will require the concurrence of Con Edison. No other major alterations of the existing Con Edison system should be necessary other than installation of these automatic sectionalizing switches.

A minimum of six new switches are required to satisfy the requirements identified above. There are no obvious locations where two or more switches could be installed near each other, so all six will be installed in different locations. Feeders 4X58 and 4X62 are pole-mounted switches in locations where sectionalization is most advantageous, with the remaining switches located at existing Con Edison vaults. Sectionalization at these locations affects spot networks as identified in Table 1 below.

The spot networks that are shown in bold text in Table 1 may serve additional Con Edison customers that would also be isolated from the Con Edison grid by the sectionalization switches and connected to the microgrid. Table 1 also includes low voltage service connections that are supplied from the affected spot networks and are shown on the Con Edison M&S plate.

With the exception of the Produce Market, the customers identified in Table 1 are not intended to receive full back-up from the CHP Facility. As such, these accounts would need to be isolated so they could not draw power from the microgrid and potentially overload the installed generation during microgrid operations. The potential existence of secondary, non-named customers on these feeders remains to be verified by Con Edison as additional loads that would potentially need to be disconnected.

At this time no sectionalizing strategy has been identified that would impact a smaller customer base than the one proposed here.

Table 1: Hunts Point Spot Networks By Feeder

Feeder	4X58	4X59	4X60	4X61	4X62
# of Switches	1	2	1	1	1
Affected Spot Networks	Produce Market ***200 FCD*** ***Baldor*** Meat Market ***Anheuser Busch*** ***Citarella/Sultana*** NY Prison Barge Fish Market	Produce Market Meat Market ***Anheuser Busch*** ***Sultana/Citarella*** Fish Market NY Prison Barge	Produce Market	Produce Market ***200 FCD*** ***Baldor*** Meat Market Fish Market	Produce Market ***200 FCD*** ***Baldor*** Meat Market ***Anheuser Busch*** ***Citarella/Sultana*** NY Prison Barge Fish Market
Addtnl Low Voltage Loads	Department of Sanitation site adjacent to Citarella Street lighting (see Attachment 6) Connection south of FCD at the intersection with Halleck Street, possibly serving street lights on the access road to the Vernon C. Bain Center (correctional facility). Small building south of the Meat Market parking area. Connection along the gas line crossing into the river.				

Note 1: The above spot networks are identified on the feeder maps, but additional, secondary customer accounts that may be served out of each spot network are not identified.

Table 2 below provides a summary of the facilities that have or are planned to have back-up generators that could run in an emergency condition with a grid outage. Facilities that have their own back-up generators would be required to disconnect from the Con Edison grid during an outage; thus, they would also be isolated from the microgrid during microgrid operations.

Table 2: Summary of Back-Up Generation Resources for Hunts Point			
Facility	**Quantity of Generators**	**Size (Total kW)**	**Reference**
Krasdale (400 Market Street)	2	125 each	Confirmed by Krasdale on 8/30/16
Baldor (240 Food Center Drivee)	2	1,000	Baldor Interview
Dairyland/Chefs Warehouse (1300 Viele Avenue)	2	750 and 1,500	1300 Viele Avenue warehouse – 750 kw 240 Food Center Drive warehouse - 1500 kw (EDC email correspondence on 8/24/16)
Citarella (600 Food Center Drive)	1 - Planned	275 kW	Portable generator provided as part of Pilot Project.
New Fulton Fish Market (800 Food Center Drive)	1 - Planned	1,500	Installed as part of the Pilot Project.
Hunts Point Meat Market (355 Food Center Drive)	2 - Proposed	4,000	Confirmed by EDC in 9/2016
Jetro/Restaurant Depot (100 Oak Point Avenue)	1	200	Confirmed by Jetro on 11/22/2016
DEP Hunts Point Wastewater Treatment Plant (1270 Ryawa Ave.)	6	2,000 each	Confirmed by EDC in 9/2016, excess backup capacity available
Pio Mendez Houses for the Elderly	1	Covers load for common areas	Site visit in 12/2016
Vernon C. Bain Correctional Center	2	2,000 each	Confirmed by DOC in 12/2016

Operation of the Proposed Sectionalizing Switches

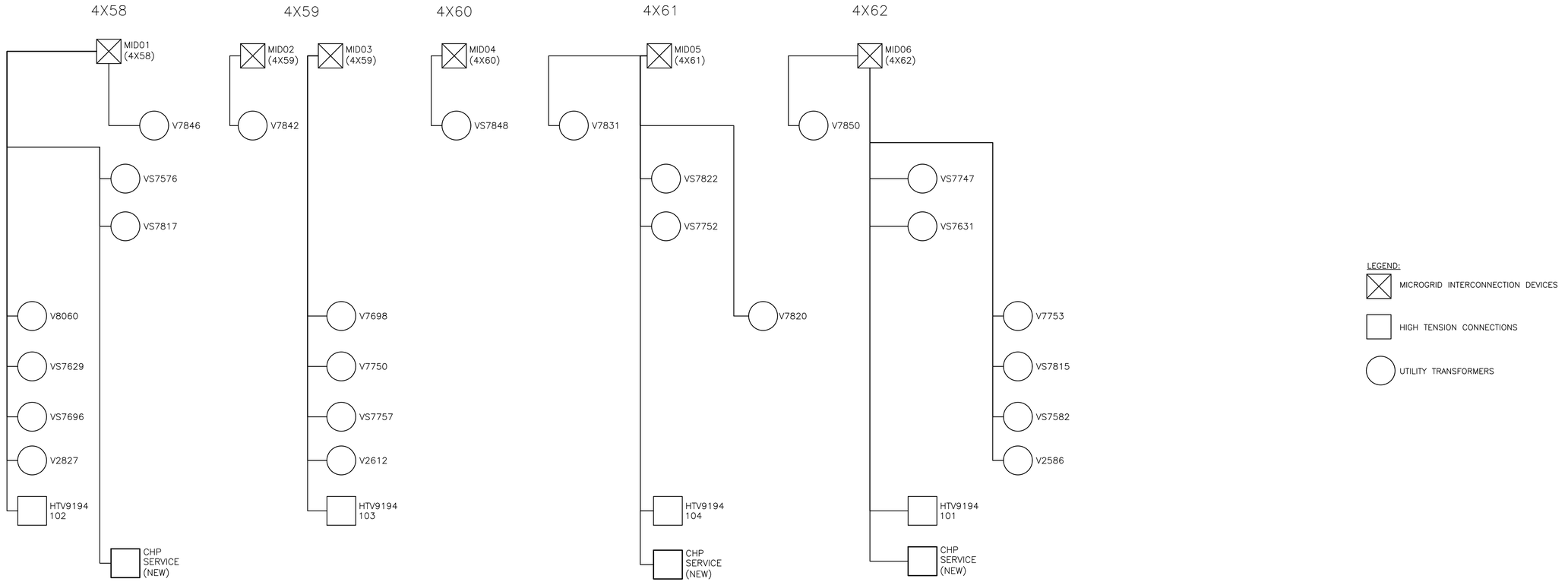
The proposed sectionalizing switches separate all loads identified in Table 1 from the Con Edison grid. The average load in the FCD area microgrid (i.e., the load connected to the transformers listed in Table 1) is expected to exceed the capacity of the CHP generators. This will require some means of load reduction to allow microgrid operation without a system overload. The microgrid project will develop procedures or identify onsite customer-side equipment to perform load management.

The vulnerability to flood risk for the transformers in the FCD area was revisited based on new information provided by Con Edison and previous resiliency assessments. There are no apparent situations where flooding at a single transformer location would put operation of the entire microgrid at risk of a fault.

Next Steps

The proposed FCD area microgrid presents unique challenges when compared to the single-site conceptual design previously considered for the Produce Market. Further pursuit of this concept should consider the following screening activities before this concept can be considered feasible:

- Share the updated switch locations with Con Edison for a more thorough review and technical discussion on sectionalization.
- Request Con Edison to confirm all customers that are fed from the bold text spot networks in Table 1, and whether additional customers could be added to any of the Table 1 networks in the future.
- Based on the information collected from the above, develop a detailed plan and description of the proposed microgrid sectionalization, operation, and load management. Information about potential legal/regulatory aspects of the proposed microgrid concept including operation of the microgrid and management of customer participation to support development of a final plan for implementation will also be developed.
- After receipt of the detailed microgrid plan, Con Edison to review and analyze the plan (including flow analysis) and return either agreement on locations, or comments and suggestions on better locations for switches.
- As discussed at a meeting between the City, Con Edison and HDR on January 31, 2018, Con Edison will discuss legal and regulatory aspects of current CHP and microgrid proposal for Hunts Point internally and report potential issues to Mayor's Office.



ISSUE	DATE	DESCRIPTION
B	09/13/2018	FOR CLIENT REVIEW
A	09/10/2018	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	R. BROWN
ENGINEER	A. STOLZ
CHECKED	A. SHAUKAT
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

NYCEDC
NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY PILOT PROJECT

TRI-GENERATION FACILITY

ONE-LINE DIAGRAM MICROGRID

0 1" 2"

FILENAME SKE-03.dwg
SCALE NONE

SHEET S□E-0□

Legend

- Affected Transformer Location
- Affected Street Lighting
- Proposed Sectionalizing Switch Location
- Affected Customer Location (black are known, red are unknown)
- Location of new CHP generation

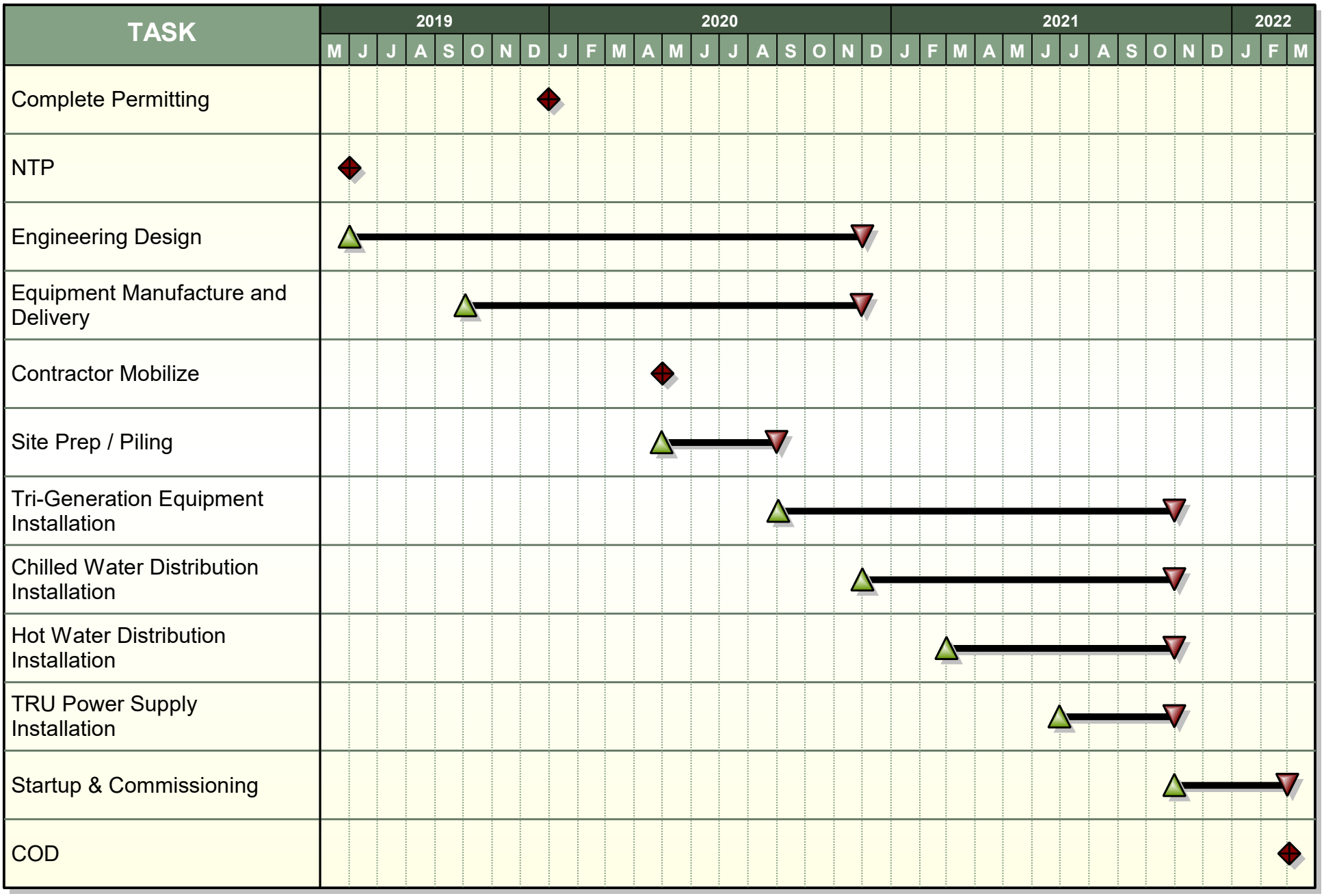
DRAFT
for discussion
purposes only
(3.2.18)

APPENDIX 2G

- Project Implementation Preliminary Schedule

Hunts Point - Microgrid with Tri-Generation Facility
Preliminary Schedule

9/28/18



PART 5 – MOBILE DIESEL GENERATORS

1 Overview

Mobile diesel emergency generators will be furnished to provide emergency power during sustained power outages to particular facilities in the Food Center Drive area. A total of four mobile diesel generators will be made available for back-up generation service. The number and size of the generators was established based on the anticipated equipment costs and resiliency benefits. Connection provisions will be installed at the Sultana/Citarella, Anheuser Busch, and Krasdale facilities for these generators. Depending on need, the generators can be connected to any one of these facilities as an emergency power source.

Each generator will have a nominal rating of 275 kW. The size of the emergency generators is not intended to supply the total load of a facility, but will be used to sustain critical loads during emergencies. The prioritization of what loads are most critical and to be powered by the generators will be identified on a facility-by-facility basis by operating staff during final design. This approach is intended to better satisfy specific operational contingency needs for a more resilient solution at each facility. As part of concept design, Sultana/Citarella will be provided two generator connections due to the greatest need for emergency power for cooling systems, oven operation, and ventilation equipment. Krasdale and Anheuser Busch will each be provided one generator connection.

2 Project Specific Design Criteria

2.1 Meteorological Data

Refer to Part 1, Section 3.5 for a listing of site ambient conditions.

Each mobile diesel generator will be mounted on a six wheel trailer that can be transported and parked at each facility. The generators will be stored offsite at the Brooklyn Army Terminal or other similar facility during blue sky days. With advanced warning of a pending need, the generators will be deployed and placed in position at the target facilities.

2.2 Flood Risk Reduction

The grade elevation at the three facilities ranges from 9.5 to 10 feet above mean sea level with an operating floor elevation of 14.3 feet. The design flood elevation for the three facilities is 18.3 feet NAVD88 for flood resiliency. The mobile generators will be placed on a four post racking system to elevate them to the design flood elevation. The electrical service connections will also be located at elevations above the design flood elevation. The actual location and orientation of the support racks will be determined during detailed design.

2.3 Fuel Source

Ultra low sulfur diesel (ULSD) will be used as fuel for the generator.

The ULSD fuel will be stored in an integral fuel tank that is built into the diesel engine skid. The volume of the fuel tank will be consistent with the supplier's standard offering and will generally provide power for up to 19 to 24 hours without refueling. During operation of the generators, the operations staff will need to monitor fuel consumption and tank level and periodically replenish the fuel tanks from a tanker truck.

2.4 Air Emissions

The mobile diesel generators will be certified for USEPA Tier IV emission levels. The Tier IV emissions standards are the latest and cleanest standards required for off-road diesel engines used in power generation applications. The emission control methods used to attain these standards varies with each equipment supplier depending on the specific design of the engine. For a mobile generator operating on ULSD, the expected emissions are summarized below in Table 5-1.

Table 5-1. Emergency Diesel Generator Emissions Summary

Emissions (Nominal)	Unit	Emissions g/bhp-hr	Emissions lb/mmbtu
Oxides of Nitrogen as NO2 (NOx)	g/hp-hr	1.55	0.49
Carbon Monoxide (CO)	g/hp-hr	0.08	0.03
Total Unburned Hydrocarbon (UHC)	g/hp-hr	0.02	0.006
Particulate Matter (PM)	g/hp-hr	0.01	0.003
Sulfur Dioxide (SO2)	g/hp-hr	0.005	0.002

Emissions from the mobile generators will fluctuate as ambient and load conditions vary. The emission rates shown in Table 5-1 represent the not-to-exceed values reported by a manufacturer of mobile generators sized similar to those proposed for this Pilot Project and are considered to be conservatively high. The SO2 emissions are based on the use of ULSD with a sulfur content of 15 ppm.

The height of the trailer mounted mobile diesel generators is approximately 10-feet. The engine exhaust duct will discharge from the top of the unit, about eight feet from the base of the trailer and will be roughly 4 inches in diameter. The exhaust flow will be approximately 1,500 cfm at a temperature of 770 ℉.

2.5 Noise Emissions

The generator trailers will be designed to meet all requirements of the jurisdiction having authority, including the New York City Zoning Resolution and the New York City Noise Control Code. See Part 1, Section 3.1.6 for details.

All equipment will be designed for a near-field noise emitting criterion of 85 dBA maximum at 3-feet from the equipment (in a free field).

The generators will be mounted on the trailers in an enclosure with the interior walls and ceiling insulated with sound attenuating foam designed to satisfy the supplier's standard noise emission level of approximately 71 dBA at a distance of 23 feet. The zoning classification of the three facilities along Food Center Drive is M3-1, and there are no adjacent properties that represent a zoning boundary (i.e. change in zoning classification) that would place a limitation on boundary noise emissions. Given the relatively low far-field noise emissions of the mobile generators and their intended purpose for emergency generation, the mobile generators are believed to be compliant with applicable noise regulations.

2.6 Grid Interconnection Requirements/Electrical Configuration

Generator interconnection boxes for the mobile generators will be connected to existing switchgear on the load side of the building service disconnects. Captive key interlocking will be provided to prevent access to portable generator connections when the utility service is feeding the facility switchgear. The captive key interlock scheme will provide total isolation from the mobile generator to the rest of the electrical system in accordance with the requirements of Revision 4 of Con Edison Specification EO-2113, Transfer of Load from Company's Supply to Customer's Emergency Generators. On loss of utility power or in preparation for maintenance, operators will manually reposition breakers and transfer keys to establish appropriate standby generation conditions. This will include isolation of the critical loads from the utility grid and connection of the emergency generator to the facility electrical distribution system. This system is not intended to provide rapid standby response automatically upon loss of power.

The mobile generators will not have any provisions to parallel with any other voltage source. Operation of the generators will only occur when the normal power source (utility power) is not available to a facility and is isolated from the loads by open and locked disconnects.

A one-line diagram is included in Appendix 5B depicting the mobile generator interconnection to existing switchgear.

3 Physical Arrangement

3.1 Site Plan

A location for parking the mobile generator trailers and permanently installing the generator connection equipment for each of the three facilities was identified during site visits and walkdowns. The selected locations are shown in the site plan in Appendix 5A. These locations were selected based on available space for accommodating the mobile generators, access for entry/exit, and position relative to the electrical interconnection point in each building. The following summarizes the approach at each of the facilities:

Sultana/Citarella – The location for the mobile generator will be on the southwest corner of the 600 Food Center Drive building. The existing Con Edison service entrance is near this location and there is a relatively short distance from this location to the electrical panels where the interconnection will be installed. Generator connection equipment as described in Section 2.5 above will be permanently installed at this location.

Anheuser Busch – The mobile generator at the Anheuser Busch facility will be parked in the alley near the northern-most corner of the facility. The Anheuser Busch building has a solar photovoltaic system that is integrated into the building electrical service system. The generator connection box will be installed near the existing system electrical boxes in the alley that serve the photovoltaic system. Electrical tie-ins for the new generator connection will parallel the conduit runs that serve the photovoltaic system.

Krasdale – The parking area for the mobile generators at Krasdale will be near the northwest corner of the building. The Con Edison service feeds are underground and enter through the floor of the electrical service room in this corner of the building. Within the building, the service entry runs overhead along the north wall into the electrical room. Electrical connections for the generator will be routed from the generator connection box installed in the generator trailer parking area to the electrical panels in the electrical room.

3.2 Physical Size of Equipment

The dimensions of a trailer mounted mobile diesel generator are approximately 20-feet (length) by 7-feet (width) and 10-feet (height).

A specification sheet for a representative 275 kW diesel generator is included in Appendix 5C, which provides more detail on the physical characteristics of the mobile generators. There are several established manufacturers of mobile generators in this size range that can supply the generators for this project.

4 Technology Performance

Each mobile generator will be capable of load following from 25 percent to full load and will generate at 60 Hz and 480V. Actual performance data will vary based on ambient conditions and the specific characteristics of the equipment purchased for the project.

The following are general performance characteristics for each mobile generator.

- Generator rating: 275 kW nominal at 1800 rpm.
- Fuel consumption: 20 gph.

5 Mechanical and Electrical Systems and Equipment

The mobile diesel generators and associated ancillary equipment will be furnished completely skid mounted and integral to the trailer. Key design features include the following:

- The engine will be fully prototype tested and registered as UL, CSA, and CE compliant.
- The skid will have integral spill containment of on-board engine fluids.
- The engine will be started by means of a battery supplied as part of the engine skid.
- The engine will be four-stroke design with compression ignition.
- Fuel fill connections and the battery can only be reached through lockable access doors.

The engine air inlet will be furnished with a filter. The engine will have a package mounted radiator to cool the engine. Radiator fluid fill and drain connections will be provided. Sight glasses and fluid level switches will be furnished.

The mobile generators will have an integral fuel tank that is built into the base of the generator trailer that will periodically be filled by a tanker truck. The fuel tank will be double walled with interstitial monitoring and a containment box/bowl at the fill port. Tank filling operations will be performed as needed to sustain emergency operations. These units are typically equipped with a 370 gallon fuel tank which can provide about 19 hours of full load operation.

5.1 Generator

The generators will be 60 Hz, 1800 rpm, three phase 480V devices with a nominal rating of 275 kW. The generators will be self-contained and capable of starting and operating continuously without interface to external controls or power. Operation of the units will be achieved via local, in-person, manual interface at the generator trailer. The generator package will include standard generator monitoring and protection features including the following:

- Monitoring
  - Voltage (L-L, L-N)
  - Current (Phase)
  - Average Volt, Amp, Frequency

- kW,kVAr, kVA (Average, Phase, %)
- Power Factor (Average, Phase)
- kW-hr, kVAr-hr (total)

- Protection
  - Generator phase sequence
  - Over/under voltage (27/59)
  - Over/under frequency (81 O/U)
  - Reverse power (kW) (32)
  - Overcurrent (50/51)

5.2 Generator Connection Box

Generator connection boxes will be installed at each facility as the interface between the generator and the electrical system of a building. The generator connection boxes will be 60 Hz, three phase 480V with a rating of 400A. The generator connection box will be a wall-mounted NEMA 3R or NEMA 4 enclosure housing all components required to directly connect the portable generator to the permanent electrical system of a building. The generator connection box connectors will be selected to match the connectors provided by the generator manufacturer (assumed to be Series 16 Cam-Lok connectors or equal, which will be finalized during detailed design).

If not included in the manual transfer switch discussed below, the generator connection boxes will include a main circuit breaker and a captive key lock to prevent access and energization on the connectors when utility power is supplied to the facility switchgear.

Enclosure handles will have provisions to be secured with a padlock.

Both ends (the generator and the connection box) will be receptacles for a Series 16 Cam-Lok, or equivalent, connection. The cables will be stored on the mobile generator trailer, but will be removable.

5.3 Critical Load Manual Transfer Switch

The critical load manual transfer switch will be 60 Hz, three phase 480V with a rating of at least 600A and 65 KAIC, depending on the results of a short circuit study conducted during detailed design. The switch will be UL 1008 listed. The transfer switch will be housed in a NEMA 3R enclosure integral with or adjacent to the generator connection box.

The manual transfer switch will be manually operated and mechanically held with interlocking to hold only one of three possible positions (Source 1, Source 2, or Off). The switch will be pad-lockable in any position and the enclosure will also be lockable.

The manual transfer switch will have a strip heater with transformer and thermostat.

5.4 Critical Load Switchboard

The critical load switchboard will be 60 Hz, three phase 480V with a rating of at least 600A. The switchboard will be housed in a NEMA 3R enclosure adjacent to the critical load manual transfer switch. Molded case circuit breakers sized to serve the facility critical loads will be provided within the load switchboard with sizing defined by the actual load that will be fed from each breaker.

5.5 Cables

The generator interconnection system will be designed and the cable sized to limit the allowable voltage drop at the powered equipment to 10 percent of the load nominal voltage rating under rated continuous operating conditions (as allowed by industry standards at the load terminals such as motors). Critical load feeders and branch circuit voltage will comply with ASHRAE 90.1 voltage drop requirements.

Low voltage power cable will consist of stranded copper conductors with solid dielectric insulation rated for a conductor temperature of 90°C and will have CSPE jackets.

Power cable ampacities will be determined and selected in accordance with the National Electric Code (NEC). Cable selection will be based on generator rating and will consider voltage drop, ambient correction factor, group derating factor based on raceway installation, and short circuit withstand duration requirements. Where more than one raceway is used for a given circuit, the lowest calculated or NEC tabulated ampacity will be used.

5.6 Raceways

Aboveground circuits will be installed in conduit.

Penetrations of fire-rated floors and walls will be sealed with a fire and smoke seal rated commensurate with the rating of the penetration.

All conduits will be sized in accordance with NEC Chapter 9 Tables requirements. Exposed conduits will be rigid galvanized steel. In corrosive areas, conduit will be rigid nonmetallic conduit, rigid galvanized steel with a PVC coating or, where applicable, constructed of non-corroding materials.

5.7 Switchboard Modification

Critical loads will be finalized during detailed design. Critical loads will include lighting, access equipment, electrical equipment charging stations, computer facilities, and may include air handling and space conditioning equipment. Critical loads will be disconnected from existing electrical feeds and re-fed from the new critical load switchboard. During load relocation, a new feed from the existing service switchgear will be connected to provide utility power to the manual transfer switch. The new feeder will be at least 400A with sizing finalized based upon selected critical loads.

5.8 Service Modification (Optional Alternative)

In lieu of installing a new critical load switchboard, interconnection to the existing switchgear may be performed as shown in Appendix 5B, Options 1 or 2. Switchboard enclosure modifications may be made to locate and interconnect captive key locking devices that prevent key removal with the service disconnects in the closed position. These modifications must be approved by Con Edison in accordance with Specification EO-2113, Transfer of Load from Company's Supply to Customer's Emergency Generators. If required, a load side tap may be performed in coordination with the switchboard manufacturer in such a way as to preserve the UL listing.

6 Instrumentation and Control Systems and Equipment

6.1 General Requirements

The instrumentation and control equipment will be manufacturer's standard equipment. Mobile generators will be self-contained and operate without the installation of additional instrumentation and controls. No control system interfaces will be provided between the portable generator and any installed equipment. No control system interfaces will be provided between new electrical equipment and any existing control systems.

7 Project Constructability Considerations

Due to the simplified nature of the interconnection with the building electrical systems, there are few constructability issues to consider for the mobile generators. The mobile generators can be stored at any location and rapidly deployed to the Food Center Drive area and placed in position when there is a pending need. There are no permanent foundations envisioned for the mobile trailers. The electrical interconnect will vary slightly depending on the exact requirements of each site location.

With regard to permitting, the mobile generator portion of the Energy Resiliency Project will be included in the overall Environmental Review to address noise, vibration, and truck traffic issues. The mobile generators will likely require listing under the NYC DEP Air Pollution Registration as emergency portable generators with a capacity greater than 40 kW. In addition, the fuel tanks of the generators may require that they be registered under the New York State Petroleum Bulk Storage requirements since they are greater than 110 gallons.

8 Operational Considerations and Costs

The following are the major operational considerations and maintenance activities for the mobile generator units.

- To maintain system functionality and reliability, the engine will be subject to a start cycle test once a month. It is assumed these tests will be conducted at the storage facility.
- The operations staff will need to monitor fuel consumption by the generators and tank levels and periodically replenish the fuel tanks from a tanker truck.
- Since the mobile generators will be stored at the Brooklyn Army Terminal, or similar facility, there is a risk that deployment to the Hunts Point facilities or possibly delivery of ULSD to support operation may be hampered by flood or other factors that would render roads impassable.
- Lubricating oil checks and makeup, as needed.
- Annual change out of lubricating oil.
- Radiator fluid makeup as needed.

The average annual maintenance service cost is estimated to be about $3,000 per year ($2021).

9 Project Capital Costs

American Association of Cost Engineers (AACE) Class 3 project cost estimates were developed for the mobile diesel generators. The cost estimates were developed based on budgetary major equipment pricing from mobile generator manufacturers, union labor rates specific to New York City, equipment quantities, preliminary layouts, and reference data from previous similar projects. The estimates do not include incremental site specific costs such as ULSD fuel supply provisions and electric transmission infrastructure as these are not anticipated for this work.

The engineering, procurement, and installation requirements for the mobile generator project are relatively simple when compared to the other Energy Resiliency projects and are expected to have a comparatively quick schedule for implementation. Therefore, it is assumed that this project will be executed on a faster timeline with a 2021 COD in advance of HUD schedule requirements.

The following approach and assumptions were utilized to develop the conceptual capital cost estimates for each of the facilities:

- The total capital cost estimate assumes the purchase of four mobile diesel generators with provisions for installation at three facilities.
- Electrical scope to tie-into the existing electrical switchgear.
- Sales tax, insurance, extended warranties, and performance bond/sureties are excluded.

- Interest during construction or allowance for funds used during construction (AFUDC) is excluded.
- January 2021 commercial operation date (COD). This assumes that the design, procurement, and installation work proceeds in 2020.
- The estimate is developed in 2018 dollars with escalation to COD added based on a flat 3 percent annual escalation rate over two years for major equipment and two years for both material and labor.
- Project direct costs include equipment, commodities, and construction labor.
- Contractor's construction indirect costs including provisions for construction and building permits, testing, expenses, services, temporary facilities, tools, rental equipment, and other costs related to construction are included.
- Contractor's project indirect costs including project management are included (based on previous project experience).
- Contractor's contingency, general and administration costs (G&A), and fees which are based on observed industry trends and previous project data are included.
- Final engineering design and the associated engineering project management is included.

In addition to the construction contractor's costs and design engineering costs noted above, construction management and Owner's costs were included for reference in this analysis and are estimated at a general rate of 10 percent of the total installed project cost, based on typical percentages of project costs observed in the industry, and are not specific to EDC. This factor is not specific to EDC. Owner's costs typically include the following provisions for:

- Project development
- Owner's project management and oversight
- Environmental and site permitting
- Operating spares and equipment maintenance contract initiation costs (as applicable)
- Design engineer and construction contractor oversight
- Project management
- Permitting
- Site preparation
- Operating spares and equipment maintenance contract initiation costs (as applicable)
- Owner's project oversight
- Owner's operations personnel (prior to COD)
- Operator training

- Startup and commissioning and performance testing.

For Owner's contingency, a 20 percent allowance was added to the cost estimate.

The estimated project capital costs for the mobile generators were provided to EDC. The total project cost represented an estimated installed cost for a January 2021 COD and include estimated Owner's costs.

10 Project Schedule

A Level I project implementation schedule was developed from the start of initial project development to the project COD, which currently is shown as January 2021. The project implementation schedule is included in Appendix 5D for reference. The longest activity will be the fabrication and delivery of the generators, which is expected to take between three and four months after award. The installation of the electrical connection equipment at each facility is not anticipated to take an extensive amount of time. This work could last between one and four months depending on how the contractor plans the work and how the installation work may need to be coordinated with facility operations. It should be noted that most of the installation work can be performed prior to delivery of the generators, which adds additional flexibility to the implementation schedule.

The schedule included in Appendix 5D is conservative in that long durations were used for most of the activities. The schedule assumes that the environmental review will be completed in 2019 and that any requirements defined in this work will be available for detailed engineering. The notice to proceed (NTP) for the final design of the mobile generators is assumed to be January 1, 2020, with detailed engineering starting by the second quarter of 2020.

There is flexibility in the schedule to shorten the implementation schedule of the mobile generator project, if desired. The COD for this project is depicted as January 2021; however, an earlier (or later) project completion date is feasible, if desired by EDC.

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PART 5 APPENDICES

5A: Mobile Diesel Generator Location Plan

5B: Mobile Diesel Generator One-Line Diagram, 480V Connection Options

5C: 275kW Diesel Generator Specification Sheet

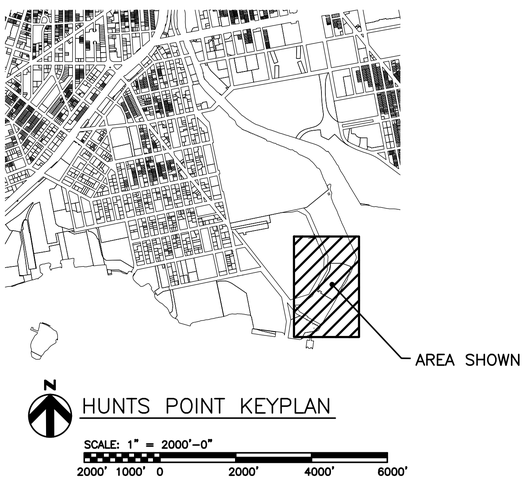
5D: Project Implementation Preliminary Schedule

APPENDIX 5A

- Mobile Diesel Generator Location Plan

NOTES

1. LOCATIONS SHOWN ARE APPROXIMATE.



ISSUE	DATE	DESCRIPTION
A	NOV. 17	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	A. STOLZ
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

NYCEDC
NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY PILOT PROJECT

MOBILE DIESEL GENERATOR LOCATION PLAN

0 1" 2"

FILENAME	10029617_0GA_C103
SCALE	AS NOTED

SHEET C10

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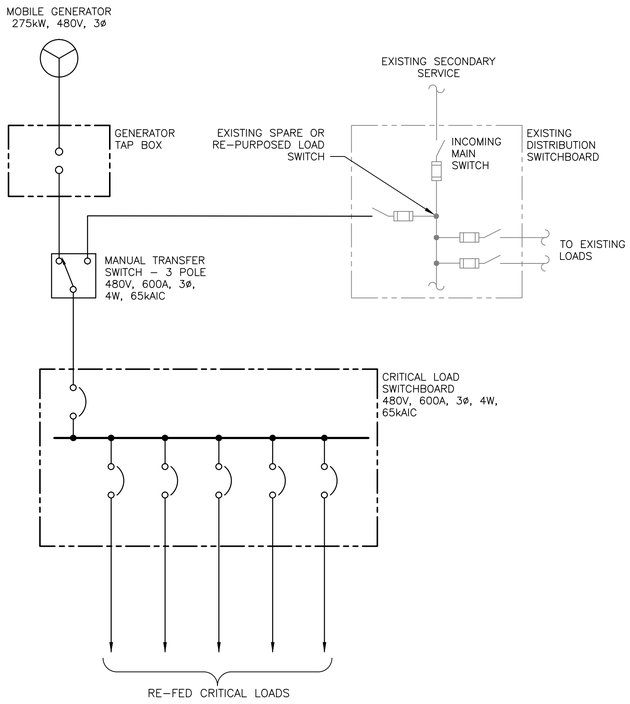
APPENDIX 5B

- Mobile Diesel Generator One-Line Diagram, 480V Connection Options



PREFERRED OPTION

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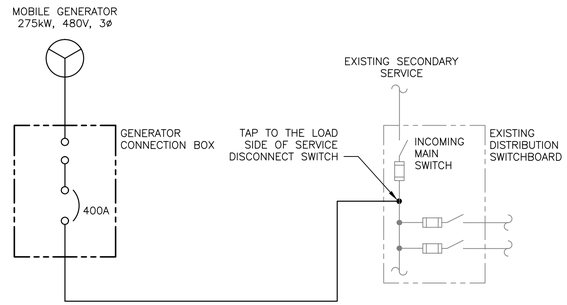

OPTION #1

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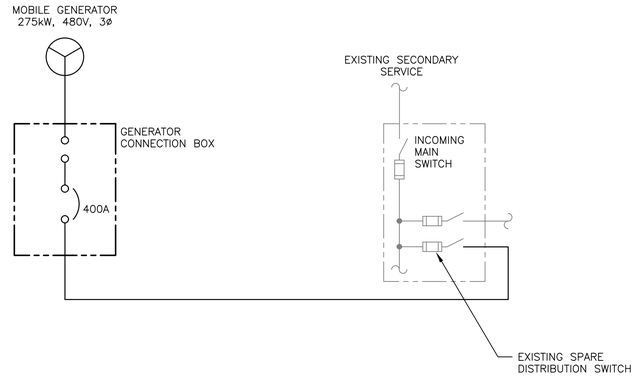

OPTION #2

SCALE: NO SCALE

ISSUE	DATE	DESCRIPTION
A	-	ISSUED FOR REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	R. BROWN
ENGINEER	A. STOLZ
CHECKED	S.A. SHAUKAT
APPROVED	
PROJECT NUMBER	10029617

NYCEDC
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HUNTS POINT RESILIENCY PILOT PROJECT

MOBILE DIESEL GENERATOR CONNECTION OPTIONS 480V ONE-LINE

0 1" 2"

FILENAME	E101
SCALE	NONE

SHEET **E101**

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APPENDIX 5C

- 275kW Diesel Generator Specification Sheet

Exhaust Emission Data Sheet
C275D2RE
60 and 50 Hz Diesel Generator Set
T4(f)/EU Stage IIIA

Engine Information:

Model:	Cummins Inc. QSL9-G9	Bore:	114 mm (4.5 in)
Type:	4 Cycle, In-line, 6 Cylinder Diesel	Stroke:	145 mm (5.7 in)
Aspiration:	Turbocharged and CAC with EGR	Displacement:	8.9 L (543 cu in)
Compression Ratio:	17.8:1		
Emission Control Device:	Turbocharged with CAC, EGR and T4F Aftertreatment system		

	60 Hz	50 Hz
PERFORMANCE DATA	**Full Standby**	**Full Standby**
BHP @ 1800 RPM (60 Hz)	433	373
Fuel Consumption (gal/Hr)	21.0	18.4
Exhaust Gas Flow (CFM)	1533	1375
Exhaust Gas Temperature (°F)	771	863
EXHAUST EMISSION DATA		
HC (Total Unburned Hydrocarbons)	0.04	0.00
NOx (Oxides of Nitrogen as NO2)	0.41	0.13
CO (Carbon Monoxide)	0.01	0.01
PM (Particular Matter)	0.01	0.01
SO2 (g/Hp-hr)	0.00	0.00
Smoke (Bosch)	NA	NA
		All Values are Grams per HP-Hour

TEST CONDITIONS

Note: mg/m^3 and PPM numbers are measured dry and corrected to 5% O_2 content.

Test Methods and Conditions:
Steady-State emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures, and emission rates stabilized.

Fuel Specifications:
46.5 Cetane Number, 0.0015 Wt. % sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No.2-D.

Reference:
25 °C (77 °F) Air Inlet Temperature, 40 °C (104 °F) Fuel Inlet Temperature, 100 kPa (29.53 in Hg) Barometric Pressure; 10.7 g/kg (75 grains H_2O/lb) of dry air Humidity (required for NO_x correction): Intake Restriction set to maximum allowable limit for clean filter; Exhaust Back Pressure set to maximum allowable limit.

Data was taken from a single engine test according to the test methods, fuel specification, and reference conditions stated above and is subject to engine-to-engine variability. Tests conducted with alternate test methods, instrumentation, fuel, or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits or with improper maintenance, may result in elevated emission levels.

Specification sheet

Rental Power 275 kW

U.S. EPA Tier IV Emissions

Description

This Cummins Power Generation rental package is a fully integrated mobile power generation system, providing optimum performance, reliability, and versatility for standby and prime power applications.

Features

Cummins diesel engines

- U.S. Tier IV Final and EU SIIIa certified Cummins QSL9-G9 engines which meet emissions limits without the use of a diesel particulate filter (DPF)
- Dual speed engine for operation at 50 or 60 Hz
- Advanced electronic engine controls with integrated aftertreatment system provide superior fuel efficiency while reducing emissions
- High-pressure common rail fuel system reduces engine noise and smoke
- Cummins Direct Flow™ air filtration offering improved air management, longer service life, and easier serviceability
- 2-stage fuel filtration with optimum particle and water separation

Control features

- The most advanced, reliable and capable generator set control system on the market today
- PowerCommand 3.3© with Masterless Load Demand (MLD) technology enables smartly adapting power to match varying load demand. MLD capable generators allow sharing of information among paralleled generator sets.
- Controls provide precise frequency and voltage regulation, alarm and status message display in one easy to operate customer interface

Engine controls

- Oil pressure and coolant temp gauge
- Fuel level gauge, Diesel Exhaust Fluid (DEF) level gauge and battery voltage gauge
- Hour meter
- Engine control module includes remote start capability

Stamford alternators

- 12-lead reconnectable alternators fitted with voltage selection switch
- Permanent magnet excitation for improved performance in non-linear load applications

Rental package enclosure

- Camlock distribution panel
- Sound attenuated, white powder coated lockable enclosure
- 24 hour fuel tank (75% prime) with gauge
- Roof mounted, single point lift
- Cooling system rated for 122° F (50° C) at 100% standby ambient
- Complete engine fluid containment reservoir
- 4 position voltage selector switch (277/480 or 139/240 or 120/208 VAC 3 phase or 120/240 VAC 1 phase)
- Shore power (15A/120V) – for coolant heater and battery charger
- Conveniently located analog gauges and heated Human Machine Interface (HMI) display

Rental package options

- Optional Auxiliary Fuel and DEF connections
- DOT approved electric brake trailer with heavy duty center mounted jack, ball or pintle hitch
- DOT approved hydraulic brake trailer with heavy duty center mounted jack, ball or pintle hitch

		Standby Rating		Prime Rating			
Model	**Voltages (V)**	**60 Hz kW (kVA)**	**50 Hz kW (kVA)**	**60 Hz kW (kVA)**	**50 Hz kW (kVA)**	**Sound level Full load @ 7m**	**Alternator model**
C275D2RE	208/240/480	275 (344)	235 (294)	250 (313)	227 (284)	77 dBA	HCI434E

Our energy working for you.™

Engine specifications

Engine model	QSL9-G9
Alternator data sheet	HCI434E (208/240/480)
Tier rating	Tier IV
Design	4 cycle, In-Line, turbocharged and after-cooled
Bore	114 mm (4.5 in.)
Stroke	145 mm (5.7 in.)
Displacement	8.9 liters (543 in3)
Cylinder block	Cast iron, In-Line 6 cylinder
Battery capacity	2 x 760 cca
Battery charging alternator	70 amps
Starting voltage	24 volt, negative ground
Fuel system	Direct injection HPCR system
Fuel filter	Spin on fuel filter with water separator
Air cleaner type	2-stage, dry replaceable element with dust ejector
Lube oil filter type(s)	Single spin-on, full flow
Standard cooling system	122 °F (50 °C) ambient radiator

Alternator specifications

Design	Brushless, 4 pole, drip proof revolving field
Stator	Double layer concentric, 2/3 winding pitch
Rotor	Singe bearing, flexible disc
Insulation system	Class H per NEMA MG1-1.65 (208/240/480 VAC)
Standard temperature rise	125/40 ºC prime (208/480 VAC)
Exciter type	PMG (permanent magnet generator)
Phase rotation	A (U), B (V), C (W)
Alternator cooling	Direct drive centrifugal blower fan
AC waveform total harmonic distortion	< 1.5% no load, < 5% non-distorting balance linear load
Telephone influence factor (TIF)	< 50 per NEMA MG1-22.43
Telephone harmonic factor (THF)	< 2%

Power capability specifications (Assume power factor = 0.80 for 3 phase amps)

	Standby rating				
	240 V, 1 phase Amps 60Hz	**208 V, 3 phase Amps 60Hz**	**480 V, 3 phase Amps 60Hz**	**240 V, 3 phase Amps 60Hz**	**400 V, 3 phase Amps 50Hz**
C275D2RE	770	954	413	826	424

Electrical power panel specifications

Model voltage	**120 V duplex receptacles**	**240 V twist**	**Load lug connection (stud diameter)**	**Load lug circuit breakers**
120/480 Volt	2 - 20 Amp GFCI	3 - 50 Amp	1/2 inch	1200 Amp

PowerCommand 3.3 Control System

An integrated microprocessor based generator set control system providing voltage regulation, engine protection, alternator protection, operator interface and isochronous governing. Refer to document S-1570 for more detailed information on the control.

Simplified display for rental operators - simplified display tailored for rental equipment operations for ease of use.
Masterless Load Demand (MLD) - The controller is capable of smartly managing power from paralleled generators to match varying load patterns.
Power management – Control function provides battery monitoring and testing features and smart starting control system.
Advanced control methodology – Three phase sensing, full wave rectified voltage regulation, with a PWM output for stable operation with all load types.
Regulation compliant – Prototype tested: UL, CSA and CE compliant.
Service - InPower™ PC-based service tool available for detailed diagnostics, setup, data logging and fault simulation.
Easily upgradeable – PowerCommand controls are designed with common control interfaces.
Reliable design – The control system is designed for reliable operation in harsh environment.

Operator panel features

Operator/display functions
- Displays paralleling breaker status
- Provides direct control of the paralleling breaker
- 320 x 240 pixels graphic LED backlight LCD
- Auto, manual, start, stop, fault reset and lamp test/panel lamp switches
- Alpha-numeric display with pushbuttons
- Heated HMI
- LED lamps indicating genset running, remote start, not in auto, common shutdown, common warning, manual run mode, auto mode and stop

Paralleling control functions
- First Start Sensor System selects first genset to close to bus
- Phase Lock Loop Synchronizer with voltage matching
- Sync check relay
- Isochronous kW and kVar load sharing
- Enhanced safety features for paralleling generators

Alternator data
- Line-to-neutral and line-to-line AC volts
- 3-phase AC current
- Frequency
- kW, kvar, power factor kVA (three phase and total)

Engine data
- DC voltage
- Lube oil pressure
- Coolant temperature
- Comprehensive FAE data (where applicable)

Other data
- Fault history
- Data logging and fault simulation (requires InPower)

Standard control functions

Digital governing
- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation
- Integrated digital electronic voltage regulator
- 3-phase, 4-wire line-to-line sensing
- Configurable torque matching

AmpSentry AC protection
- AmpSentry protective relay
- Over current and short circuit shutdown
- Over current warning
- Single and three phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse var shutdown
- Field overload shutdown

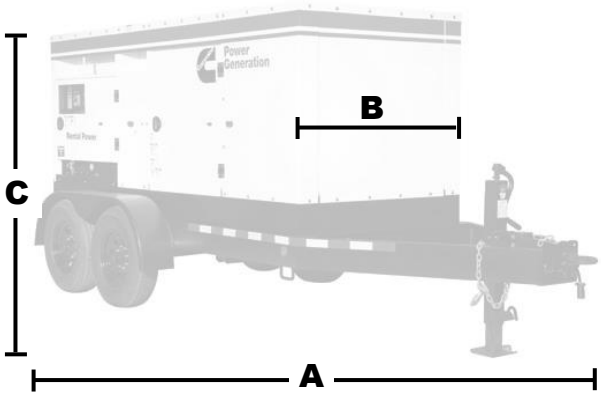
Engine protection
- Battery voltage monitoring, protection and testing
- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Cranking lockout
- Sensor failure indication
- Full authority electronic engine protection

Control functions
- Time delay start and cool down
- Real time clock for fault and event time stamping
- Cycle cranking
- Load shed
- Remote emergency stop

Ratings definitions

Standby:
Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

Prime (unlimited running time):
Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514).



Dimensions

Model	Dim "A" mm (in.)	Dim "B" mm (in.)	Dim "C" mm (in.)	Weight w/o fuel kg (lbs)	Weight with fuel kg (lbs)	Fuel capacity liters (gal)*
C275D2RE	4162 (164)	1575 (62)	2405 (95)	4766 (10485)	5954 (13100)	1400 (370)
With Trailer	6124 (241)	2130 (84)	2910 (115)	6039 (13285)	7336 (16140)	1400 (370)

***** Onboard DEF capacity is sized for 24 hours of operation at 15 gallons

Fuel consumption

	Standby				Prime				
	275 (344)				250 (313)				Hours of operation
Load	¼	½	¾	Full	¼	½	¾	Full	75% load
US Gal/hr	6.5	10.8	15.5	19.7	6.4	10.3	14.1	17.9	24
L/hr	24.6	40.9	58.6	74.5	24.2	39	53.4	67.7	24

Note: DEF consumption ~4% of fuel consumption

Trailer information

Model	Tire size	Tire type	Load range	Number of tires per trailer	Lug pattern
C275D2RE	ST235/85R16	Radial	E	6	8x6.5

Certifications

These generator sets are certified to following standards:

CAN/CSA STD C22.2 NO. 100
CAN/CSA STD C22.2 NO. 14

North America
1400 73rd Avenue N.E.
Minneapolis, MN 55432
USA

Phone 763 574 5000
Fax 763 574 5298

Our energy working for you.™

NAS-5959a-EN (3/16)

power.cummins.com

Cat® XQ425 Rental Generator Set

Image shown may not reflect actual configuration

Standby 375 kW
Prime 340 kW
50/60 Hz Switchable
1500-1800 rpm

Specification

Frequency	Voltage	Standby kW (kVA)	Prime kW (kVA)	Speed rpm
480V 50/60 Hz Switchable Rating				
60 Hz	480/277V	375 (469)	340 (425)	1800
60 Hz	240/139V	375 (469)	340 (425)	1800
60 Hz	208/120V	350 (438)	320 (400)	1800
50 Hz	400/230V	320 (400)	290 (363)	1500
600V 60 Hz Rating				
60 Hz	600V	375 (469)	340 (425)	1800
60 Hz	480V	320 (400)	292 (365)	1800

Cat® C13 ACERT™ Diesel Engine	Metric	Imperial (English)
Configuration	I-6, 4-Stroke-Cycle Water Cooled Diesel	
Bore	130 mm	5.1 in
Stroke	157 mm	6.2 in
Displacement	12.5 L	763 in^3
Aspiration	Turbocharged-Aftercooled	
Compression Ratio	17.0:1	
Fuel System	MEUIC	
Governor Type	ADEM™ A4	
Aftercooler	ATAAC	
Turbocharger	Single	
Fuel	Requires ULSD	

Benefits & Feature

Fuel/Emissions Strategy
- Meets U.S. EPA Tier 4 Final and CARB Certified for Non-Road Mobile applications at all 50 and 60 Hz ratings

Single-source Supplier
- Factory designed and fully prototype tested with certified torsion vibration analysis available
- ISO 9001:2000 compliant facility

Cat C13 ACERT Tier 4 Final Diesel Engine
- Uses ACERT Technology and Cat NOx Reduction System (NRS)
- Four-stroke diesel engine combines consistent performance and excellent fuel economy with minimum weight
- ECM electronic engine control

Cat CEM (Clean Emissions Module)
- Aftertreatment module consists of Diesel Oxidation Catalyst (DOC), Diesel Particulate Filter (DPF), and Selective Catalytic Reduction (SCR)

Diesel Exhaust Fluid (DEF) Tank
- 12 gallon DEF tank with on tank fill and integrated pump, level sensor and heating elements
- Electrically heated DEF lines from DEF tank to CEM

Cat EMCP 4.2 Control Panel
- Fully featured power metering, protective relaying and engine/generator control and monitoring
- Simple user friendly interface and navigation
- Automatic set-point adjustment integrated with voltage and frequency changes

Cat SR4B Series Generator
- Designed to match performance and output characteristics of Cat diesel engines
- Permanent magnet excitation
- Segregated AC/DC, low voltage accessory box provides single-point access to accessory connections

Cat Digital Voltage Regulator (Cat DVR)
- Three-phase sensing
- Adjustable volts-per-hertz regulation
- Provides precise control, excellent block loading, and constant voltage in the normal operating range

Enclosure
- Highly corrosion-resistant 12-gauge sheet steel construction
- Two-coat polyester powder-coated finish
- 7 doors and 3 access doors for ease of maintenance
- Secure and safe design with safety glass control panel viewing window with lockable access door
- Fuel fill and battery can only be reached through lockable access doors
- Certified single-point lifting eye and lifting points on the base frame

Distribution Panel*
- Switchable via linkboard from 480/277V 3-phase to 240/139V 3-phase (can be adjusted down to 208/120V 3-phase)

Rear Customer Access
- Separate control panel and distribution panel access doors
- Hinged door over main bus connectors
- Emergency stop on panel
- Remote start/stop contacts

Reduced Environmental Impact
- EPA Tier 4 Final technology
- 110% spill containment of onboard engine fluids
- Meets 76 dB(A) at 7 m per SAE J1074 measurement procedure at 110% prime loads

Rental Ready Features
- Anti-condensation heater 110-120 VAC
- Coolant heater 110-120 VAC
- UL Listed battery charger
- Solar powered battery maintainer

*N/A for 600V

Factory-installed Standard Equipment

Air Inlet
- Air cleaner, two-stage cyclonic/paper with dust cup and service indicator
- Turbocharger and air-to-air aftercooler

Charging System
- UL/CSA listed 120V, 20A battery charger, shock mounted and enclosed in dust-proof housing
- Charging alternator; 24V-45A, heavy-duty with integral regulator and belt guards

Control Panel
- EMCP 4.2 generator set mounted controller
- NEMA 2, IP23 dust-proof enclosure, UL508 listed
- Idle/rated and 50/60 Hz frequency switches
- Generator protection features: 32, 32RV, 46, 50/51, 27/59, 81 O/U
- Metering display: voltage, current, frequency, power factor, kW, WHM, and kVAR
- Panel illumination lights and emergency stop switch

Cooling System
- Package-mounted radiator with vertical air discharge provides 43°C ambient capability at prime +10% rating
- Blower fan, fan drive, fan guard, and belt guards
- 120VAC coolant heater, fuse protected, thermostatically controlled, automatically disconnected on start-up
- Coolant drain line with internal brass ball control valve piped to base-frame
- Coolant sight gauge, level switch, and shutdown
- 50% coolant antifreeze with corrosion inhibitor

Distribution System
- NEMA 1 steel enclosure, separate hinged, lockable door with rust-resistant pinned hinges
- Main bus connections with hinged load cover with Plexiglas window closed for operation
- Main circuit breaker 3-pole, 240/480V-1600A with 24V DC shunt trip wired to load door safety switch
- Current transformers, hard mounted
- Multiple duplex and twist-lock receptacles with individual circuit breakers
- Two-wire remote start/stop terminals and 120 VAC shore power connection for rapid starting

Enclosure
- Sound attenuating, 12-gauge sheet metal enclosure limits overall noise to 77 dB(A) @ 7m (23')
- Modular panel construction and one-piece welded roof design with 2 degree pitch
- Interior walls and ceilings insulated with flame retardant, precision cut foam materials meeting NFPA220
- Black stainless steel pad-lockable latches, doorkeepers on all doors and zinc die-cast hinges/grab handles
- Single-point lifting
- Painted Cat power module white with Cat rental decals

Engine
- EPA Tier 4 Final certified Cat C13 ACERT ATAAC heavy duty diesel engine
- Electronic ADEM A4 controls

CEM
- Cat CEM comes with integrated DOC, DPF, and SCR and is located in separate compartment

DEF System
- 12 gal plastic DEF tank provides 24 hours run time @ 75% Prime + 10% rating similar to fuel system
- DEF tank is equipped with integrated pump, level sensor to display the DEF level in EMCP panel, and electrically heated lines from DEF tank to CEM
- Equipped with low and critically low level alarms with a critically low shutdown

Fuel System
- 520 gal (1970 L) double wall fuel tank, UL142, ULC, and Transport Canada certified, 27 hours run time @ 75% prime +10% rating, internal fuel fill
- Fuel cooler, pressure gauge, primary fuel filter with integral water separator, and engine mounted secondary
- Switch operated, electric priming pump
- Auxiliary connections for customer supplied fuel transfer system with 6-way fuel transfer valve

Factory-installed Standard Equipment (continued)

Generator
- SR4B 450 frame, three-phase, random wound, 12-lead design, permanent magnet excited, 0.750 pitch
- 240-480 volt link board built into distribution system provides either 480/277 volt or 240/139 volt*
- Coastal insulation protection
- Windings impregnated in a triple dip, thermo-setting moisture, oil and acid resisting polyester varnish; heavy coat of anti-tracking varnish for additional protection
- Cat DVR with VAR/PF control, RFI suppression, exciter diode monitor
- 120VAC anti-condensation heater

Lube System
- Pump, integral oil cooler, lube oil, filter, filler and dipstick, and oil sampling valve
- Open crankcase breather with 75% filter
- Oil drain line with internal brass ball valve routed to connection point accessible from exterior
- 500-hour oil change intervals

Mounting System
- Generator set soft mounted to the heavy-duty, fabricated steel base frame
- Skiddable steel base frame with tie-down eyes contains integral fuel tank
- Provides 110% spill containment of all engine fluids

Starting System
- Single electric starting motor, 24V
- Dual 12V (1400 CCA) maintenance free batteries with disconnect switch, battery rack, and cables
- UL listed, 120V single-phase jacket water heater with thermostat and shut-off valves

General
- Canadian Standards Authority (CSA) certified
- Factory testing of standard generator set
- Full manufacturer's warranty
- O&M manuals

Optional Equipment

Available Options
- Tandem axle trailer with electric brakes

Cat EMCP 4.4 Control Panel
- Simple user-friendly interface and navigation
- Automatic set-point adjustment integrated with voltage and frequency selection
- UL508A recognized
- Convenient service access for Cat service tools (not included)
- Integration with the Cat DVR provides enhanced system monitoring
- Ability to view and reset diagnostics of all controls networked on primary CAN data link eliminates need for separate service tools for troubleshooting
- True RMS AC metering, 3-phase
- Multiple stored setpoint group selection via switched input eliminates need to reprogram control when switching voltages and frequencies

EMCP 4.4 Engine Operator Interface
- Controls
  - Run/Auto/Stop
  - Speed adjust
  - Voltage adjust
  - Emergency stop
  - Cycle crank
  - Cool-down timer
- Digital indication for
  - RPM
  - Operating hours
  - Coolant temperature
  - DC volts
  - Oil pressure
  - Oil temperature
  - L-L volts, L-N volts, phase amps, Hz
  - ekW, kVA, kVAR, kW-hr, %kW, PF
- Shutdowns with common indicating light for
  - Low oil pressure
  - High coolant temp
  - Failure to start (overcrank)
  - Low coolant level
  - Overspeed
  - High oil temp
  - Emergency stop
- Emergency stop pushbutton
- Panel illuminating lights
- Display navigation keys including two shortcut keys for engine parameters, generator parameters, control, and main menu
- Fuel level monitoring and control

EMCP 4.4 Generator Protective Relaying
- Phase over/under voltage (device 27/59)
- Over/under frequency (device 81 O/U)
- Reverse power (device 32/32RV)
- Current balance (46)
- Overcurrent (device 50/51)
- Bus phase sequence

*N/A for 600V

Optional Equipment (continued)

Modes Of Operation

- Provides for:
  - Single unit standalone mode
  - Island mode paralleling and load sharing (multi-unit mode) with other EMCP4.4 product
- Single unit standalone mode
  - The utility is providing power for the plant loads
  - The PM generator breaker is open
  - The PM is in automatic standby mode to respond to a utility failure
- Multi-unit mode
  - Features auto synchronization (voltage and phase matching), load sharing (kW) analog signal (like units only), and load sharing (kVAR) analog signal (like units only)
  - The customer protective relaying senses a utility abnormal condition
  - A run request is sent to the PM generator plant
  - The first PM generator to reach rated to voltage and frequency is closed to the bus and remaining units are paralleled to the bus as they reach rated voltage and frequency
  - Plant load is transferred to the power modules, which share load equally via load share lines

Technical Data

Cat Generator	
Frame size	SR4B – 450
Pitch	0.750
No. of poles	4
Excitation	Static regulated brushless PM excited
Number of bearings	Single bearing, close coupled
Insulation	Class H
Temperature rise	105°C
Enclosure	Drip proof IP23
Overspeed capability – % of rated	125% of rated
Voltage regulator	3-phase sensing with volts-per-hertz
Voltage regulation	Less than ± 1/2% voltage gain (adjustable to compensate for engine speed droop and line loss)
Wave form deviation	3%
Telephone Influence Factor (TIF	Less than 50%
Harmonic Distortion (THD)	Less than 5%

Technical Data (continued)

Cat Generator Set					
	Units	50 Hz		60 Hz	
		Standby	Prime	Standby	Prime
Performance Specificatio		EM0181	EM0180	EM0179	EM0178
Power Rating	**kW (kVA)**	**320 (400)**	**290 (360)**	**375 (468)**	**340 (425)**
Lubricating System					
Total oil pan capacity	L (gal)	37 (19.5)			
Fuel System					
Fuel Consumption – 100% Load	L/hr (gal/hr)	97.5 (25.1)	88.0 (23.1)	95.7 (25.1)	88.0 (23.1)
75% Load	L/hr (gal/hr)	73.4 (19.2)	67.9 (17.7)	73.4 (19.2)	67.9 (17.7)
50% Load	L/hr (gal/hr)	52.3 (13.6)	48.6 (12.7)	52.3 (13.6)	48.6 (12.7)
Fuel Tank Capacity	L (gal)	1970 (520)	1970 (520)	1970 (520)	1970 (520)
Running Time @ 75% rating	Hr	26	29	26	29
DEF System					
DEF Tank Capacity	L (gal)	48 (12)	48 (12)	48 (12)	48 (12)
DEF Consumption – 100% Load	L/hr (gal/hr)	—	—	2.5 (0.7)	2.4 (0.6)
75% Load	L/hr (gal/hr)	—	—	1.8 (0.5)	1.5 (0.4)
50% Load	L/hr (gal/hr)	—	—	—	—
Running Time @ 75% rating	Hr	—	—	27	33
Cooling System					
Ambient capability	°C (°F)	43			
Engine & radiator coolant capacity	L (gal)	61 (16.2)			
Engine coolant capacity	L (gal)	19 (5.0)			
Air Requirements					
Combustion air flo	m^3/min (cfm)	19.7 (693.2)	18.3 (646.1)	(828.3)	(803.3)
Exhaust System					
Exhaust flow at rated (dry exhaust	m^3/min (cfm)	13.8 (485.1)	13.1 (460.3)	16.0 (565.7)	15.9 (558.9)
Exhaust temperature at rated kW	°C (°F)	496.4 (924.7)	488.9 (911.8)	473.4 (880)	454.1 (846.9)
Noise rating (with enclosure)					
@ 7 meters (23') @ 75% of rating	dB(A)	76			
Emissions (not to exceed data)					
NOx	g/hp-hr	1.42	1.28	1.55	1.56
CO	g/hp-hr	0.08	0.07	0.08	0.07
HC	g/hp-hr	0.01	0.01	0.02	0.02
PM	g/hp-hr	0.02	0.02	0.01	0.02

Weights and Dimensions

Model	Length mm (in)	Width mm (in)	Height mm (in)	Weight with Lube Oil & Coolant kg (lbs)	Weight with Fuel, Lube Oil, & Coolant kg (lbs)
XQ425 without trailer	5080 (208.7)	1524 (60)	2642 (104)	6667 (14,700)	8571 (18,900)
XQ425 with trailer	7206 (283.7)	2591 (102)	3204 (126.1)	8132 (17,930)	10 036 (22,130)

Standard Features

- NEMA 2, IP23 dust-proof enclosure with hinged lockable door and viewing window
- EMCP 4.2 display
- Panel light on/off switch
- Emergency stop pushbutton
- Lamp test/reset pushbutton
- Voltage adjust potentiometer
- Alarm and shutdown indicators
- Idle/rated switch
- Regeneration alarm indications for DPF 80% soot level and high exhaust temperature
- 50/60 Hz frequency adjustment
- Fuel level display
- Convenient service access for Cat dealers (service tools not included)

EMCP 4.2 Engine Operator Interface

- Controls
  - Run/Auto/Stop
  - Speed adjust
  - Voltage adjust
  - Emergency stop
  - Cycle crank
  - Cool-down timer
- Engine monitoring
  - RPM
  - Operating hours
  - Coolant temperature
  - DC volts
  - Oil pressure
  - Oil temperature
  - Crank attempt and successful start counter
- Generator monitoring
  - L-L volts, L-N volts, current (phase)
  - Average volts, amps, frequency
  - ekW, kVA, kVAR, kW-hr
  - Power factor (average, phase)
  - kW-hr, kVA-hr (total)
  - Excitation voltage and current (with Cat DVR)
- Shutdowns with common indicating light for
  - Low oil pressure
  - High coolant temp
  - Failure to start (overcrank)
  - Low coolant level
  - Overspeed
  - High oil temp
  - Emergency stop

EMCP 4.2 Generator Protective Relaying

- Generator phase sequence
- Over/under voltage (27/59)
- Over/under frequency (81 O/U)
- Reverse power (kW) (32)
- Reverse reactive power (kVAR) (32RV)
- Over current (50/51)

*N/A for 600V

Distribution Panel

- Separate load and control sections
- Access using a hinged padlock-able door
- Main busbar with hinged cover door with a clear Plexiglas window
- Customer convenience power receptacles protected by miniature circuit breaker:
  1 – 240V, 50A California-style twist lock
  1 – 240V, 20A twist lock
  2 – 120V, 20A ground fault interrupters
  2 – 120V, 15A duplex receptacles with GFI

Circuit Breaker

- Includes DC shunt trip coil activated on any monitored engine or electrical fault
- 100 KA-interrupting capacity at 480 VAC
- Undervoltage release
- 1600A fixed type, 3 poles, generator set mounted*
- 600A fixed type 3 poles, generator set mounted (600 V only)

Link Board Assembly*

- High/low voltage output reconnection via movable link board
- Includes switch providing voltage setting input to the EMCP 4.2 for automatic set point configuration

Ratings Definitions and Condition

Meets or Exceeds International Specifications: CSA 22.0 No. 100, IEC60034-22, ISO3046, ISO8528, NEMA MG1-22, NEMA MG1-16, UL1004B, NEC,CEC, 2006/42/EEC, 2006/95/EC, 2004/108/EC, 2000/EC/14, UL142, Ulc601, IBC CGSB43, API 546, EGSA 101P, IEEE 43, DEFRA, UL1741, NFPA 99/110, OSHA, 97/68/EC, BS4999, BS5000, IEC60034-5.

Fuel Rates are based on fuel oil of 35° API [16°C (60°F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29°C (85°F) and weighing 838.9 g/liter (7.001 lb/U.S. gal).

Additional ratings may be available for specific customer requirements, contact your Caterpillar representative for details. For information regarding low sulfur fuel and biodiesel capability, consult your Cat dealer.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions.

Standby – Applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The generator on the generator set is peak prime rated (as defined in ISO8528 at 30°C (86°F).

Prime – Applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation on the annual hours of operation and the generator can supply 10% overload power.

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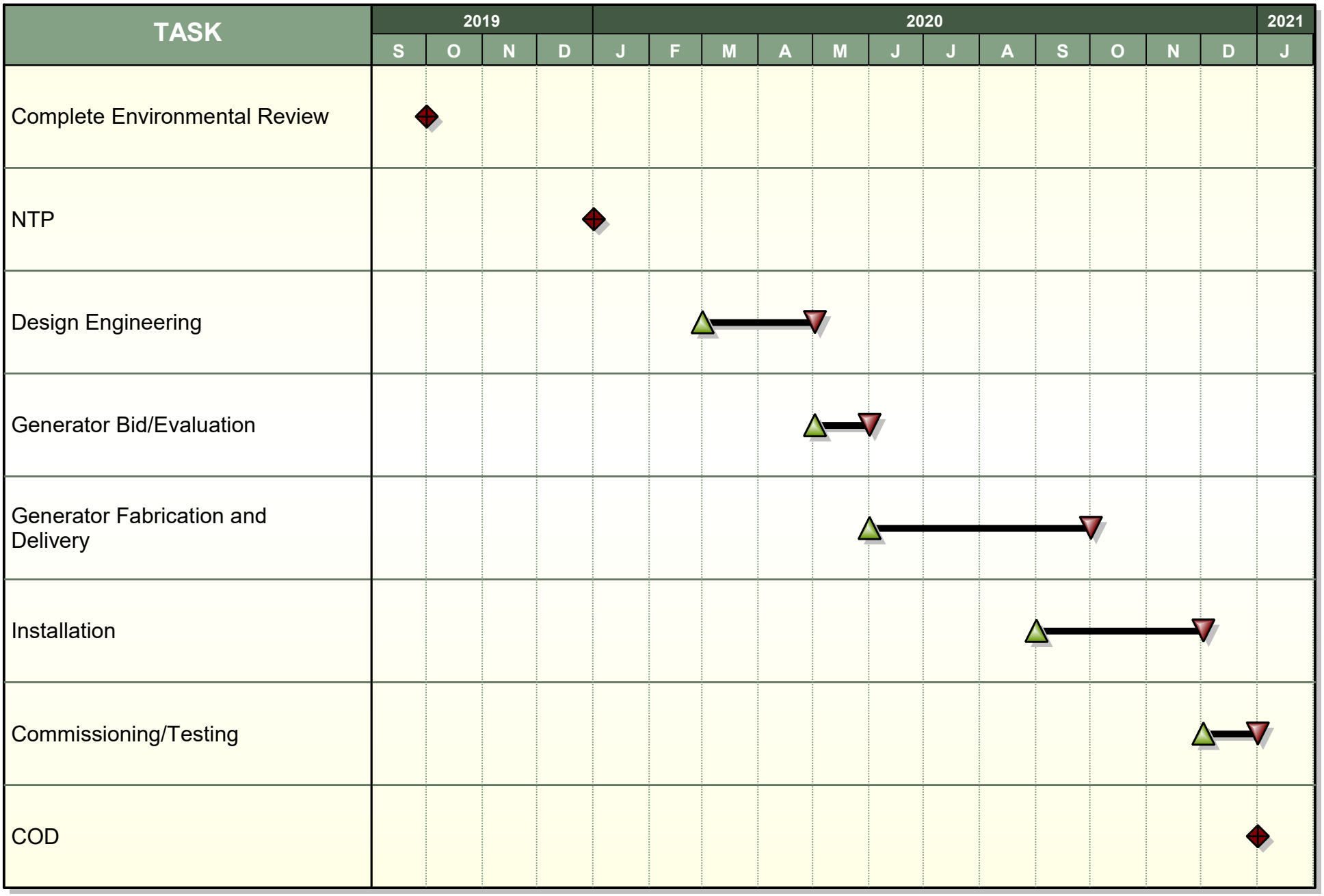
APPENDIX 5D

- Project Implementation Preliminary Schedule

Hunts Point - Mobile Diesel Generator
Preliminary Schedule

8/13/18



PART 6 – BATTERY STORAGE AND SOLAR PV AT MIDDLE SCHOOL 424

1 Overview

The proposed on-site generation components for Middle School 424 (MS 424) will include a solar photovoltaic (PV) system and an energy storage system (ESS). Together, the two components will provide sustainable backup power to critical loads during emergency conditions. These components will also offset electrical consumption from the utility grid by maximizing solar PV production on the upper and lower roof space. A general arrangement drawing for the solar PV system and ESS is provided in Appendix 6A.

The ESS consists of a bank of grid-tied batteries that are capable of charging and discharging energy based on the power requirements of the building or the utility grid. For resiliency applications, an ESS can enable other on-site generation technologies, such as solar PV, to provide backup power to critical loads. Due to its intermittent nature, solar PV must be coupled with ESS or another voltage-source technology to operate when fully disconnected from the utility grid in islanded mode, while supplying critical building loads. Additionally, an ESS can be deployed to reduce the building's peak power demand in order to generate savings, also known as peak shaving.

The solar PV system at MS 424 will be a 450 kW ballasted system. The system will be equipped with module level power electronics in order to maximize production and minimize operation and maintenance costs. The components of the system will be shipped to the site from the various suppliers and will require onsite assembly.

The ESS at MS 424 will be a lithium-ion (Li-ion) battery, containerized solution. The system will be capable of up to 125 kW of power output and will have at least 274 kWh of storage. The ESS will be shipped to site pre-assembled inside an enclosure (container) and set on a foundation.

The ESS will be grid-connected and capable of separately feeding a new critical electrical load panel installed in the existing electrical room of MS 424. This will allow for the critical loads to be powered during a power outage and will enable peak shaving during day-to-day operation. The ESS will have the capability to initiate a voltage supply during a black out scenario, allowing the solar PV system to continue functioning and provide power to the critical loads of MS 424 during a utility outage.

2 Project Specific Design Criteria

2.1 Meteorological Data (Ambient Conditions)

Refer to Part 1, Section 3.5 for site ambient conditions.

2.2 Flood Risk Reduction

The grade elevation at MS 424 is approximately 43.7 feet NAVD 88, which is outside the 500-year floodplain. Therefore, no design provisions for flood risk reduction are required at MS 424.

2.3 Structural Design Criteria

The roof of MS 424 is composed of 5-inch and 10.5-inch thick concrete slabs. The structural drawings for the roof indicate that the original design live and snow load for the building is 30 pounds per square foot (psf). The current live and snow loading criteria based on the New York City Building Code Sections 1607 and 1608 is 23 psf. Based on this assessment, the existing roof has seven psf of allowable reserve load capacity to support the proposed solar PV installation.

The expected average load increase for the roof will be approximately six psf. This is within the allowable reserve load capacity; however, it is critical that the installation contractor properly distribute the weight of the solar PV system to minimize excessive point loads.

The ESS, with an estimated weight of 2,150 pounds will be located on grade near the MS 424 building. Grade installation of the ESS will require a flat slab concrete foundation designed to withstand the weight of the ESS. The ESS installation will also include fire walls with a minimum one-hour fire protection rating as a safety barrier to the playground area and the school building. The need and design for the fire walls will be further clarified during detailed design with the FDNY, NFPA, and/or the applicable insurance company.

The system will require an externally installed transformer to convert the 480 volt operating voltage of the battery/inverter equipment to the school distribution system voltage of 208 volts. This transformer will be installed on a flat slab concrete foundation next to the ESS. The area where the ESS and transformer will be located will also be secured by a chain link perimeter fence.

2.4 Electric Load Data/Requirements

MS 424 consumes approximately 1,325 MWh of electricity annually. This consumption is based on monthly billing data for MS 424 provided by the New York City Department of Citywide Administrative Services (DCAS) for fiscal years 2010 through 2018.

A review of interval data, utility usage information, and discussions with MS 424 staff personnel identified a minimum useful ESS power output capacity of approximately 75 kW. This output capacity is needed to provide power to key critical loads identified by MS 424 facility personnel and shown in Table 6-1. The critical load panel will provide

power to the elevator control panel, exit lighting panel, cafeteria LP-CL panel, Refrigeration PP-K panel, Kitchen PP-K panel, and the 24 hour panel. The ESS requires approximately 255 kWh to provide power to these loads for eight hours. The sizing load will be confirmed through additional measurements during final design.

Table 6-1. Critical Load Data

Critical Loads	Basis	Quantity	Load (kW)	Assumed Operating Time in 8 Hours (Hrs)	Required Energy Storage Capacity (kWh)
24 Hour Panel	Assumed power consumption	1	6	8	48
Refrigeration Panel	Assumed power consumption	1	8.6	8	68.8
Kitchen Power Panel	Assumed power consumption	1	8.6	8	68.8
Cafeteria Lighting Panel	Power draw taken from power riser drawing	1	4.2	8	33.6
Exit Lighting Panel	Power draw taken from power riser drawing	1	1.8	8	14.4
Elevator Control Panel	Assumed power consumption	1	45	0.5	22.5
		TOTAL	**74**		**256**

2.5 Grid Interconnection Requirements/Electrical Configuration

The solar PV system and ESS will connect to the existing power system via the main distribution panel (MDP). Additionally, a portion of the solar PV system will function with the ESS to deliver power to a newly installed standby panel, labeled SDP1, to provide resilient energy to the critical loads. The power from the solar PV system not delivered to SDP1 will be supplied directly to the MDP to offset the need for electrical consumption from the utility. The one-line diagram in Appendix 6B shows the associated power delivery configuration.

During normal, grid parallel operation, power from eight 33.3 kW inverters will be collected in an AC combiner panel located on the south side of the lower rooftop. Power will flow back to the MDP depending on electrical consumption of the critical loads. If the solar power production exceeds the building loads, any excess power will flow to the utility grid as export power. The ability to export power will be confirmed during detailed design via the Con Edison Coordinated Electric System Interconnection Review (CESIR). The ESS can also feed the other loads in MS 424 to reduce peak demand, as shown on the one-line diagram in Appendix 6B.

Grid-connected inverters (both ESS and solar PV) will be IEEE 1547 compliant, providing utility protection and anti-islanding functions as required for parallel operation with the utility grid. The design of the inverters will include all required protection features and functionality typical of that included in a traditional grid protection relay. The complete design will meet Con Edison interconnection requirements as documented in EO-2115.

The new panel SDP1 and three solar PV inverters will be connected to load port terminals on the ESS as shown on the one-line diagram. This arrangement allows for the standby panel SDP1 to normally draw power from the utility at night or if the solar PV system is non-operational, while still allowing for backup power generation by a portion of the solar PV system and ESS when utility grid power is unavailable.

During a utility power outage, the battery inverter will detect the loss of voltage on the utility side of the inverter and shut down. As a result, the solar PV inverters will also shut down. An internal contactor in the ESS will open, disconnecting SDP1 from the grid. After a 10-second time delay, the battery inverter will restart and power will begin flowing through the alternate connection to the panel SDP1. When the solar PV inverters detect this voltage source, they will switch back on. After 300 seconds they will begin powering critical loads in the SDP1 panel if sufficient solar irradiation is available. This time delay is a standard allocation in accordance with IEEE 1547. Figure 6-1 shows the details of the internal wiring of the battery inverter.

SDP1 may be manually disconnected form the utility by opening the utility supply breaker feeding the ESS at the AC Combiner Panel.

3 ESS and Solar PV Characteristics

3.1 Site Plan

The solar PV system will utilize both the upper and lower rooftop areas of MS 424. The modules will be located in accordance with New York City Building Code and will be arranged to allow access to all mechanical equipment. The inverters and combiner panels will be located on the southern edge of the lower roof. This part of the lower roof will be shaded most of the time by the upper roof and is not an ideal location for solar PV panel power production, so this is a good location for the inverter and panels. Figure 6-2 and Figure 6-3 provide pictures of the upper and lower rooftop with existing obstructions. Figure 6-4 illustrates the solar PV arrangement with the approximate location of the various rooftop system components.

Figure 6-1. Internal Wiring of Battery Inverter

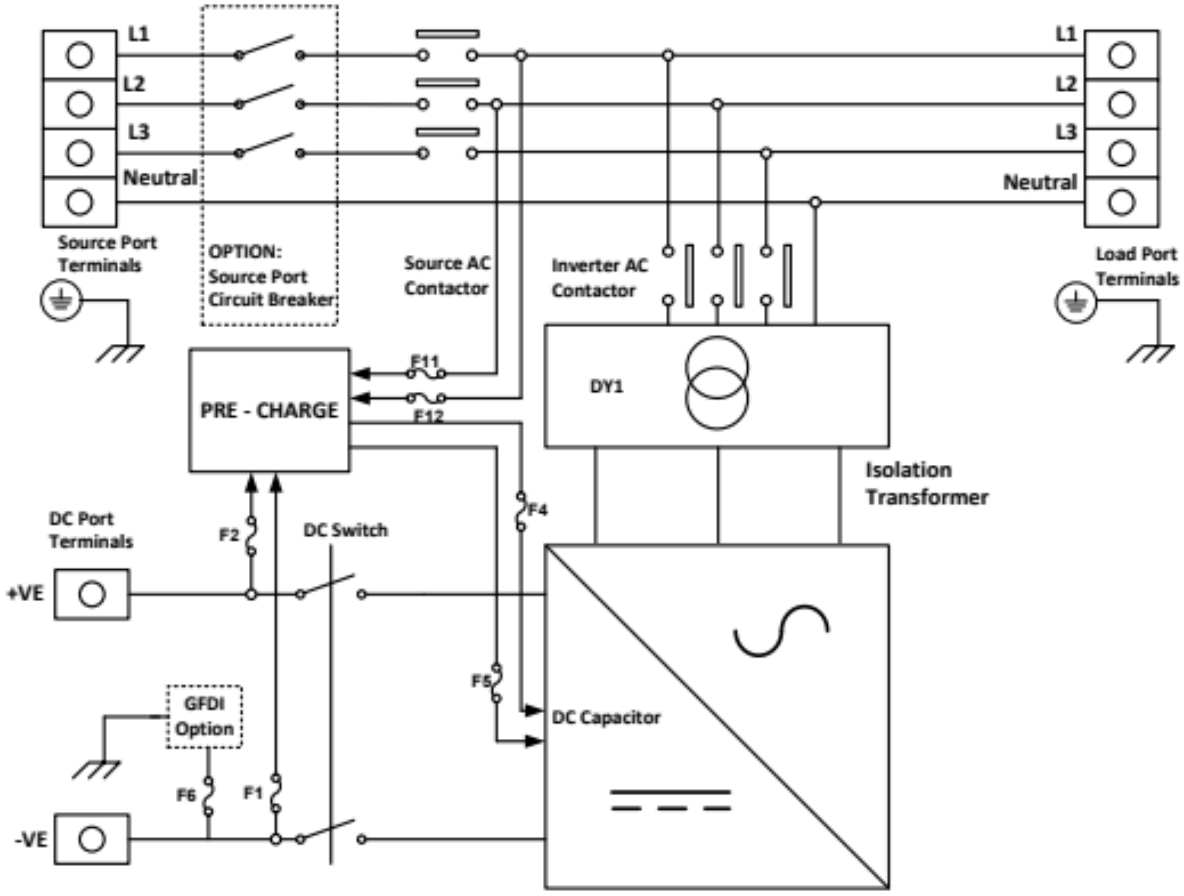
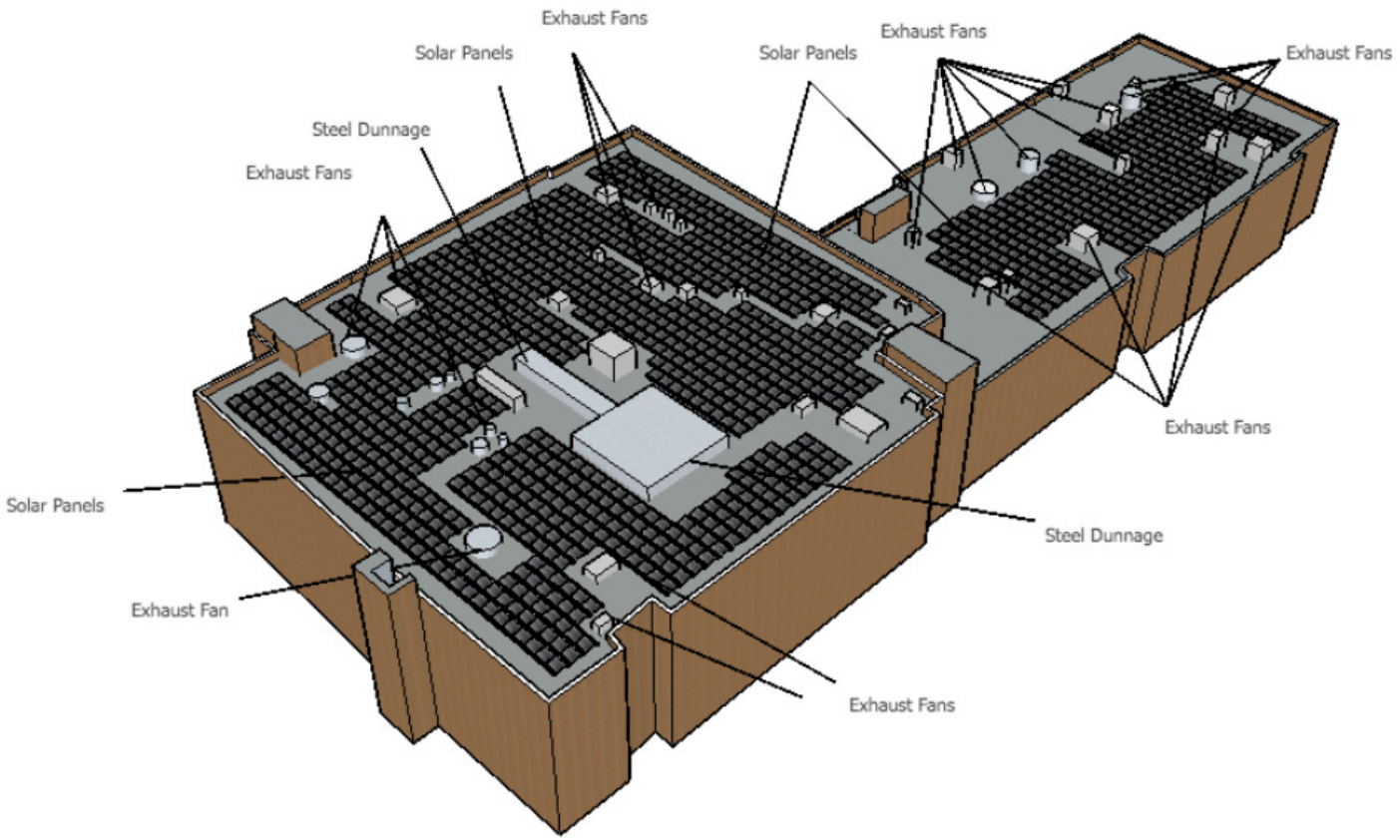


Figure 6-2. MS424 Upper Rooftop

Figure 6-3.MS424 Lower Rooftop

Figure 6-4. Proposed Rooftop Solar PV System Layout

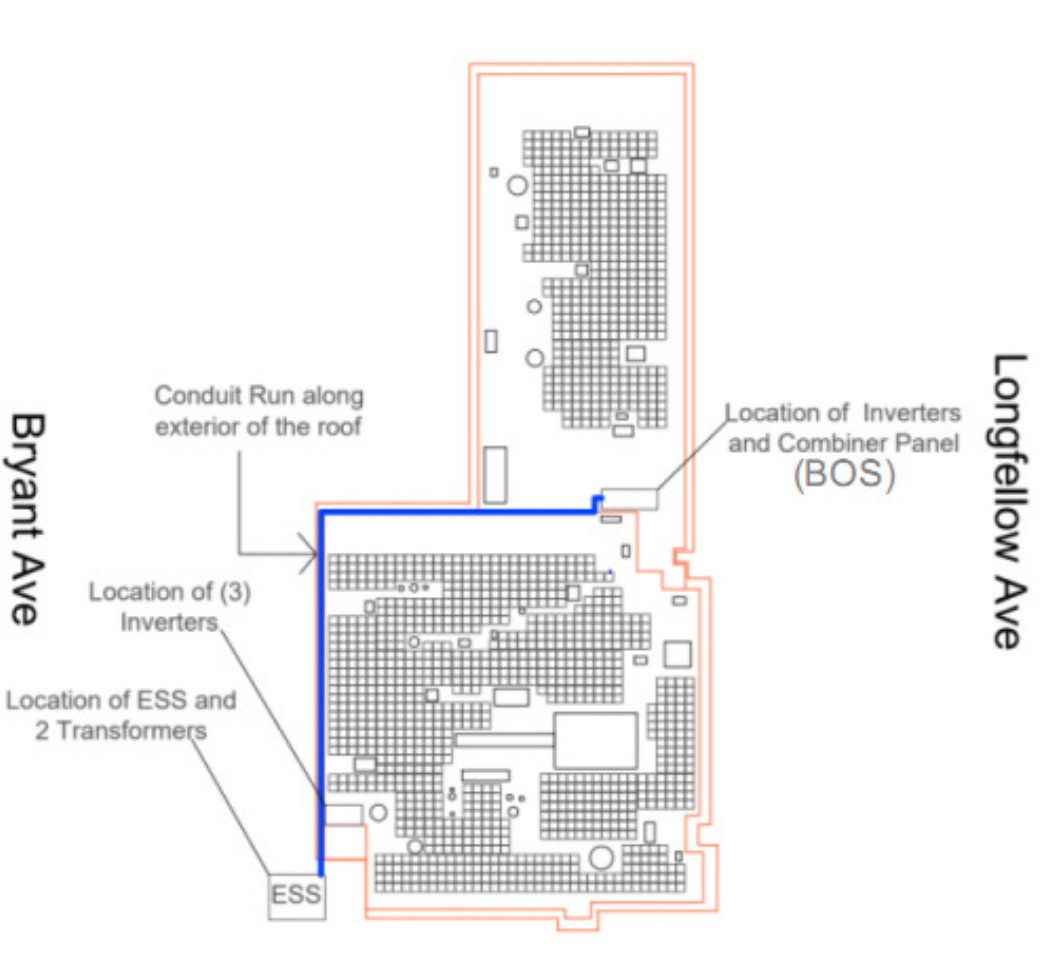


A solar PV energy system calculator (PVWatts) was used to estimate the production of the 450 kW for the rooftop solar PV system. The calculator assesses module type, racking type, tilt angle, azimuth angle and system losses (soiling, shading, snow, wire inefficiencies, degradation) to properly estimate annual power production. The estimated annual solar PV power production for the proposed 450 kW system is 545 MWh.

The proposed locations for the ESS are outdoors, within one of the grass-covered areas of the school property perimeter, as shown in Figure 6-5. The final location of the ESS will receive approval from FDNY. These onsite locations were chosen for ease of access for operations personnel and first responders and for close proximity to the building electrical room. Conduit containing electrical cables will need to be installed between the lower rooftop, ESS location, and the main electrical room. Conduit will be installed along the western wall from the ESS to the inverters and AC combiner panel, labeled balance of system (BOS) in Figure 6-6 (with the ESS shown on the Bryant Avenue side of MS 424). Conduit will extend to the electrical room as shown in the general arrangement drawing in Appendix 6A. It will be the responsibility of the installation contractor to identify appropriate locations for the electrical panels. A standard 8 foot tall chain link fence with top barbed wire guard will be required to surround the perimeter of the ESS.

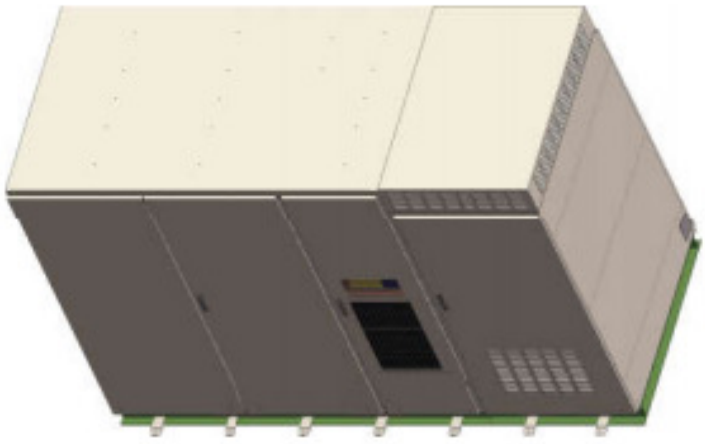
Figure 6-5. Potential Energy Storage System Locations

Figure 6-6. Solar PV/ESS System Layout



A representative ESS container is 12.1 feet wide, 8 feet tall, and 4.9 feet long. A three dimensional image of the ESS container is shown in Figure 6-7 below:

Figure 6-7. ESS Container Dimensions



A site arrangement plan drawing of MS 424 showing the rooftop solar PV system and ESS locations is included in Appendix 6A.

3.2 Energy Storage Technology Options Screening

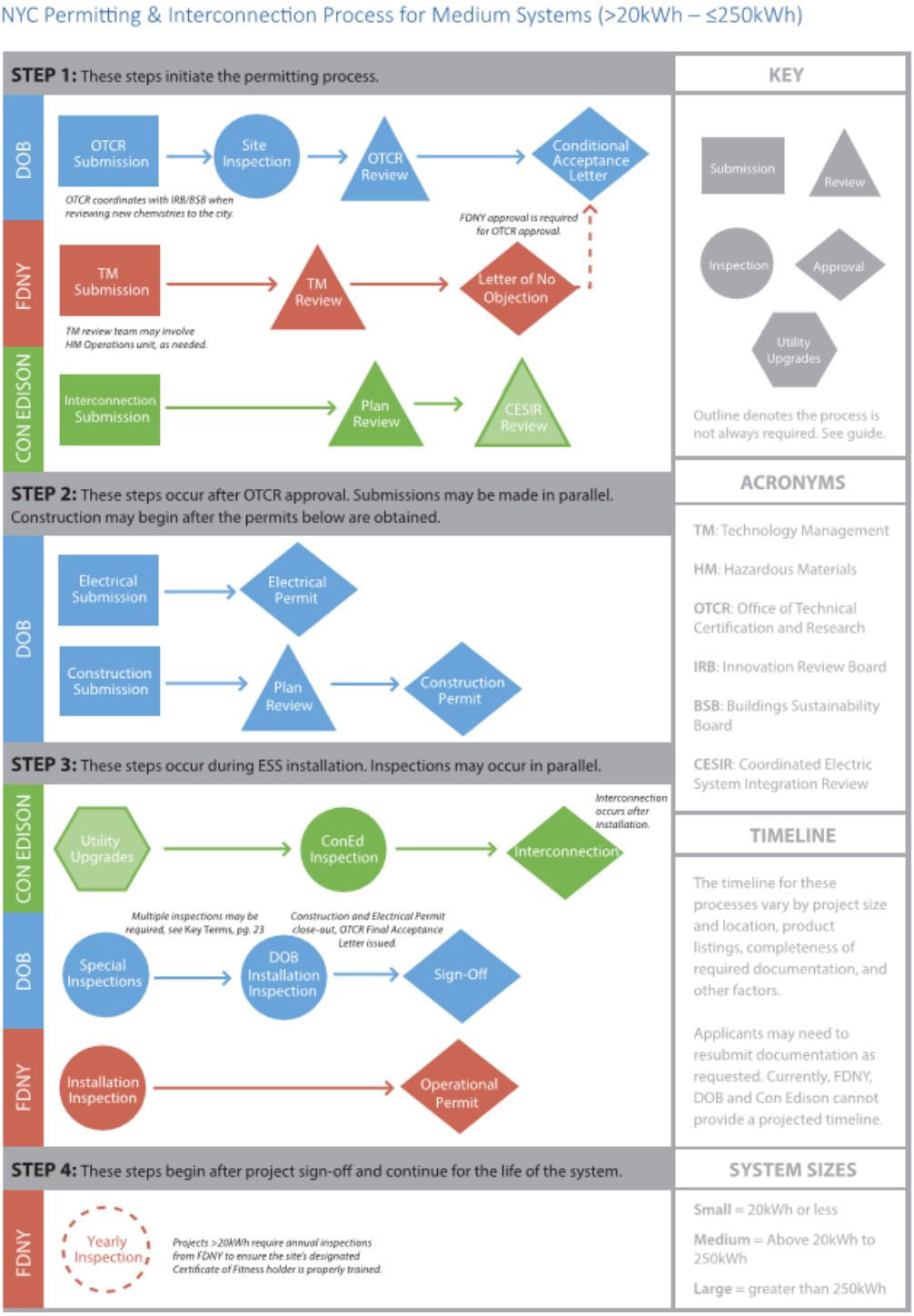
In New York City, the regulatory environment for energy storage dictates the equipment and battery chemistry selection. In particular, the FDNY has a stringent review process, which poses significant project risk for battery technologies that have not been previously approved. The same holds true for battery configurations and vendors which have not been previously approved, even if they offer a product with previously-approved battery chemistry. In New York City, only valve regulated lead acid (VRLA), Li-ion, and vanadium redox flow batteries have successfully obtained FDNY letters of no objection for energy storage applications. It is worth noting that the vendor that previously obtained the approval for a vanadium redox project did not complete this project; therefore, to minimize risk for this project, only VRLA and Li-ion chemistries are recommended. The permitting process for energy storage systems can take anywhere from 6 months to a year. This process includes a review by the FDNY and the Office of Technical Certification and Research (OTCR). The ESS will also require a review by the Public Design Commission (PDC). Figure 6-8 details the New York City permitting and interconnection process for medium systems up to 250 kW.

Table 6-2 provides a high-level comparison between the two viable battery chemistry options. Note that this table is representative of battery chemistry and does not take into account product-specific details which can have a large impact on performance, cost, etc. All values are approximated and costs represent only those associated with the supply of the BESS equipment.

Li-ion battery technology was selected for this project given the significant energy density and performance advantages it offers over VRLA. Even though Li-ion technology is currently more expensive per kWh than VRLA, the project as a whole is more cost-effective by utilizing Li-ion batteries, as there would be fewer project siting costs, a smaller footprint required, and reduced maintenance and battery replacement costs.

When comparing VLRA and Li-ion battery technologies, it is important to ensure that the usable energy reflects the differences in depth of discharge and relative efficiency losses between the technologies so that the comparison reflects systems that can satisfy an equivalent energy demand.

Figure 6-8. Interconnection Process for Energy Storage Systems in New York City[1]



[1] The Smart Distributed Generation (DG) Hub, established by Sustainable CUNY of the City University of New York in 2013, published the *Storage System Permitting and Interconnection Process for New York City Lithium-Ion Outdoor Systems* guidance document in April 2018. The work of the DG Hub is supported by the U.S. Department of Energy, the New York State Energy Research & Development Authority (NYSERDA), the New York Power Authority (NYPA) and the City of New York.

Table 6-2. High-Level Comparison of Battery Storage Options

Feature	VRLA	Li-ion
Nameplate Capacity*	440 kWh	274 kWh
Depth of Discharge**	50%	80%
Usable Battery Energy***	220 kWh	220 kWh
	36,000 lbs	5,000 lbs
Footprint without Enclosure	50 square feet	15 square feet
Approximate Cost****	$225,000	$270,000
Warranty Term	5 to 10 years	10 year minimum

* Due to the lower depth of discharge for VRLA batteries the nameplate capacity of a VRLA battery will be significantly larger than a Li-ion solution in order to achieve the same amount of usable energy.

**Depth of discharge refers to the percent of battery capacity discharged during a typical battery use event. Increased depths of discharge will shorten the battery life.

***Usable battery energy refers to the amount of energy that is required to run the critical loads for 8 hours. The nameplate capacity may need to be higher due to ESS-specific factors such as rated Depth of Discharge, efficiency losses, etc.

****The cost of Li-ion batteries has trended downward for the past few years, and is expected to continue dropping in the future. However, the availability of Li-ion batteries at the moment of purchase can significantly affect pricing. The cost of VRLA batteries has not declined over the past few years.

3.3 ESS Performance

Table 6-3 summarizes typical performance of the ESS at MS 424. Manufacturer data sheets are included in Appendix 6C.

Table 6-3. ESS Performance

Parameter	Performance
Maximum Electrical Output (kW)	125
Electrical Storage Capacity (kWh)	274
Round Trip Efficiency (including transformer and ESS losses)	83%

3.4 Solar PV Performance

The solar PV system is designed to achieve maximum production based on available roof area. To satisfy the project goal of maximizing efficiency, high efficiency solar PV modules, power optimizers, and a high efficiency inverter were selected for the design. A traditional 60-cell module is approximately 39 inches wide and 65 inches tall. The 96-cell, 360-W, high efficiency solar modules used in this design are approximately 41 inches wide and 61 inches tall. This size allows for additional modules to be installed and more flexibility during design and installation. A typical, commercially available solar PV module is between 17 and 18 percent efficient and has a degradation rate of 1.0 percent per year. The modules selected for this project are more than 22 percent efficient and have a degradation rate of 0.25 percent per year.

Power optimizers are selected to ensure that the modules are producing the maximum amount of power possible. Power optimizers are a very high efficiency single-stage

DC-to-DC converter. The DC-to-DC converter boosts the module output current and decreases the voltage. The higher output current results in a higher conversion efficiency of the output from the solar PV panels. The optimizers will be located in close proximity to the modules, generally mounted on the underside of the module. The power optimizers provide module level monitoring and a number of safety related functions. In addition to the optimizers, maximum power point tracking ensures that the solar PV system is producing optimal power at all conditions, by operating at the most efficient voltage with partial shading loss mitigation over a wide range of irradiance levels. The power optimizer inverter combination also allows for greater energy production in more shaded areas than other types of inverters.

The design utilizes three phase 480 V inverters in order to minimize the number and cost of inverters that are required and reduce the size of conductors where possible.

4 Electrical Systems and Equipment

The electrical system will be designed and built based on applicable codes and standards to provide reliability in support of the solar PV and ESS service, personnel and equipment safety, ease of maintenance and operation, and maximum interchangeability of equipment. The major electrical system components and their mutual relationships to each other are shown on the one-line diagram in Appendix 6B.

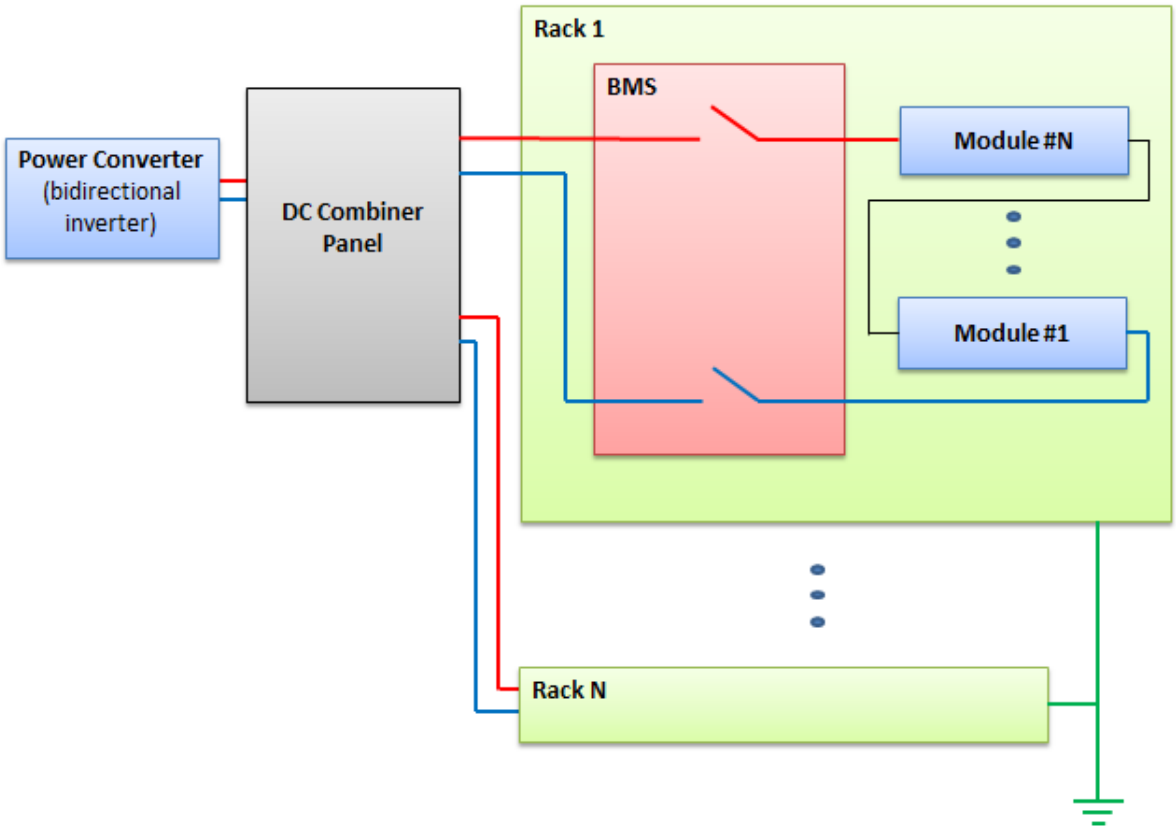
4.1 Equipment

The following major pieces of equipment are included as part of the ESS:

- Li-ion battery racks including battery cells, battery modules, battery racking structure, battery protection unit, battery management systems, and a protective relay
- Bidirectional inverter
- Step down transformer for critical loads
- Bidirectional transformer for battery connection to MDP
- AC combiner panel
- Critical load panel.

Figure 6-9 below shows a typical battery system architecture for an ESS.

Figure 6-9. Battery System Architecture



4.2 Electrical Protection, Monitoring, and Controls

Protective Relaying

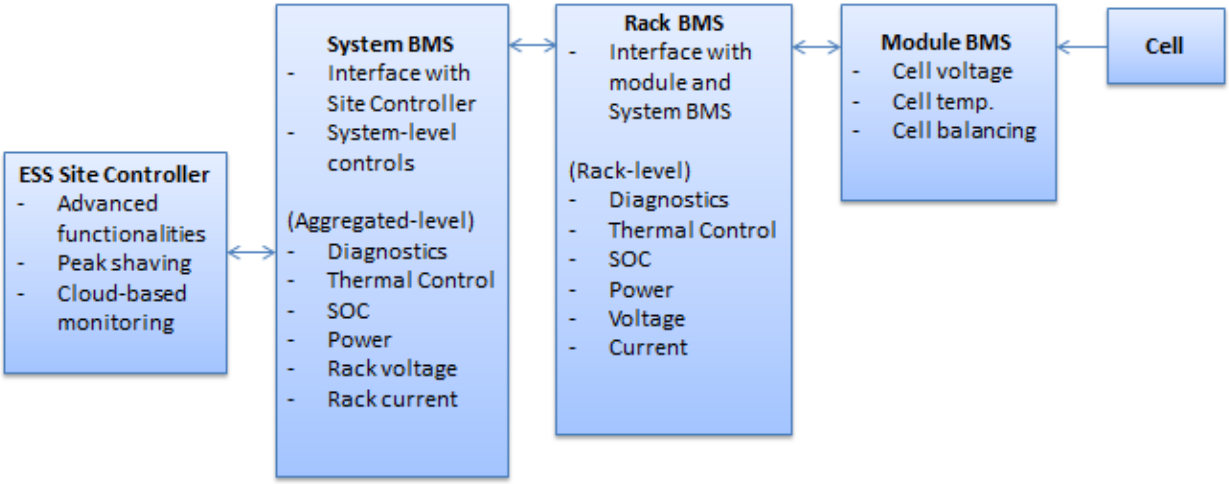
Each inverter will constantly monitor the incoming utility feeder's voltage and frequency and will provide all required utility protections as identified in Con Edison Specification EO-2115. This feature will protect any utility workers that may need to repair or troubleshoot damage to line-side equipment during an emergency.

Upon loss of power, the utility protection functions incorporated in the inverter will open a contactor and disconnect the utility from the ESS and solar PV system at MS 424.

Battery Monitoring System

The battery rack contains multiple monitoring units that allow the system to work safely, within manufacturer-specified operating parameters. Figure 6-10 is a representation of the different battery monitoring system (BMS) units and their relative hierarchy.

Figure 6-10. BMS Components



Thermal management is handled by the BMS. It protects the battery from over-temperature and thermal runaway conditions by tripping the battery disconnect on each module if the maximum temperature is exceeded. Individual sensors are attached to each cell and connected in series to the main unit.

The system will be installed with a site controller which provides supervisory controls and monitoring, as well as cloud-based data management and internet-enabled operational capabilities. The site controller allows the system to perform the desired peak shaving functionality. In the hierarchy shown in Figure 6-10 the ESS site controller is the equivalent of the energy management system. The ESS site controller is not required for resiliency functionality but is required to perform additional activities, such as peak shaving.

4.3 Transformers

Two new transformers will be used. The transformer feeding SDP1 will be a 480 V/208V 112.5 kVA transformer. The bidirectional transformer between the combiner panel and MDP will be approximately 400 kVA. Transformers will be air cooled, dry type and provided with enclosures suitable to their environment.

4.4 Cable and Conduit System

The electrical power distribution system will be designed and cable sized per NEC requirements. All circuits will be installed in conduit.

All conduits will be sized in accordance with NEC Chapter 9 requirements. Outdoor conduits will be rigid aluminum conduit while electric metallic tubing conduit will suffice for indoor installations. Schedule 40 PVC pipe will be used for buried or embedded conduit.

4.5 Grounding Protection

Electrical equipment and systems will be grounded and bonded in accordance with NEC requirements. The ground fault return path will be either through a copper grounding equipment conductor, the metal conduit and/or the metal tray system between power source and load. Any discontinuities will be bonded with an appropriately-sized copper conductor. Outdoor equipment will be provided with two connections to the existing site grounding electrode. The ESS enclosure will be provided with a ground ring that is connected to the existing site grounding electrode.

4.6 Enclosures and Hazardous Area Classifications

The ESS will be enclosed in a NEMA 3R rated enclosure. The enclosure is constructed for indoor or outdoor use and provides a degree of protection to personnel against access to hazardous parts. The enclosure will also provide a degree of protection for the equipment inside the enclosure against ingress of solid objects and water.

Outdoor enclosures will be provided with lockable door handles and tamper-resistant construction.

4.7 Electrical System Studies

Due to the size of the solar PV system and ESS, a Coordinated Electric System Interconnection Review (CESIR) is required to assess costs for any upgrades that Con Edison deems necessary. Additional electrical system studies will be performed during detailed design engineering to finalize equipment ratings. CESIR is required for any combined system size of distributed generation that is over 50 kW in Con Edison's service territory. Both the solar and ESS technologies to be used at this site will trigger the CESIR study. For more information, refer to Con Edison's standardized interconnection requirements.

4.8 Mechanical Systems and Equipment

The solar PV system will utilize a ballasted racking system to tilt the solar PV modules at 5 degrees from horizontal. The ballasted system should be hot dip galvanized or aluminum to protect against corrosion. This ballasted system will be weighted by ballast blocks and will not require any mechanical attachments to the roof deck. This will simplify the installation for the contractor, will decrease the amount of time that the contractor will need to be onsite and avoid complications from roof penetrations.

The ballasted system will be designed to withstand a wind load calculated based on New York City Building Code Section 1609. The ballasted system will also be designed to withstand an ice loading and wind plus ice loading according to ASCE 7-16 Chapter 10. The specific structural design criteria are included in Section 3.6 of Part 1 of this DBD.

5 Instrumentation and Control Systems and Equipment

5.1 General Requirements

The instrumentation and control equipment associated with the ESS and solar PV equipment will be the inverter supplier's standard equipment. The containerized ESS will operate without the installation of additional instrumentation and controls. External controls, such as a site controller may be added in the future to fine tune the peak shaving functionality of the system, but are not a requirement of this design. As such, all controls will be located within equipment enclosures.

The main control equipment for the ESS are the site controller and the BMS that are described in Section 4.2 above.

Inverters will be provided with a web-based monitoring portal with inter-inverter networking and interface with the site network to be determined during detailed design. The monitoring platform will be provided and operated by the inverter manufacturer with the facility operator receiving access to the data. An automated control architecture will ensure maximum power production and provide ease of access to the real time monitoring platform. An example of a real time monitoring platform is shown in Figure 6-11.

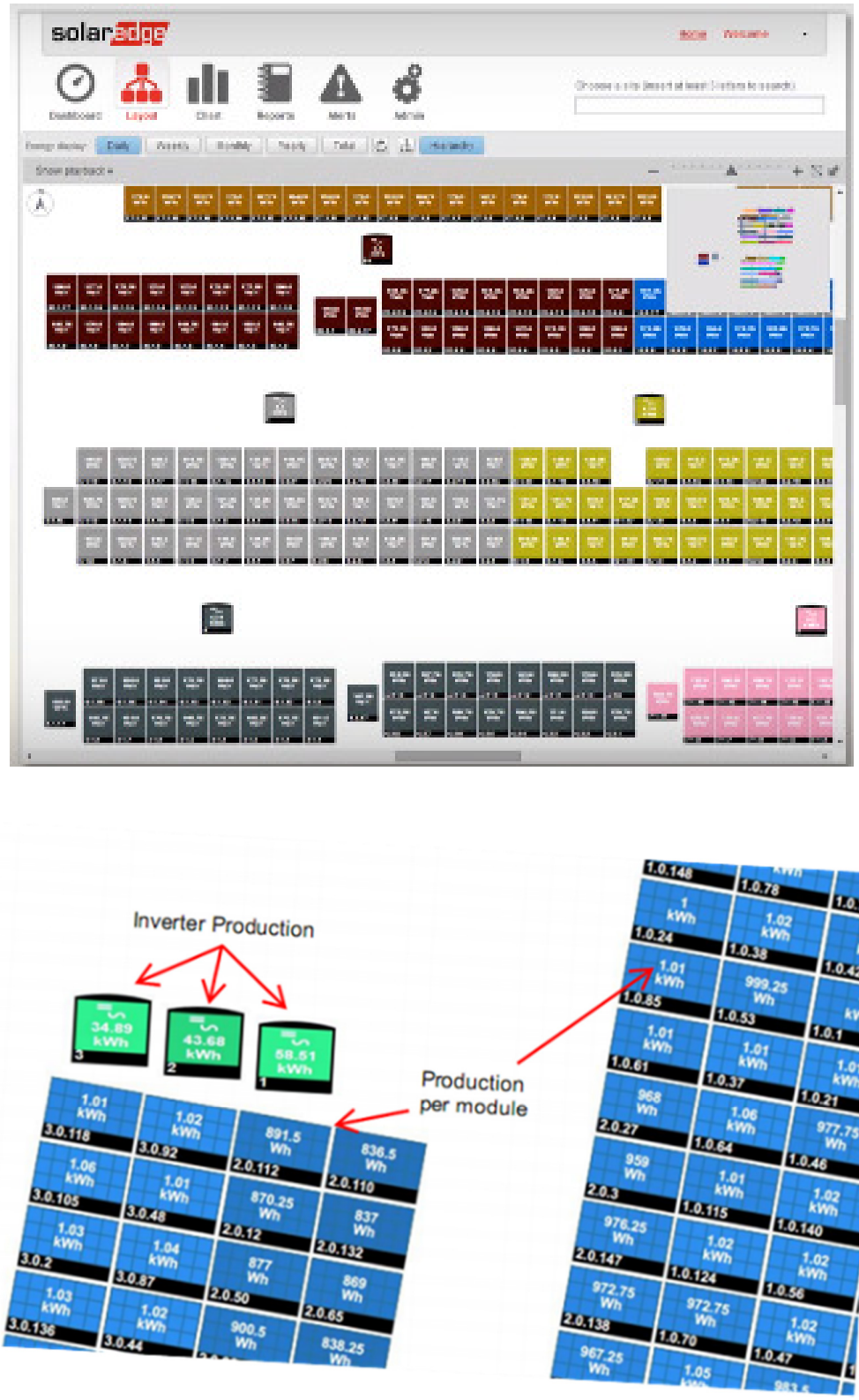
The power optimizer can isolate each PV module so that if one module that is part of a larger string goes down, the entire string is not compromised and the rest of the modules continue producing. The inverters can detect the status of each module's production based on the optimizer's data, which will provide production numbers and troubleshooting messages in real time on the monitoring platform.

5.2 Automated Sequences

The ESS has two automated modes of operation: grid tied and off grid. The ESS will automatically switch between the modes of operation upon loss of power from the utility grid.

- Grid Tied (normal operation): When grid power is available, the ESS and solar PV systems will be connected to the electric grid via a fused disconnect at the MDP within the MS 424 electrical room. This interconnection point will be used to charge the batteries and to supply power to the critical loads if there is no solar PV production. Additionally, the system will be capable of discharging power from the batteries to the grid interconnection point during peak periods to effectively reduce the peak power consumption (peak shaving).
- Off Grid (backup power event): In the case of a grid outage, the ESS system is able to automatically disconnect from the electric grid and supply power to the critical loads using stored energy in the batteries. Off Grid operation of the ESS system may also be initiated manually by opening the utility supply breaker feeding the ESS at the AC Combiner Panel.

Figure 6-11. Monitoring Platform (Top) with Close-Up of Individual Module Production (Bottom).



6 Project Constructability Considerations

The roof at MS 424 was last replaced approximately 10 years ago, and has an expected remaining life of another 10 years. The solar PV system of MS 424 will be constructed on the current roof. As discussed above, the PV panels will be supported by a ballasted racking system, so there will be no penetrations through the existing roof. In the future when the roof is replaced, the solar PV system will be disassembled and reinstalled to allow for construction of the new roof for some additional cost. During installation of the solar PV system, slip sheets should be used to protect the roof membrane from abrasion from the panel racking system. Roof maintenance fees and costs are not included in the solar PV system operating and maintenance fee estimate. The ballast system installation should not significantly impact future maintenance of the roof.

A final conduit routing between the various components will need to be determined by the installation contractor and the MS 424 facility staff to make sure that all aesthetic considerations are taken into account.

The two primary proposed locations for the ESS are located by the yard areas of MS 424 as depicted in Figure 6-5. The ESS container needs to be located at least 10 feet away from any operable windows and flammable objects to keep flammable objects away from the system. Any potentially hazardous or flammable activity that occurs in the vicinity of the battery, even if more than 10 feet away, may require the addition of fire/blast barriers by the FDNY. Additionally, any potential exposure to hazardous conditions for people in the vicinity of the battery (including children, staff, or the public on adjacent streets) will need to be mitigated with barriers. The primary hazardous condition of concern is if a fire would occur. If the batteries are located in close proximity of operable windows, nearby windows should be sealed shut. A fire and blast proof barrier should also be constructed dependent on the proximity of the ESS to the MS 424 yard area or to recreation areas, playgrounds, pathways, or stairs.

The two locations proposed are expected to cause minimal disruption to school operations. A potential other location for the ESS is the northeast corner of the lower rooftop. This location is beneficial due to the limited amount of ground space at the property and the close proximity to the solar PV system. However, additional structural reinforcement on the rooftop would likely be required. In addition, FDNY considers rooftop ESS installations a hazard to the building due to the potential for fire to spread on the roof.

There is no mechanical connection between the ESS and the solar PV system. The two systems are interconnected electrically via dedicated feeders and switchgear installed as part of this project. The two systems will be able to synchronize and interact with each other, but will operate independently. Also, as discussed in Section 2.5, a larger portion of the solar PV array on the roof will be connected to the building electrical infrastructure without the ability to interact with the ESS.

7 Operational Considerations and Costs

Operating costs for the solar PV system and ESS at MS 424 are minimal and consist mainly of remote monitoring and annual inspections. No additional onsite staff is required for operation or maintenance.

It is assumed that most of the equipment maintenance work will be outsourced. Maintenance contracts and agreements for equipment can also include an annual remote monitoring fee. The annual maintenance service contract cost is approximately $3,500 for the MS 424 solar PV system and $2,500 for the MS 424 ESS. An extended warranty, with associated operations and maintenance services managed by the equipment supplier can also be procured with the original procurement of the equipment at an estimated cost of $70,000.

8 Project Capital Costs

Inside-the-fence conceptual cost estimates were developed based on a conventional contracting strategy. The cost estimates were developed based on budgetary major equipment pricing from equipment manufacturers, prevailing wage labor rates specific to New York City, equipment quantities, layout takeoffs, and reference data from previous similar projects. The estimates do not include outside-the-fence/incremental site specific costs such as infrastructure upgrades and electric transmission infrastructure beyond that noted within this document. The project cost estimates developed for this assessment are for budgeting purposes only.

The following approach and assumptions were utilized to develop the conceptual capital cost estimates for each of the options:

- The solar PV system and ESS will be built simultaneously.
- Electric transmission system upgrade costs to be identified during the CESIR study are excluded.
- Land acquisition costs are excluded.
- Sales tax, extended warranties, and performance bond/sureties are excluded.
- Estimate assumes a March 2022 Commercial Operation Date (COD).
- Project direct costs including equipment, commodities, and construction labor are included.
- Contractor’s construction indirect costs including provisions for construction and building permits, testing, expenses, services, temporary facilities, tools, rental equipment, and other costs related to construction are included.
- Contractor’s project indirect costs including project management are included (based on previous project experience).
- Contractor’s contingency, general and administration costs (G&A), and fees which are based on observed industry trends and previous project data are included.

- Final engineering design and the associated engineering project management is included.
- Roof reinforcing or replacement costs are not included.

In addition to the Contractor's costs and design engineering costs noted above, construction management and Owner's costs are estimated at 10 percent of the installed project cost, based on typical percentages of project costs observed in the industry, and are not specific to EDC. Owner's costs typically account for the following provisions:

- Project development
- Owner's project management and oversight
- Environmental and site permitting
- Operating spares and equipment maintenance contract initiation costs (as applicable)
- Design Engineer and construction Contractor oversight
- Operations personnel (prior to COD)
- Operator training
- Startup and commissioning and performance testing.

The estimated total project capital costs for the solar PV system and ESS at MS 424 were provided to EDC. The total project cost represented an estimated installed cost for a March 2022 COD and includes the estimated Owner's costs.

9 Project Schedule

A Level I project implementation schedule was developed from initial project development to project COD, which currently is planned for March 2022. The project implementation schedule is included in Appendix 6D for reference. These implementation schedules were developed based on a review of key project milestones, construction activities, equipment lead times, permitting lead times and experience on previous/similar projects. The schedule assumes nine months to complete the permitting process with FDNY and other entities such as OTCR. However, based on recent experience, there is a risk that permitting could require a longer period of time. The permitting process timeline is subject to the discretion of FDNY and OTCR to perform the necessary reviews, resolve concerns, and approve final design.

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PART 6 APPENDICES

6A: ESS and Solar PV at Middle School 424 General Arrangement

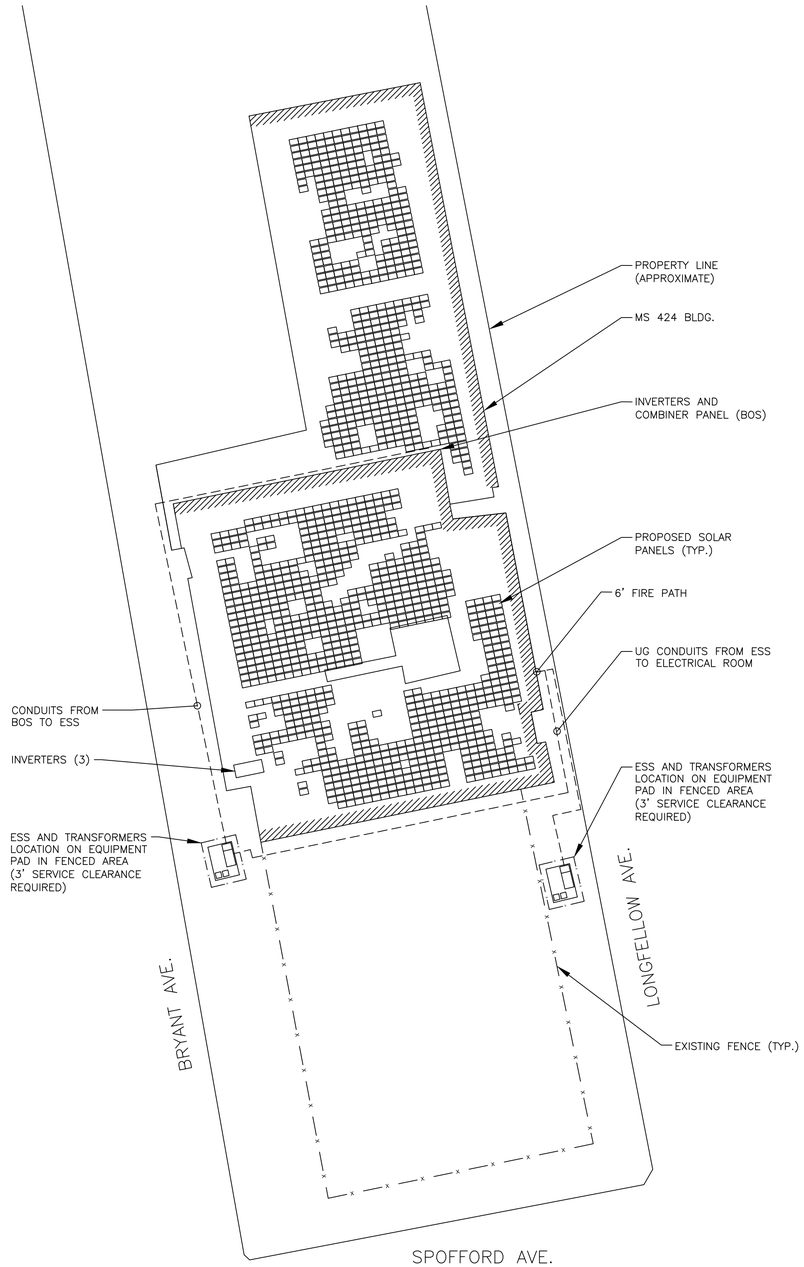
6B: Power Delivery Configuration One-line Diagram

6C: Representative Manufacturer Data Sheets

6D: Project Implementation Preliminary Schedule

APPENDIX 6A

- ESS and Solar PV at Middle School 424 General Arrangement



NOTES

1. LOCATIONS SHOWN ARE APPROXIMATE.

N

PLAN

SCALE: 1" = 40'-0"

40' 20' 0 40' 80' 120'

N

HUNTS POINT KEYPLAN

SCALE: 1" = 2000'-0"

2000' 1000' 0 2000' 4000' 6000'

ISSUE	DATE	DESCRIPTION
A	08/31/18	CLIENT REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	-
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

NYCEDC
NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY PILOT PROJECT

ESS AND SOLAR PV AT MIDDLE SCHOOL 424

GENERAL ARRANGEMENT PLAN

0 1" 2"

FILENAME 10029617_0GA_C106

SCALE AS NOTED

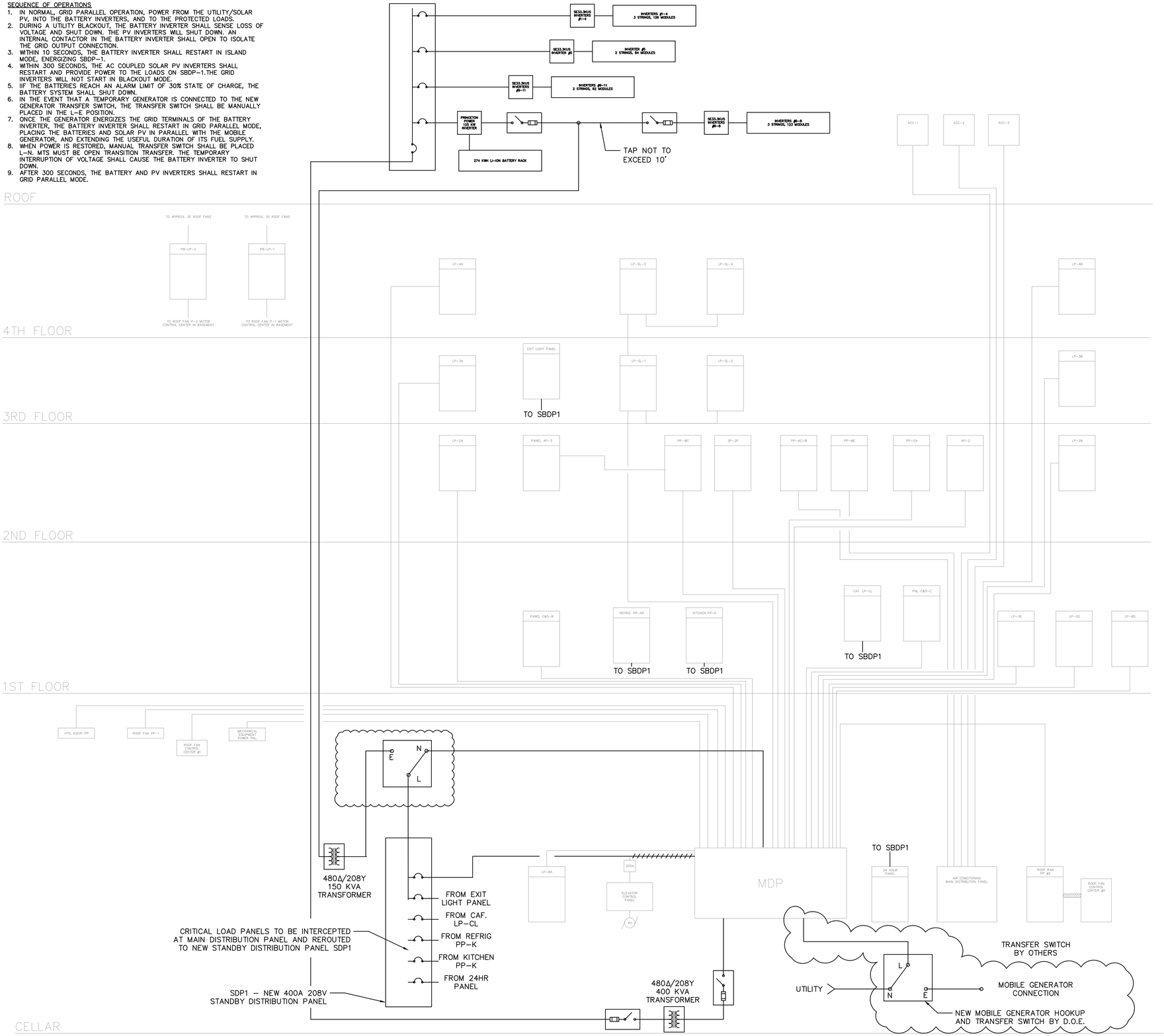
SHEET C106

APPENDIX 6B

- Power Delivery Configuration One-line Diagram

SEQUENCE OF OPERATIONS

1. IN NORMAL, GRID PARALLEL OPERATION, POWER FROM THE UTILITY/SOLAR PV, INTO THE BATTERY INVERTERS, AND TO THE PROTECTED LOADS.
2. DURING A UTILITY BLACKOUT, THE BATTERY INVERTER SHALL SENSE LOSS OF VOLTAGE AND SHUT DOWN. THE PV INVERTERS WILL SHUT DOWN. AN INTERNAL CONTACTOR IN THE BATTERY INVERTER SHALL OPEN TO ISOLATE THE GRID OUTPUT CONNECTION.
3. WITHIN 10 SECONDS, THE BATTERY INVERTER SHALL RESTART IN ISLAND MODE, ENERGIZING SBDP-1.
4. WITHIN 300 SECONDS, THE AC COUPLED SOLAR PV INVERTERS SHALL RESTART AND PROVIDE POWER TO THE LOADS ON SBDP-1.THE GRID INVERTERS WILL NOT START IN BLACKOUT MODE.
5. IIF THE BATTERIES REACH AN ALARM LIMIT OF 30% STATE OF CHARGE, THE BATTERY SYSTEM SHALL SHUT DOWN.
6. IN THE EVENT THAT A TEMPORARY GENERATOR IS CONNECTED TO THE NEW GENERATOR TRANSFER SWITCH, THE TRANSFER SWITCH SHALL BE MANUALLY PLACED IN THE L-E POSITION.
7. ONCE THE GENERATOR ENERGIZES THE GRID TERMINALS OF THE BATTERY INVERTER, THE BATTERY INVERTER SHALL RESTART IN GRID PARALLEL MODE, PLACING THE BATTERIES AND SOLAR PV IN PARALLEL WITH THE MOBILE GENERATOR, AND EXTENDING THE USEFUL DURATION OF ITS FUEL SUPPLY.
8. WHEN POWER IS RESTORED, MANUAL TRANSFER SWITCH SHALL BE PLACED L-N. MTS MUST BE OPEN TRANSITION TRANSFER. THE TEMPORARY INTERRUPTION OF VOLTAGE SHALL CAUSE THE BATTERY INVERTER TO SHUT DOWN.
9. AFTER 300 SECONDS, THE BATTERY AND PV INVERTERS SHALL RESTART IN GRID PARALLEL MODE.



BRIGHT POWER
Your Energy Management Partner
www.brightpower.com
11 Hanover Sq, 21st Floor
New York, NY 10005
tel.: (212) 803.5868

DOB STAMP & SIGNATURES

DOB SCAN

PROJECT NAME:
HUNTS POINT RESILIENCY STUDY
MS424

REV	DATE	DESCRIPTION
-	-	-
-	-	-
-	-	-
2	9-4-2018	UPDATED TO INCLUDE TRANSFER SWITCH
1	3-30-2016	ISSUED FOR REVIEW

DRAWING

SINGE LINE DIAGRAM

SEAL & SIGNATURE

PROJECT NO: PR-4293
FILE:
DRAWN BY: MB
CHECKED BY: JB
DRAWING NO.

E-101

SHEET 1 OF 1

APPENDIX 6C

- Representative Manufacturer Data Sheets

Princeton Energy Management System (PEMS-250-500)

PRINCETON POWER SYSTEMS
Clean Power Made Simple™

PEMS 250-500

1 Day Installation
Pad-Ready AC Battery System

Features

- TUV Certified to UL1741
- System Controls
- Energy Storage Bays
- Pad Cable Entry
- Side Cable Entry
- Heating & Cooling Systems

Round Trip Efficiency
True Entire System AC-AC 92%

ABOUT PRINCETON POWER SYSTEMS

Princeton Power Systems, based in New Jersey and founded in 2001, designs and manufactures state-of-the-art technology solutions for energy management, microgrid operations and electric vehicle charging. The company is a global leader working with customers and partners across North America, Europe, Africa and the Caribbean. It manufactures UL and CE-certified power electronics that are used in advanced battery operations and alternative energy, with built-in smart functions for ancillary services. The company solves power issues to allow continued growth of distributed renewable energy by providing energy storage solutions that are proven to work, even in harsh environments. Princeton Power Systems builds integrated systems and designs, commissions and operates microgrids for leading organizations, including Fortune 500 automakers and industrials, and non-profit organizations. The company proudly manufactures its products in the USA. More information about Princeton Power Systems is available at www.princetonpower.com.

ELECTRICAL

System	250 kW inverter with 500 kWh storage
Battery Chemistry	Lithium Ion
Battery Certification	UL1642, UL1973RU, UN38.3
Inverter Certification	TUV Certified to UL1741/IEEE 1547
Round-trip System Efficiency at Full Load	92%
AC Voltage	480 VAC +10%, -12%, 3-phase 3/4 wire
AC Frequency	60 Hz nominal, 59.3-60.5 Hz (per UL requirement)
Max Continuous AC Power	250 kW AC/250 KVA AC
Energy Storage Capacity measured at AC Terminals	500 kWh
3rd Party Control Interface & Protocol	TCP/RS232/RS485 Modbus

FOOTPRINT & SYSTEM CHARACTERISTICS

Enclosure	NEMA 3R
Height x Width x Depth (ft)	8.3 x 12.1 x 4.9
Weight	15,100 lbs / 6,850 kg
Operating Temperature	-20°C to 50°C / -4°F to 122°F
kWh/ft²	8.4

CONTACT US

Princeton Power Systems, Inc. | 3175 Princeton Pike, Lawrenceville, NJ 08648
Sales: +1 (609) 955-5390 | Email: sales@princetonpower.com | Web: www.princetonpower.com

INVERTERS

SolarEdge Three Phase Inverters for the 208V Grid for North America

SE9KUS / SE14.4KUS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

Three Phase Inverters for the 208V Grid[1] for North America

SE9KUS / SE14.4KUS

	SE9KUS	SE14.4KUS	
OUTPUT			
Rated AC Power Output	9000	14400	VA
Maximum AC Power Output	9000	14400	VA
AC Output Line Connections	4-wire WYE (L1-L2-L3-N) plus PE or 3 wire Delta		
AC Output Voltage Minimum-Nominal-Maximum[2] (L-N)	105-120-132.5		Vac
AC Output Voltage Minimum-Nominal-Maximum[2] (L-L)	183-208-229		Vac
AC Frequency Min-Nom-Max[2]	59.3 - 60 - 60.5		Hz
Max. Continuous Output Current (per Phase)	25	40	A
GFDI Threshold	1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes		
INPUT			
Maximum DC Power (Module STC)	12150	19400	W
Transformer-less, Ungrounded	Yes		
Maximum Input Voltage DC to Gnd	250	300	Vdc
Maximum Input Voltage DC+ to DC-	500	600	Vdc
Nominal Input Voltage DC to Gnd	200		Vdc
Nominal Input Voltage DC+ to DC-	400		Vdc
Maximum Input Current	26.5	38	Adc
Maximum Input Short Circuit Current	45		Adc
Reverse-Polarity Protection	Yes		
Ground-Fault Isolation Detection	1MΩ Sensitivity	350kΩ Sensitivity[3]	
CEC Weighted Efficiency	96.5	97	%
Night-time Power Consumption	< 3	< 4	W
ADDITIONAL FEATURES			
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional)		
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect[4]		
RS485 Surge Protection	Supplied with the inverter		
STANDARD COMPLIANCE			
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07		
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)		
Emissions	FCC part15 class B		
INSTALLATION SPECIFICATIONS			
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG	3/4" minimum / 8-4 AWG	
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG		
Number of DC inputs	2 pairs	3 pairs[5]	
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260		in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight	73.2 / 33.2	99.5 / 45	lb / kg
Weight with Safety Switch	79.7 / 36.2	106 / 48	lb / kg
Cooling	Fans (user replaceable)		
Noise	< 50	< 55	dBA
Operating Temperature Range	-40 to +140 / -40 to +60[6]		˚F / ˚C
Protection Rating	NEMA 3R		

[1] For 277/480V inverters refer to: http://www.solaredge.com/files/pdfs/products/inverters/se-three-phase-us-inverter-datasheet.pdf
[2] For other regional settings please contact SolarEdge support
[3] Where permitted by local regulations
[4] P/N SE9K-US0xxxxxx has Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)
[5] Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1
[6] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

RoHS

SunPower® X-Series Residential Solar Panels | X22-360

More than 22% Efficiency

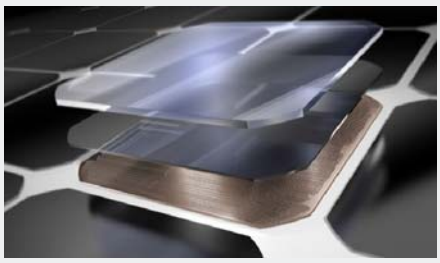
Ideal for roofs where space is at a premium or where future expansion might be needed.

Maximum Performance

Designed to deliver the most energy in demanding real-world conditions, in partial shade and hot rooftop temperatures.[1,2,4]

Premier Technology

Engineered with the newest and most powerful Maxeon technology, X-Series brings unmatched power and performance to your home.



Maxeon® Solar Cells: Fundamentally better
Engineered for performance, designed for durability.

Engineered for Peace of Mind

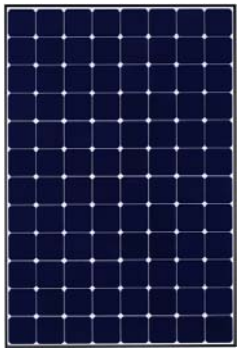
Designed to deliver consistent, trouble-free energy over a very long lifetime. [3,4]

Designed for Durability

The SunPower Maxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade conventional panels. [3]

Same excellent durability as E-Series panels.
#1 Rank in Fraunhofer durability test.[9]
100% power maintained in Atlas 25+ comprehensive durability test.[10]

High Performance & Excellent Durability



SPR-X22-360

X22 SERIES

Highest Efficiency[5]

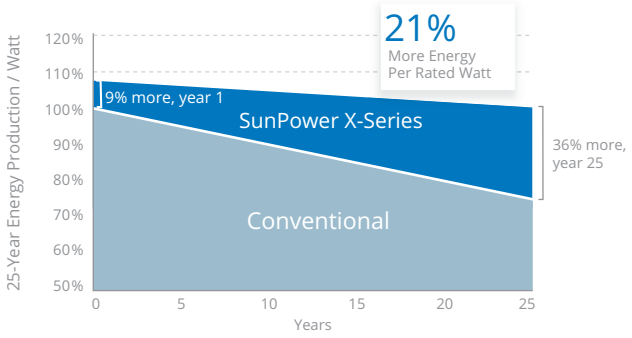
Generate more energy per square foot

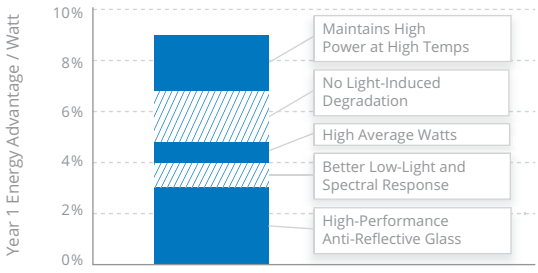
X-Series residential panels convert more sunlight to electricity by producing 38% more power per panel[1] and 70% more energy per square foot over 25 years.[1,2,3]

Highest Energy Production[6]

Produce more energy per rated watt

High year-one performance delivers 8–10% more energy per rated watt.[2] This advantage increases over time, producing 21% more energy over the first 25 years to meet your needs.[3]

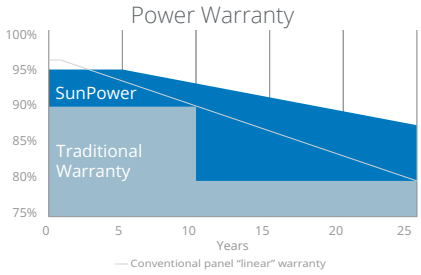




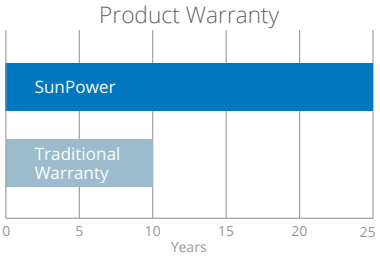
SUNPOWER®

SunPower® X-Series Residential Solar Panels | X22-360

SunPower Offers The Best Combined Power And Product Warranty



More guaranteed power: 95% for first 5 years, –0.4%/yr. to year 25 [7]

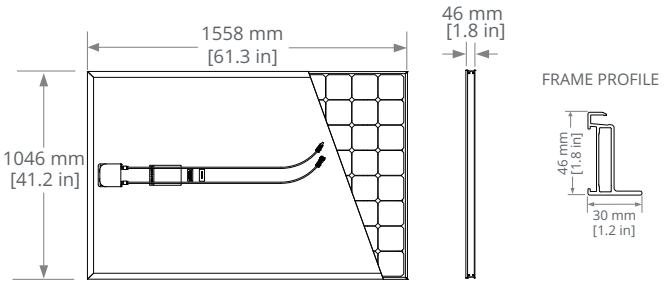


Combined Power and Product defect 25-year coverage [8]

Electrical Data	
	SPR-X22-360
Nominal Power (Pnom)[11]	360 W
Power Tolerance	+5/-0%
Avg. Panel Efficiency[12]	22.2%
Rated Voltage (Vmpp)	59.1 V
Rated Current (Impp)	6.09 A
Open-Circuit Voltage (Voc)	69.5 V
Short-Circuit Current (Isc)	6.48 A
Max. System Voltage	600 V UL & 1000 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	–0.29% / ° C
Voltage Temp Coef.	-167.4 mV / ° C
Current Temp Coef.	2.9 mA / ° C

Tests And Certifications	
Standard Tests[13]	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Certs	ISO 9001:2008, ISO 14001:2004
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, REACH SVHC-163, PV Cycle
Sustainability	Cradle to Cradle Certified™ Silver (eligible for LEED points)[14]
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	Potential-Induced Degradation free: 1000 V[9]
Available Listings	UL, TUV, JET, CEC

Operating Condition And Mechanical Data	
Temperature	–40° F to +185° F (–40° C to +85° C)
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)
Appearance	Class A+
Solar Cells	96 Monocrystalline Maxeon Gen III
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, MC4 compatible
Weight	41 lbs (18.6 kg)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m² front & back Snow: 125 psf, 6000 Pa, 611 kg/m² front
Frame	Class 1 black anodized (highest AAMA rating)



Please read the safety and installation guide.

REFERENCES:
1 All comparisons are SPR-X21-345 vs. a representative conventional panel: 250 W, approx. 1.6 m², 15.3% efficiency.
2 Typically 8–10% more energy per watt, BEW/DNV Engineering "SunPower Yield Report," Jan 2013.
3 SunPower 0.25%/yr degradation vs. 1.0%/yr conv. panel. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, Feb 2013; Jordan, Dirk "SunPower Test Report," NREL, Q1-2015.
4 "SunPower Module 40-Year Useful Life" SunPower white paper, May 2015. Useful life is 99 out of 100 panels operating at more than 70% of rated power.
5 Highest of over 3,200 silicon solar panels, Photon Module Survey, Feb 2014.
6 1% more energy than E-Series panels, 8% more energy than the average of the top 10 panel companies tested in 2012 (151 panels, 102 companies), Photon International, Feb 2013.
7 Compared with the top 15 manufacturers. SunPower Warranty Review, May 2015.
8 Some restrictions and exclusions may apply. See warranty for details.
9 X-Series same as E-Series, 5 of top 8 panel manufacturers tested in 2013 report, 3 additional panels in 2014. Ferrara, C., et al. "Fraunhofer PV Durability Initiative for Solar Modules: Part 2". Photovoltaics International, 2014.
10 Compared with the non-stress-tested control panel. X-Series same as E-Series, tested in Atlas 25+ Durability test report, Feb 2013.
11 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C). NREL calibration Standard: SOMS current, LACCS FF and Voltage.
12 Based on average of measured power values during production.
13 Type 2 fire rating per UL1703:2013, Class C fire rating per UL1703:2002.
14 See salesperson for details.

See www.sunpower.com/facts for more reference information.
For more details, see extended datasheet: www.sunpower.com/datasheets.

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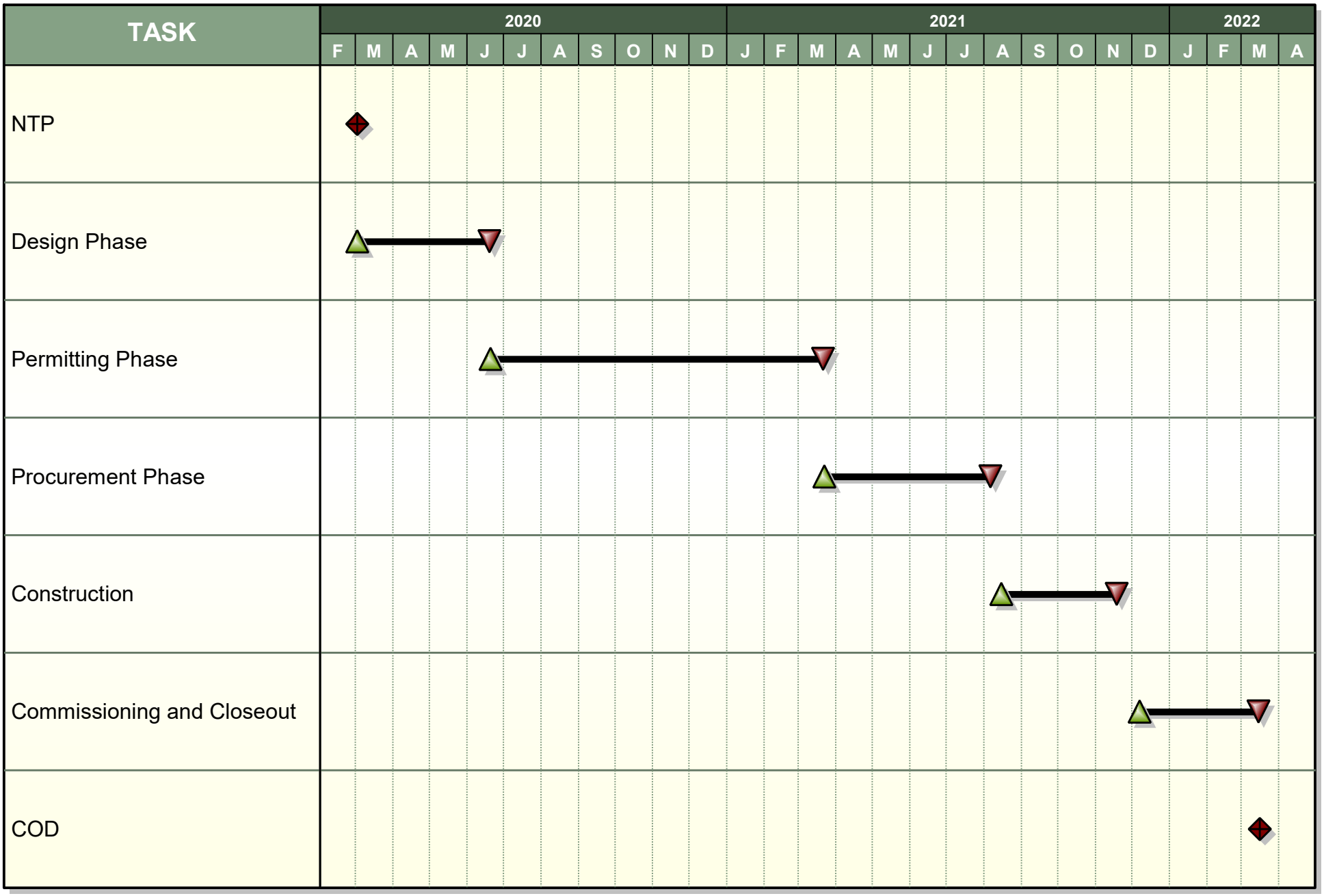
APPENDIX 6D

- Project Implementation Preliminary Schedule

Hunts Point - MS 424
Preliminary Schedule

8/13/18



PART 7 – BATTERY STORAGE AND SOLAR PV AT PUBLIC SCHOOL 48

1 Overview

The proposed on-site-generation components for Public School 48 (PS 48) will include a solar photovoltaic (PV) system and an energy storage system (ESS). Together, the two components will provide sustainable backup power to critical loads during emergency conditions. These components will also offset electrical consumption from the utility grid by maximizing solar PV production on the roof space. A general arrangement drawing for the solar PV system and ESS is provided in Appendix 7A.

The ESS consists of a bank of grid-tied batteries that are capable of charging and discharging energy based on the power requirements of the building or the grid. For resiliency applications, energy storage can enable other on-site-generation technologies, such as solar PV, to provide backup power to critical loads. Due to its intermittent nature, solar PV must be coupled with energy storage or another voltage-source technology to operate when fully disconnected from the utility grid in an islanded mode, while supplying critical building loads. Additionally, ESSs can be deployed to reduce the building's peak power demand in order to generate savings, also known as peak shaving.

The solar PV system at PS 48 will be approximately a 72 kW strut and post system. The system will be equipped with module level power electronics in order to maximize production and minimize operation and maintenance costs. The components of the system will be shipped to the site from the various suppliers and will require onsite assembly.

The ESS at PS 48 will be a lithium-ion (Li-ion) battery, containerized solution. The system will be capable of up to 125 kW power output and will have 274 kWh of storage. The ESS will be shipped to site pre-assembled inside an enclosure (container) and lifted into place. The ESS will either be sited on the roof or ground-mounted in the parking lot, per further discussion with school facility staff.

The ESS will be tied into a critical load panel and will have a line side tap on the main switchgear. This will allow for the critical loads to be powered during a power outage and will enable peak shaving during day to day operation. The ESS will have the capability to initiate a voltage supply during a black out scenario, allowing the solar PV system to continue functioning and provide power to the critical loads of PS 48 during a utility outage.

2 Project Specific Design Criteria

2.1 Meteorological Data (Ambient Conditions/Site Elevation)

Refer to Part 1, Section 3.1.1 for site ambient conditions.

2.2 Structural Design Criteria

The roof of PS 48 consists of a concrete slab supported by steel beams and columns. Based on preliminary analysis of the roof system, the existing roof structure has 10 pounds per square foot (psf) of allowable reserve load capacity to support the proposed installation. The proposed solar system will not be placed within six feet of the existing parapets or within 10 feet of the existing bulkheads for access, maintenance, and roof loading purposes. Furthermore, Figure 7-1 identifies other areas of the roof structure where additional loads should not be placed due to limited design reserve load capacity.

Due to the high wind loads and limited roof space of PS 48, a steel support system consisting of a strut and post framing system, or equivalent, will be used to provide greater solar capacity and adequate structural support and protection from high winds caused by the height and geometry of the building.

To support the ESS on the rooftop, additional structural support will be installed in order to distribute the weight of the ESS onto existing load bearing beams. The weight of the ESS is estimated at 2,150 pounds.

The system will require an externally installed transformer to convert the 480 volt operating voltage of the battery/inverter equipment to the school distribution system voltage of 208 volts. This transformer will be installed in the basement of the building near the existing electrical room.

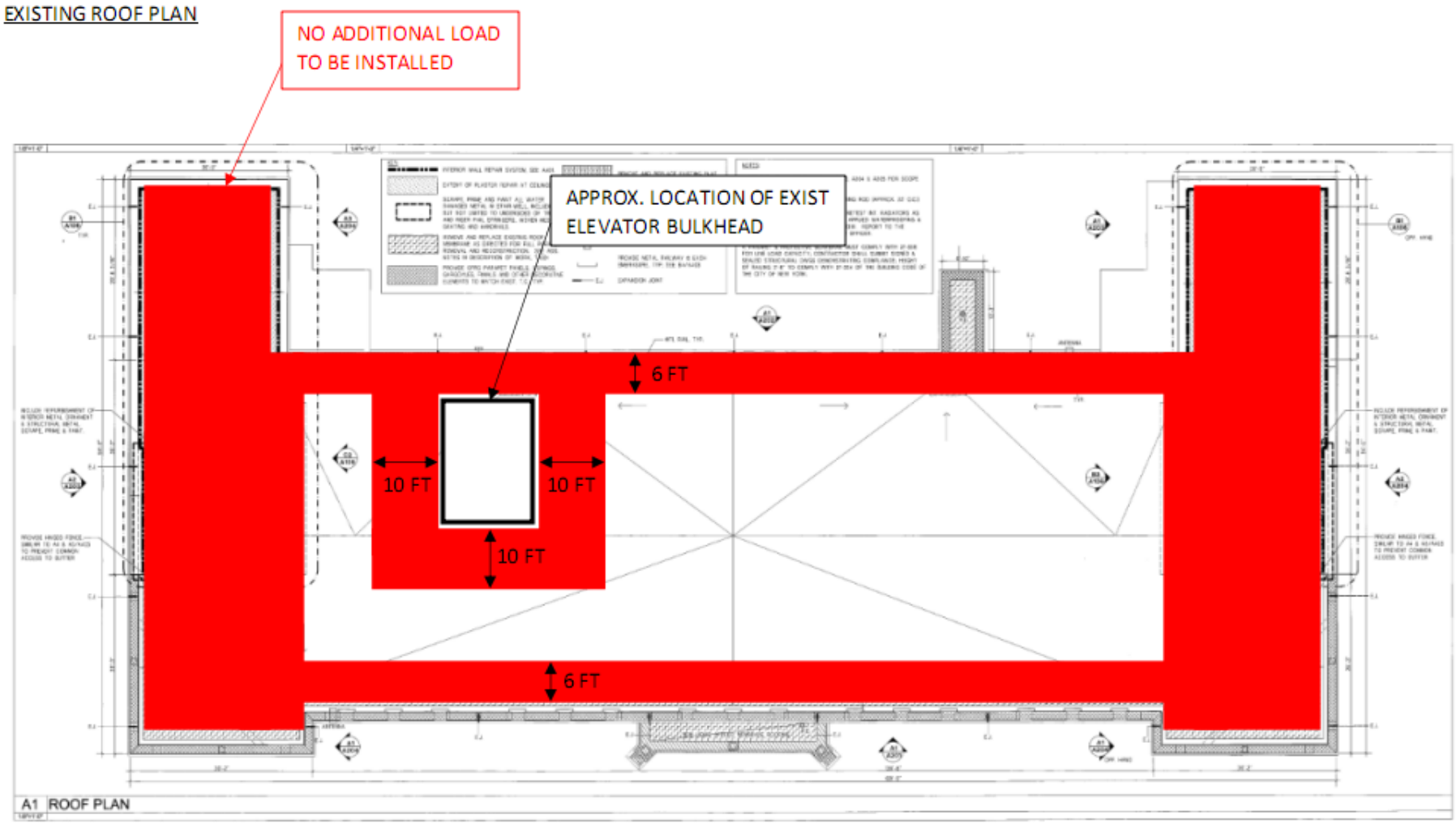
2.3 Flood Risk Reduction

The grade elevation at PS 48 is about 58.8 feet NAVD 88, which is outside the 500-year floodplain. Therefore, no design provisions for flood risk reduction are required at PS 48.

2.4 Electric Load Data/Requirements

PS 48 consumes approximately 400 MWh of electricity annually. This consumption is based on monthly billing data for PS 48 provided by the New York City Department of Citywide Administrative Services (DCAS) for fiscal years 2016 through 2018. Prior years (2015 to 2010) averaged approximately 480 MWh of annual electric consumption.

Figure 7-1. Additional Load Parameters



A review of interval data, utility usage information, and discussions with PS 48 staff personnel identified a minimum useful ESS power output capacity of approximately 60 kW. This output capacity is needed to provide power to key critical loads as shown in Table 7-1. The ESS will provide power to the Elevator Control Panel (LP-El), Elevator Motor, Kitchen Power Panel (LPEM-A), the Emergency Lighting Panel (LPEM-B), and the Basement Power Panel (PPB-1). The ESS will need approximately 270 kWh to provide power to these loads for eight hours assuming minimal elevator usage. A 274 kWh storage system will be utilized to meet the 270 kWh requirement. The sizing load will be confirmed through additional measurements during final design.

Table 7-1. Critical Load Data

Critical Loads	Basis	Quantity	Measured Load (Amps)	Power (kW)	Assumed Operating Time in 8 Hours (Hrs)	Required Energy Storage Capacity (kWH)
Lighting Panel (LP-AA) Roof Receptacles	Measured	1	5	1.8	8	14.4
Elevator Control Panel (LP-EL) Elevator cab ventilation, controls, sump pump	Measured	1	20	7.2	8	57.6
Lighting Panel (LPS-A&B) (relocate)	Assumed as zero during emergency	1	0	0	8	0
Power Panel PP-Room (relocate)	Assumed as zero during emergency	1	0	0	8	0
Kitchen	Measured	1	20	7.2	8	57.6
Basement Power Panel (PPB-1)	Measured	1	45	16.2	8	130
Power Panel (PP-LIB)	Assumed as zero during emergency	1	0	0	8	0
Kitchen Power Panel and Emergency Lighting Panel (LPEM A+B)	Rated Capacity	1	30	10.8	8	86.4
Elevator Motor	Assumed	1	24	8.64	0.5	4.32
Total	**NA**	**NA**	**NA**	**144**	**NA**	**350***

* This load was measured during the school day at full capacity. In the event of an emergency, reduced load is expected. The 274 kWh ESS is expected to provide approximately 8 hours of backup power assuming that site load is managed by on-site personnel.

2.5 Grid Interconnection Requirements/Electrical Configuration

The solar PV system and ESS will connect to the existing power system via a line side tap in the main switchgear. During normal, grid parallel operation, power from three 20kW inverters will be collected in an AC combiner panel located on the north side of the elevator bulkhead. The panel will be located in the basement of PS 48 next to the electrical room and will offset the need for electrical consumption from the utility. Power produced from the solar PV system will flow through the ESS, through the 125 kVA transformer, and into the main switchgear. Depending on the electrical consumption of PS 48 the solar energy will flow to loads in PS 48 and possibly back to the utility as export power if generation exceeds loading. The ability to export power will be confirmed during final design via the Con Edison Coordinated Electric System Interconnection Review (CESIR). The ESS can also feed the other loads in PS 48 to reduce peak demand, as shown on the one-line diagram in Appendix 7B.

During a utility power outage, the battery inverter will detect the loss of voltage on the utility side of the inverter and shut down. As a result, the solar PV inverters will also shut down. An internal contactor in the ESS will automatically open, disconnecting the AC combiner panel from the grid. After a 10 second delay, the battery inverter will restart and restore voltage to the AC combiner panel. Automatic transfer switches ATS-1 and ATS-2 will switch from their normal operating position to their emergency power position, connecting MDP-A and the fire alarm (FA) panel to the ESS supply. After 300 seconds of the solar PV inverters detecting this voltage source, they will begin powering the critical loads in MDP-A, and at the fire alarm panel. This time delay is a standard allocation in accordance with IEEE 1547. Figure 7-2 shows the details of the internal wiring of the battery inverter.

MDP-A may be manually disconnected from the utility by opening the utility supply breaker feeding the ESS at the AC combiner panel.

3 Solar PV and ESS Characteristics

3.1 Site Plan

The solar PV system will utilize the available rooftop space of PS 48. The modules will be located in accordance with the NYC Building Code and will be arranged to allow access to all mechanical equipment. The inverters and combiner panels will be located on the northern side of the elevator bulkhead. Figure 7-3 provides a picture of the available PS 48 rooftop. Figure 7-4 illustrates the solar PV arrangement with the approximate location of the various rooftop system components.

A solar PV energy system calculator (PVWatts) was used to estimate the production of the 72 kW system shown in Figure 7-4. The calculator assesses module type, racking type, tilt angle, azimuth angle, and system losses (soiling, shading, snow, wire inefficiencies, and degradation) to properly estimate annual power production. The estimated annual solar PV power production for the proposed 72 kW system is 87 MWh.

Figure 7-2. Internal Wiring of Battery Inverter

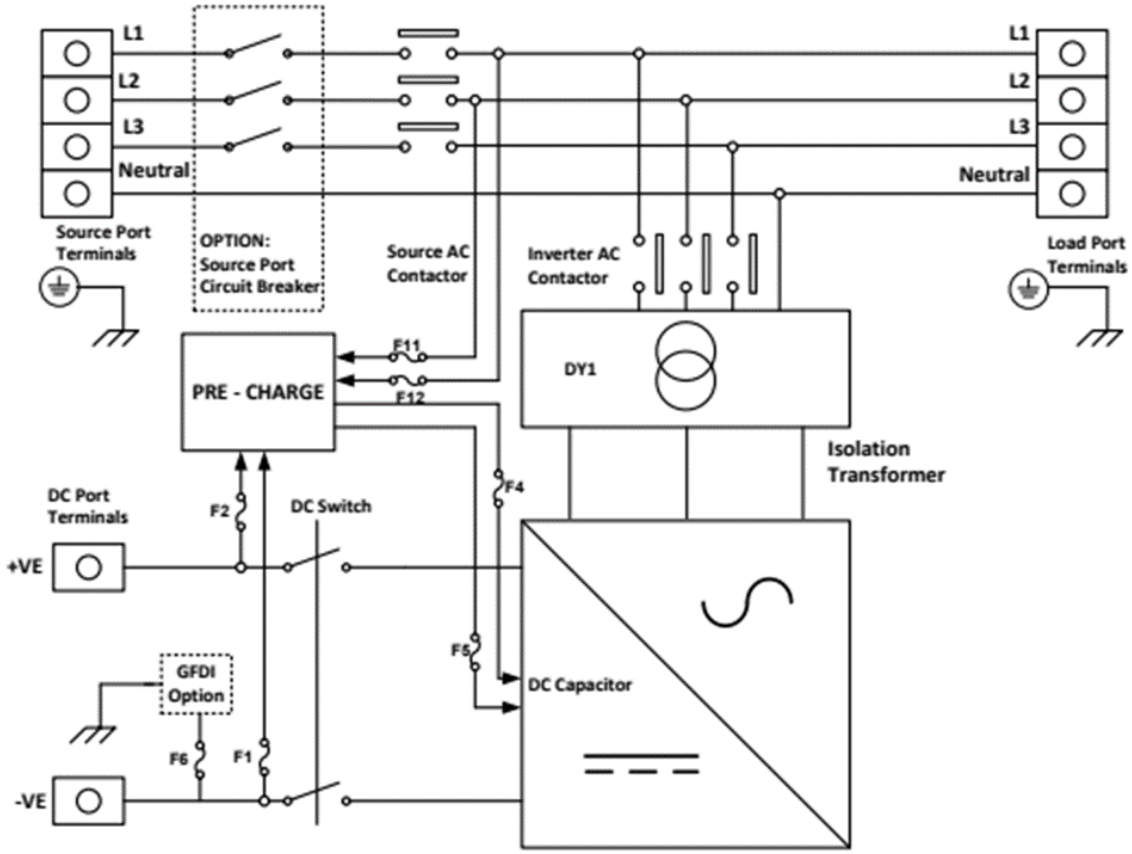
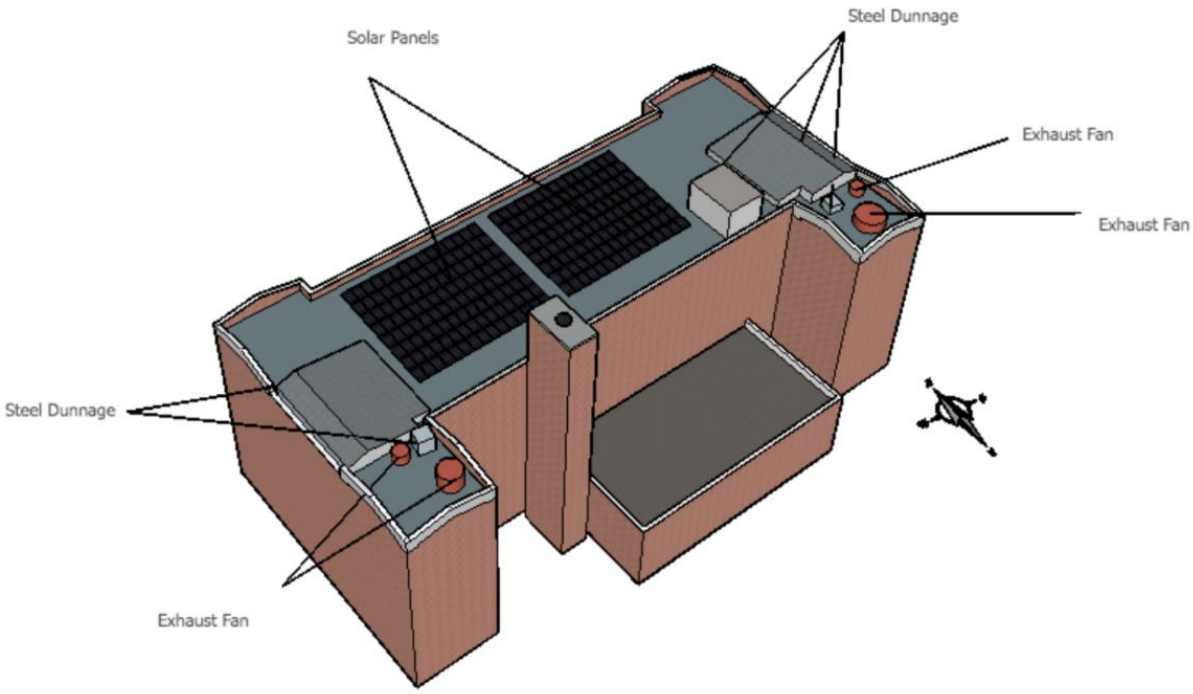


Figure 7-3. PS 48 Rooftop

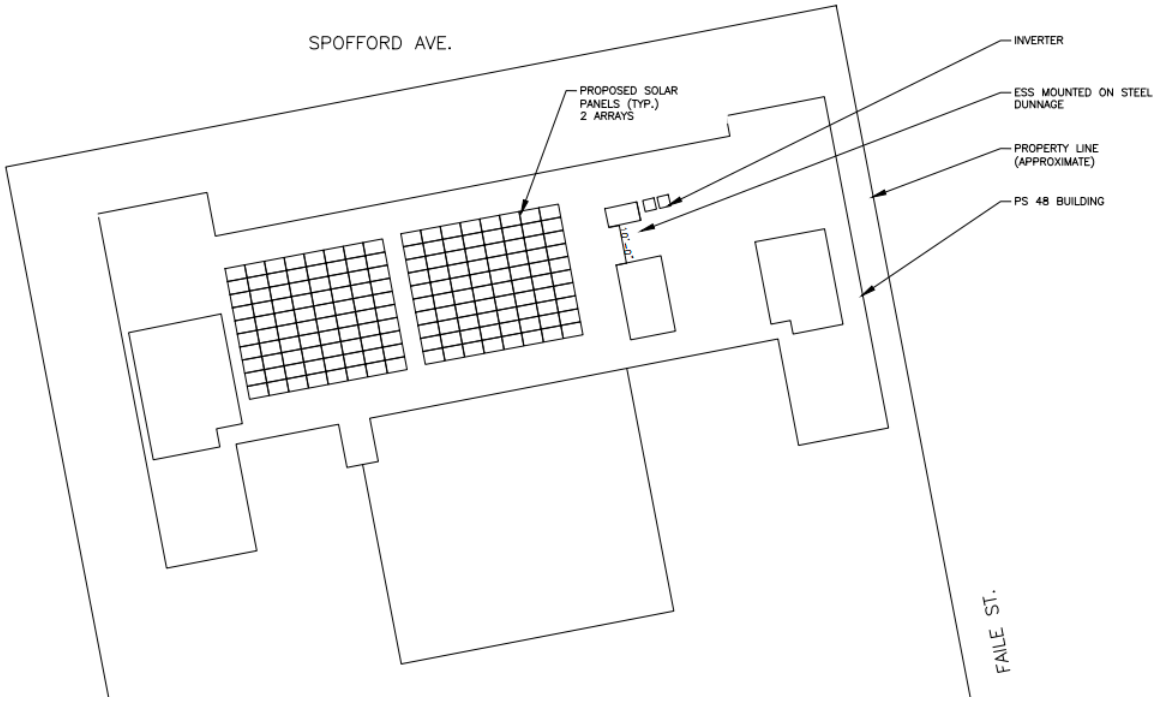
Figure 7-4. Three-dimensional Model of PV System



The preferred sites for Li-ion energy storage systems in New York City is outdoors. Due to the limited available outdoor ground area around PS 48, the proposed energy storage location is on the building rooftop, using columns or steel beams to support the weight of the containerized ESS. Due to the close proximity to the solar PV system, the design will minimize conduit runs and simplify the installation.

A two-dimensional layout of the PV system is shown in Figure 7-5 (with a racking detail shown in Figure 7-10).

Figure 7-5. Two-dimensional Solar PV and ESS Layout



A representative ESS container is 12.1 feet wide, 8 feet tall, and 4.9 feet long. A three dimensional image of the ESS container is shown in Figure 7-6.

Figure 7-6. Representative ESS Container

A site arrangement plan drawing of PS 48 showing the rooftop solar PV system and ESS locations is included in Appendix 7A.

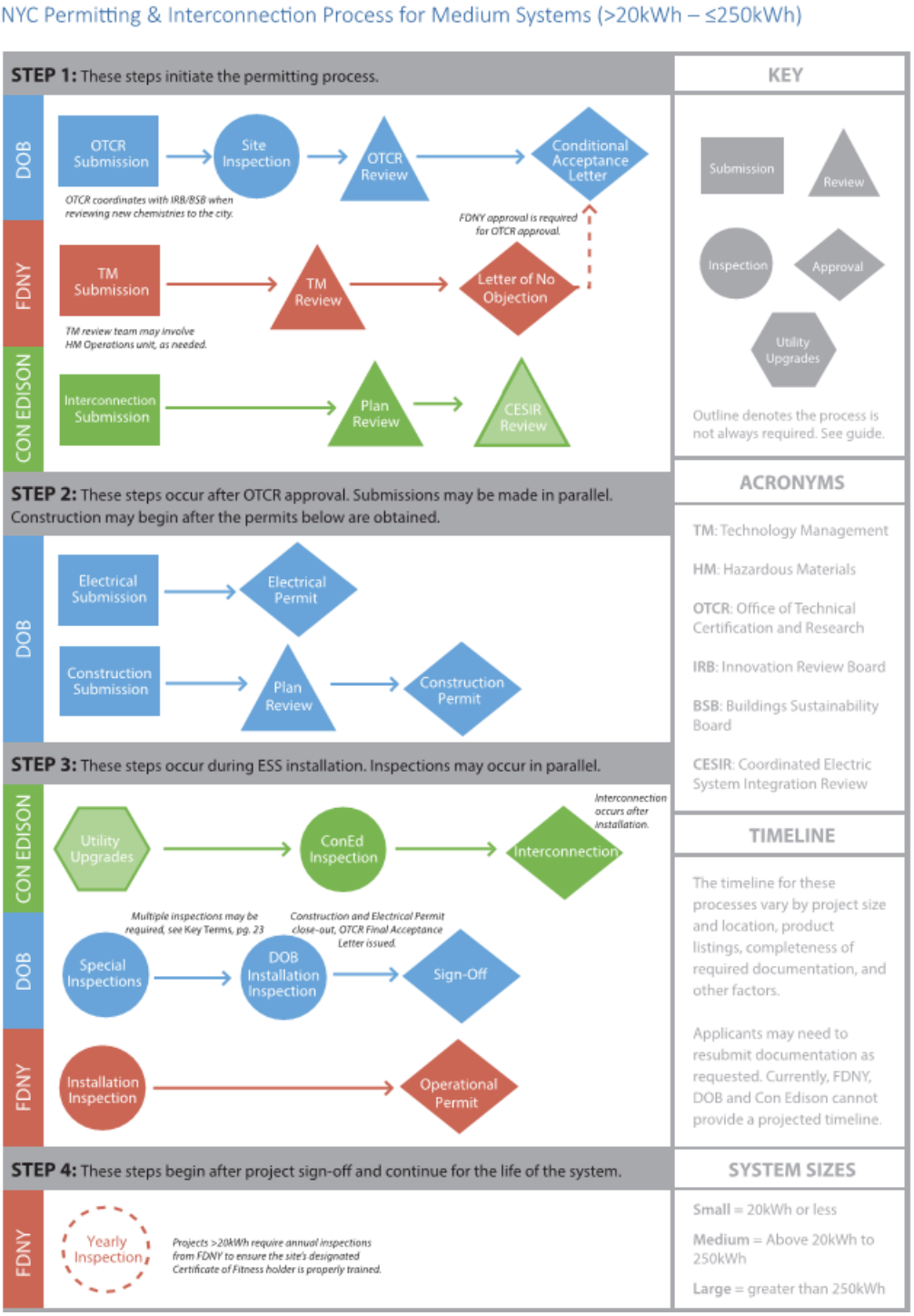
3.2 Energy Storage Technology Options Screening

In New York City, the regulatory environment for energy storage dictates the equipment and battery chemistry selection for a project. In particular, the FDNY has a stringent review process which poses significant project risk for battery technologies that have not been previously approved. The same holds true for battery configurations and vendors which have not been previously approved, even if they offer a product with previously-approved battery chemistry. In New York City, only valve regulated lead acid (VRLA), Li-ion, and vanadium redox flow batteries have successfully obtained FDNY letters of no objection for energy storage applications. It is worth noting that the vendor that previously obtained the approval for a vanadium redox project did not complete this project; therefore, to minimize risk for this project only VRLA and Li-ion chemistry's are recommended.

The permitting process for energy storage systems can take anywhere from 6 months to a year. This process includes a review by the FDNY and the Office of Technical Certification and Research (OTCR). The ESS will also require a review by the Public Design Commission (PDC). Figure 7-7 details the NYC permitting and interconnection process for medium systems up to 250 kW.

Table 7-2 provides a high-level comparison between the two viable battery chemistry options. Note that this table is representative of battery chemistry and does not take into account product-specific details which can have a large impact on performance, cost, etc. All values are approximated and costs represent only those associated with the supply of the BESS equipment.

Figure 7-7. Interconnection Process for Energy Storage Systems in New York City[1]



[1] The Smart Distributed Generation (DG) Hub, established by Sustainable CUNY of the City University of New York in 2013, published the *Storage System Permitting and Interconnection Process for New York City Lithium-Ion Outdoor Systems* guidance document in April 2018. The work of the DG Hub is supported by the U.S. Department of Energy, the New York State Energy Research & Development Authority (NYSERDA), the New York Power Authority (NYPA) and the City of New York.

Table 7-2. High-Level Comparison of Battery Storage Options

Feature	VRLA	Li-Ion
Nameplate Capacity*	440 kWh	274 kWh
Depth of Discharge**	50%	80%
Usable Battery Energy***	220 kWh	220 kWh
Weight	36,000 lbs	5,000 lbs
Footprint without Enclosure	50 square feet	15 square feet
Approximate Cost****	$225,000	$270,000
Warranty Term	5 to 10 years	10 year minimum

* Due to the lower depth of discharge for VRLA batteries the nameplate capacity of a VRLA battery will be significantly larger than a Li-Ion solution in order to achieve the same amount of usable energy.

**Depth of discharge refers to the percent of battery capacity discharged during a typical battery use event. Increased depths of discharge will shorten the battery life.

***Usable battery energy refers to the amount of energy that is required to run the critical loads for 8 hours. The nameplate capacity may need to be higher due to ESS-specific factors such as rated Depth of Discharge, efficiency losses, etc.

****The cost of Li-ion batteries has trended downward for the past few years, and is expected to continue dropping in the future. However, the availability of Li-ion batteries at the moment of purchase can significantly affect pricing. The cost of VRLA batteries has not declined over the past few years.

Li-ion battery technology was selected for this project given the significant energy density and performance advantages compared to VRLA batteries. Even though Li-ion technology is currently more expensive per kWh than VRLA, the project as a whole is more cost-effective by utilizing Li-ion batteries, as there would be fewer project siting costs, a smaller footprint required, and reduced maintenance and battery replacement costs.

When comparing VLRA and Li-ion battery technologies, it is important to ensure that the usable energy reflects the differences in depth of discharge and relative efficiency losses between the technologies so that the comparison reflects systems that can satisfy an equivalent energy demand.

3.3 ESS Performance

Table 7-3 summarizes typical performance of the ESS at PS 48. Manufacturer data sheets are included in Appendix 7C.

Table 7-3. ESS Performance

Parameter	Performance
Maximum Electrical Output (kW)	125
Electrical Storage Capacity (kWh)	274
Round Trip Efficiency (including transformer and ESS losses)	83%

3.4 Solar PV Performance

The solar PV system is designed to achieve maximum production based on available roof area. To satisfy the project goal of maximizing efficiency, high efficiency solar PV modules, power optimizers, and a high efficiency inverter were selected for the design. A traditional 60 cell module is approximately 39 inches wide and 65 inches tall. The 96 cell, 360 W, solar modules that were used in this design are approximately 41 inches wide and 61 inches tall. This size allows for additional modules to be installed and flexibility during design and installation. A typical, commercially available, solar PV module is between 17 percent and 18 percent efficient and has a degradation rate of 1.0 percent per year. The modules selected for this project are more than 22 percent efficient and have an estimated degradation rate of 0.25 percent per year.

Power optimizers were selected to ensure that the modules are producing the maximum amount of power possible. Power optimizers are a very high efficiency single-stage dc-to-dc converter. The dc-to-dc converter boosts the module output current and decreases the voltage. The optimizers will be located in close proximity to the modules, generally mounted on the underside of the module. In addition to the optimizers, maximum power point tracking ensures that the solar PV system is producing optimal power at all conditions by operating at the most efficient voltage with partial shading loss mitigation over a wide range of irradiance levels. The power optimizer inverter combination also allows for greater energy production in more shaded areas than other types of inverters.

The design utilizes three phase 480 V inverters in order to minimize the number of inverters that are required and reduce the size of conductors where possible.

4 Electrical Systems and Equipment

The electrical system will be designed and built based on applicable codes and standards to provide reliability of the solar PV and ESS service, personnel and equipment safety, ease of maintenance and operation, and maximum interchangeability of equipment. The major electrical system components and their mutual relationships to each other are shown on the one-line diagram in Appendix 7B.

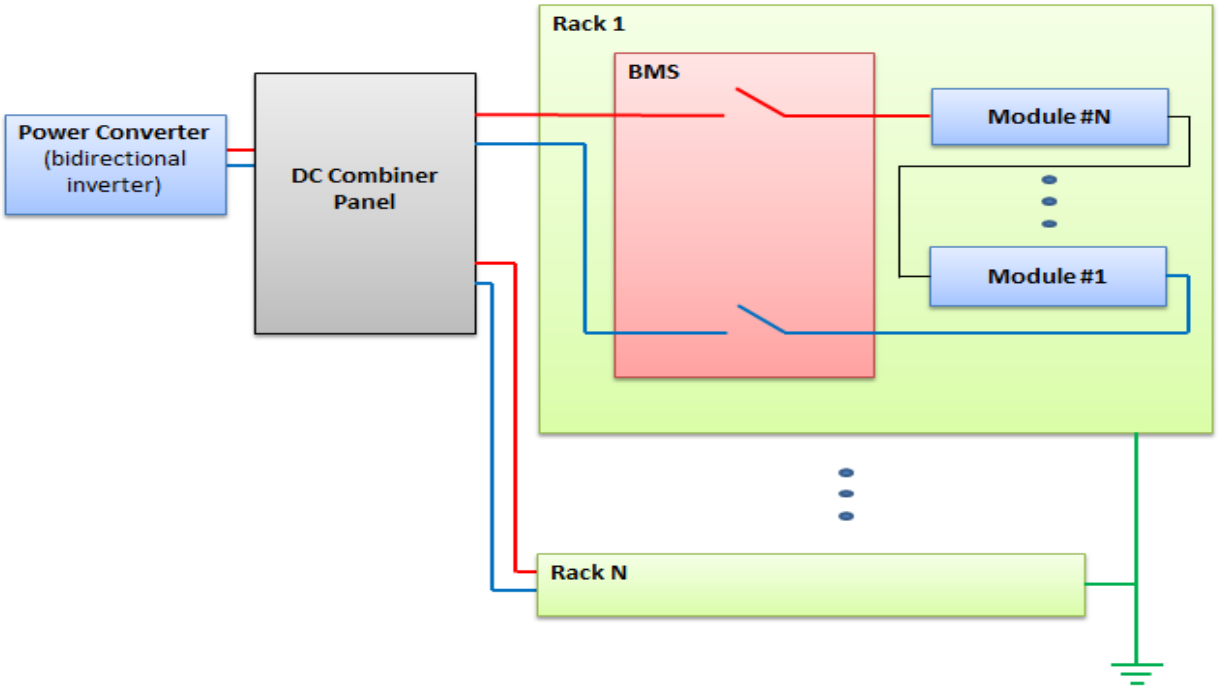
4.1 Equipment

The following major pieces of equipment are included as part of the ESS:

- Li-ion battery racks including battery cells, battery modules, battery racking structure, battery protection unit, battery management systems and a protective relay
- Bidirectional inverter
- Step down transformer for critical loads
- Bidirectional transformer for battery connection to the MDP
- AC combiner panel
- Critical load panel.

Figure 7-8 shows a typical battery system architecture for an ESS.

Figure 7-8. Battery System Architecture



4.2 Electrical Protection, Monitoring, and Controls

Protective Relaying

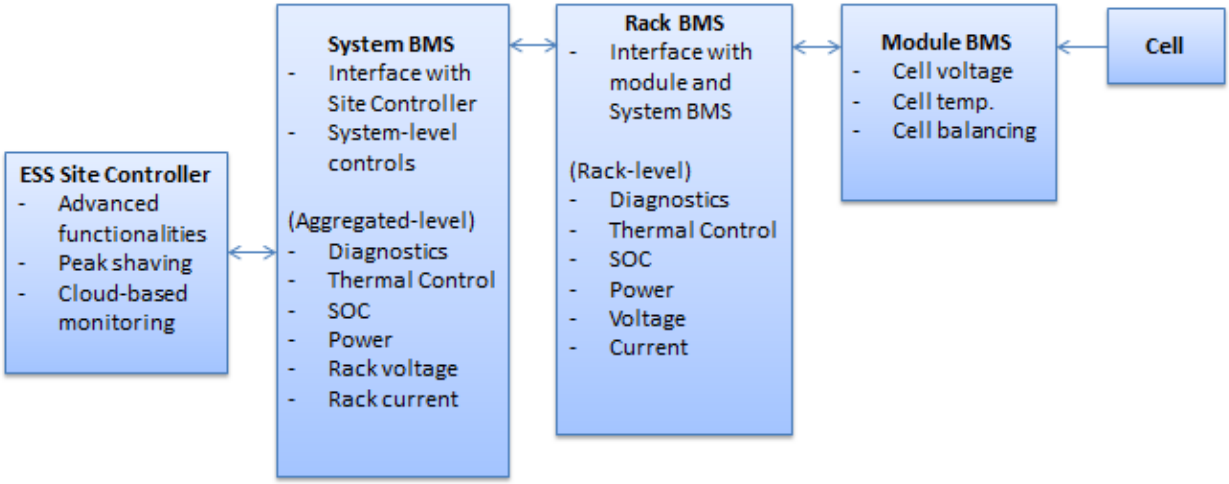
Each inverter will constantly monitor the incoming utility feeder's voltage and frequency and will provide all required utility protections as identified in Con Edison Specification EO-2115. This feature will protect any utility workers that may need to repair or troubleshoot damage to line-side equipment during an emergency.

Upon loss of power, the utility protection functions incorporated in the inverter will open a contactor and disconnect the utility from the ESS and solar PV system at PS 48.

Battery Monitoring

The battery rack contains multiple monitoring units that allow the system to work safely, within manufacturer-specified operating parameters. Figure 7-9 is a representation of the different battery monitoring system (BMS) components and their relative hierarchy.

Figure 7-9. BMS Components



Thermal management is handled by the BMS. It protects the battery from over-temperature and thermal runaway conditions by tripping the battery disconnect on each module if the maximum temperature is exceeded. Individual temperature sensors are attached to each cell and connected in series to the main unit.

The system will be installed with a site controller which provides supervisory controls and monitoring, as well as cloud-based data management and internet-enabled operational capabilities. In the hierarchy shown in Figure 7-9, the ESS site controller allows the system to perform the desired peak shaving functionality. The ESS site controller is not required for resiliency functionality but is required to perform additional activities, such as peak shaving.

4.3 Transformers

Two new transformers will be used. The transformer feeding MDP-A will be a 480 V/208V 125 kVA transformer. The bidirectional transformer between the combiner panel and the main switchgear will be approximately 125 kVA. Transformers will be dry type and will be located in the basement of the PS 48 building.

4.4 Cable and Conduit System

The electrical power distribution system will be designed and cable sized per NEC requirements.

All conduits will be sized in accordance with NEC Chapter 9 requirements. Outdoor conduit will be rigid aluminum conduit while electric metallic tubing conduit will be applied for indoor installations. Schedule 40 PVC pipe will be used for buried or embedded conduit.

4.5 Grounding Protection

Electrical equipment and systems will be grounded and bonded in accordance with NEC requirements. The ground fault return path will be either through a copper grounding equipment conductor, the metal conduit and/or the metal tray system between power source and load. Any discontinuities will be bonded with an appropriately-sized copper conductor. Outdoor equipment will be provided with two connections to the existing site grounding electrode. The ESS enclosure will be provided with a ground ring that is connected to the existing site grounding electrode.

4.6 Enclosures and Hazardous Area Classifications

The ESS will be enclosed in a NEMA 3R rated enclosure. The enclosure is constructed for indoor or outdoor use and provides a degree of protection to personnel against access to hazardous parts. The enclosure will also provide a degree of protection for the equipment inside the enclosure against ingress of solid objects and water.

Outdoor enclosures will be provided with lockable door handles and tamper-resistant construction.

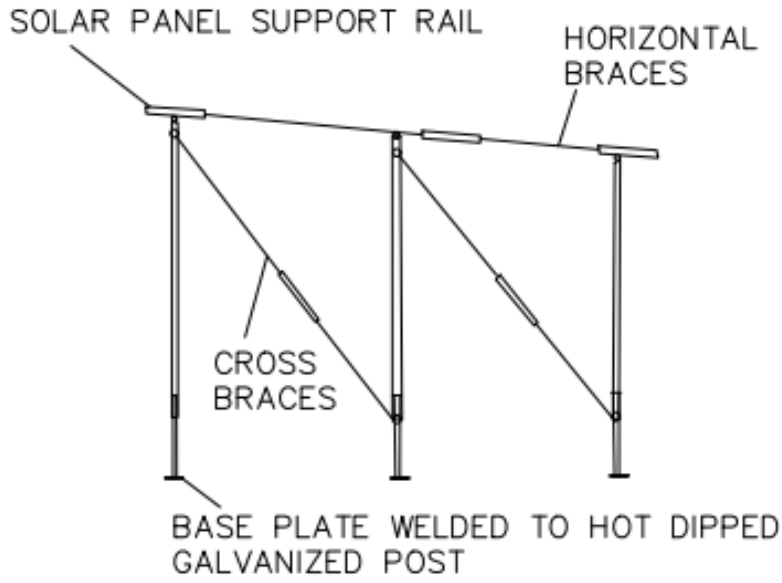
4.7 Electrical System Studies

Due to the size of the solar PV system and ESS, a Con Edison Coordinated Electric System Interconnection Review (CESIR) is required to assess costs for any upgrades that Con Edison deems necessary. Additional electrical system studies will be performed during final design engineering to finalize equipment ratings. CESIR is required for any combined system size of distributed generation that is over 50 kW in Con Edison territory. Both the solar and ESS technologies to be used at this site will trigger the CESIR study. For more information, refer to Con Edison's standardized interconnection requirements.

4.8 Mechanical Systems and Equipment

The solar PV system will utilize a strut and post racking system to tilt the solar PV modules at 5 degrees from horizontal. The system will attach to the concrete deck using mechanical anchors. The baseplate will be welded to an appropriately designed post which will be reinforced by cross braces. The solar rails will sit on top of the posts and horizontal cross braces, as shown in Figure 7-10.The steel posts will be hot dip galvanized to protect against corrosion. The rails will be made of aluminum construction. One and ½-inch or 2-inch diameter posts will be used to minimize the amount of penetrations through the roof membrane. Each penetration will need to be appropriately waterproofed once the membrane and insulation is cut away. There will be approximately one post for every two solar PV modules. Using a qualified roofing contractor will ensure that the roof warranty is maintained. This type of racking system allows for more compact row spacing between panels which is important to maximize production on a space constrained rooftop.

Figure 7-10. Racking Detail for PV System



5 Instrumentation and Control Systems and Equipment

5.1 General Requirements

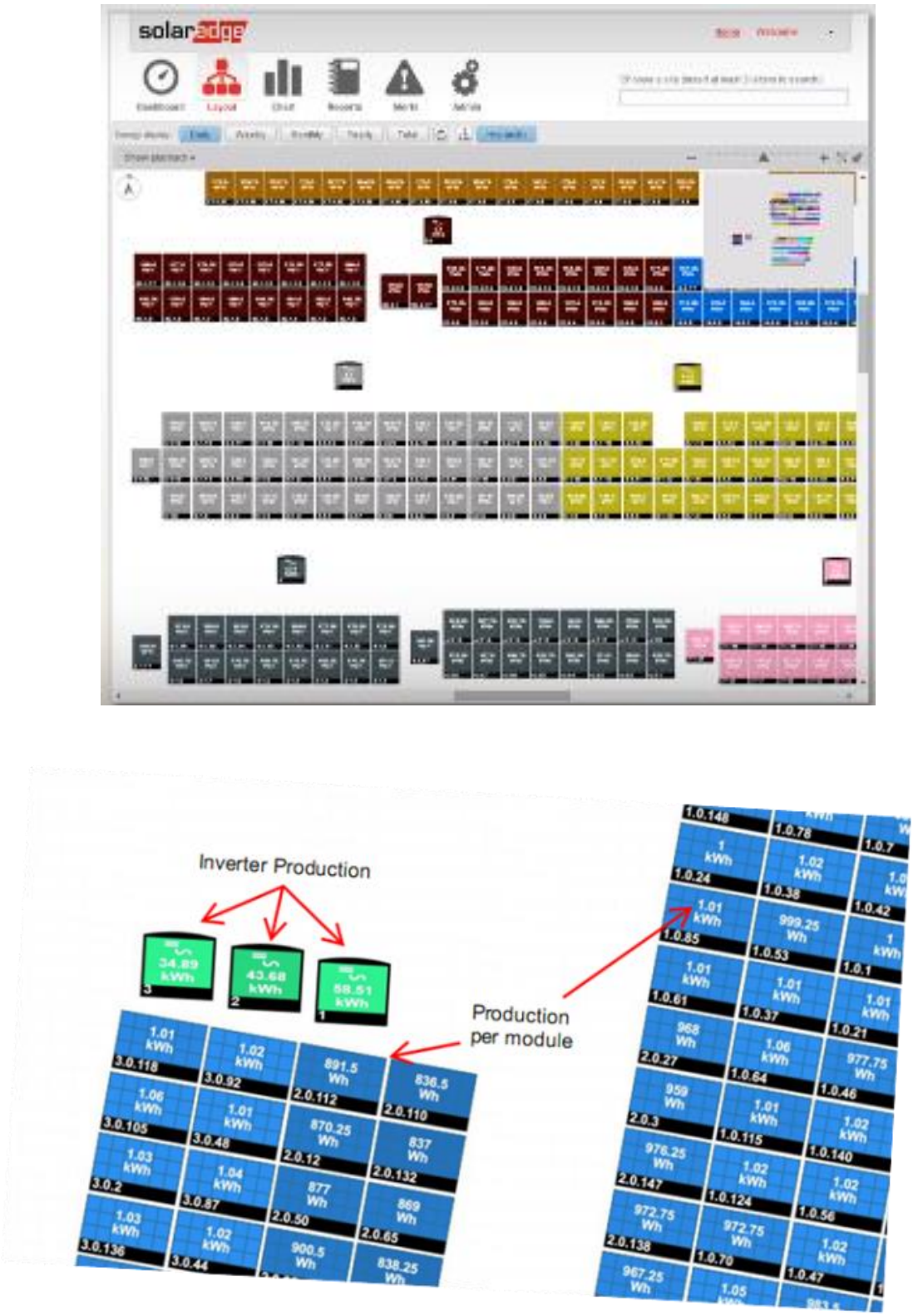
The instrumentation and control equipment associated with the ESS and solar PV equipment will be the supplier's standard equipment. The containerized ESS will operate without the installation of additional instrumentation and controls. External controls, such as a site controller, may be added in the future to fine tune the peak shaving functionality of the system but are not a requirement of this design. As such, all controls will be located within equipment enclosures.

The main control equipment for the ESS consists of the site controller and the BMS that are described in Section 4.2 above.

Inverters will be provided with a web-based monitoring portal with inter-inverter networking and interface with the site network to be determined during final design. The monitoring platform will be provided and operated by the inverter manufacturer with the facility operator receiving access to the data. An automated control architecture will ensure maximum power production and provide ease of access to the real time monitoring platform. An example of a real time monitoring platform is shown in Figure 7-11.

The power optimizer can isolate each PV module so that if one module that is part of a larger string goes down, the entire string is not compromised and the rest of the modules continue producing. The inverters can detect the status of each module's production based on the optimizer's data, which will provide production numbers and troubleshooting messages in real time on the monitoring platform.

Figure 7-11. Monitoring Platform (Top) with Close-Up of Individual Module Production (Bottom).



5.2 Automated Sequences

The ESS has two automated modes of operation grid tied and off grid. The ESS will automatically switch between the modes of operation on loss of power from the utility grid.

Grid Tied (normal operation): When grid power is available, the ESS and PV systems will be connected to the electric grid at the main switchgear within the PS 48 electrical room. This interconnection point will be used to charge the batteries and to supply power to the critical loads if there is no solar PV production. Additionally, the system will be capable of discharging power from the batteries to the grid- interconnection point during peak periods to effectively reduce the peak power consumption (i.e. peak shaving).

Off Grid (backup power event): In the case of a grid outage, the ESS system is able to automatically disconnect from the electric grid and supply power to the critical loads using stored energy in the batteries. Off Grid operation of the ESS system may also be initiated manually by opening the utility supply breaker feeding the ESS at the AC combiner panel.

6 Project Constructability Considerations

The rooftop location for the ESS is beneficial due to the limited amount of ground space at the property and the close proximity to the solar PV system of the school, but may have additional fire suppression requirements. In their ESS project review, FDNY considers rooftop ESS installations to be preferable to indoor installations, but still a hazard to the building. Due to the high potential for a fire to spread on the roof, FDNY may require fire barriers around the equipment, to protect any combustible surface (i.e., the roof) and to protect any structural member supporting the battery (i.e., steel dunnage). A preliminary structural review has determined that reinforcement will be needed to support the weight of the battery system on the roof. The costs for roof reinforcement and additional fire suppression are included in the cost estimate discussed in Section 8. It is possible that the FDNY review will conclude that a rooftop location for the ESS on PS 48 is not acceptable. In this case, EDC will work with the New York City Department of Education (DOE) to identify acceptable locations for a ground-mounted ESS on the PS 48 property.

A final conduit routing between the various components will need to be determined by the installation contractor and the PS 48 facility staff to make sure that all aesthetic considerations are taken into account.

Any of the locations proposed above should cause minimal disruption to school operation. However, final design and construction activities will need to be closely coordinated with the DOE to minimize impacts to school and facility operations.

There is no mechanical connection between the ESS and the solar PV system. The two systems are interconnected electrically via dedicated feeders and switchgear installed as part of this project. The two systems will be able to synchronize and interact with each other, but will operate independently.

7 Operational Considerations and Costs

Operating costs for the solar PV system and ESS at PS 48 are minimal and consist mainly of remote monitoring and annual inspections. No additional onsite staff is required for operation or maintenance.

It is assumed that most of the equipment maintenance work will be outsourced. Maintenance contracts and agreements for equipment can also include an annual remote monitoring fee. The annual maintenance service contract cost is approximately $2,500 for the PS 48 solar PV system and $2,500 for the PS 48 ESS. An extended warranty, with associated operations and maintenance services managed by the equipment supplier can also be procured with the original procurement of the equipment at an estimated cost of $70,000.

8 Project Capital Costs

Inside-the-fence conceptual cost estimates were developed based on a conventional contracting strategy. The cost estimates were developed based on budgetary major equipment pricing from equipment manufacturers, prevailing wage labor rates specific to New York City, equipment quantities, layout takeoffs, and reference data from previous similar projects. The estimates do not include outside-the-fence/incremental costs such as infrastructure upgrades and electric transmission infrastructure beyond that noted within this document. The project cost estimates developed for this assessment are for budgeting purposes only.

The following approach and assumptions was utilized to develop the conceptual capital cost estimates for each of the options:

- The solar PV system and ESS will be built simultaneously.
- Electric transmission system upgrade costs to be identified during the CESIR study are excluded.
- Land acquisition costs are excluded.
- Sales tax, insurance, extended warranties, and performance bond/sureties are excluded.
- Estimate assumes a March 2022 Commercial Operation Date (COD).
- Project direct costs including equipment, commodities, and construction labor are included.
- Contractor’s construction indirect costs including provisions for construction and building permits, testing, expenses, services, temporary facilities, tools, rental equipment, and other costs related to construction are included.
- Contractor’s project indirect costs including project management are included (based on previous project experience).

- Contractor's contingency, general and administration costs (G&A), and fees which are based on observed industry trends and previous project data are included.
- Final engineering design and the associated engineering project management is included.
- Roof membrane reinforcing or replacement costs are not included as the roof was recently replaced.

In addition to the Contractor's costs and design engineering costs noted above, construction management and Owner's costs are estimated at 10 percent of the installed project cost, based on typical percentages of project costs observed in the industry, and are not specific to EDC. Owner's costs typically account for the following provisions:

- Project development
- Project management and oversight
- Environmental and site permitting
- Operating spares and equipment maintenance contract initiation costs (as applicable)
- Design Engineer and construction Contractor oversight
- Operations personnel (prior to COD)
- Operator training
- Startup and commissioning and performance testing.

The estimated total project capital costs for the PV system and ESS at PS 48 were provided to EDC. The total project cost represented an estimated installed cost for a March 2022 COD and includes the estimated Owner's costs.

9 Project Schedule

A Level I project implementation schedule was developed from initial project development to project COD, which currently is planned for March 2022. The project implementation schedule is included in Appendix 7D for reference. The implementation schedule was developed based on a review of key project milestones, construction activities, equipment lead times, permitting lead times and experience on previous/similar projects. Construction scheduling will ultimately need to be closely coordinated with DOE to minimize impacts to school and facility operations. The schedule assumes nine months to complete the permitting process with FDNY and other entities such as OTCR. This duration is consistent with recent experience on similar projects. The permitting process timeline is subject to the discretion of FDNY and OTCR to perform the necessary reviews, resolve concerns, and approve final design.

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PART 7 APPENDICES

7A: ESS and Solar PV at PS 48 General Arrangement Plan

7B: Power Delivery Configuration One-line Diagram

7C: Representative Manufacturer Data Sheets

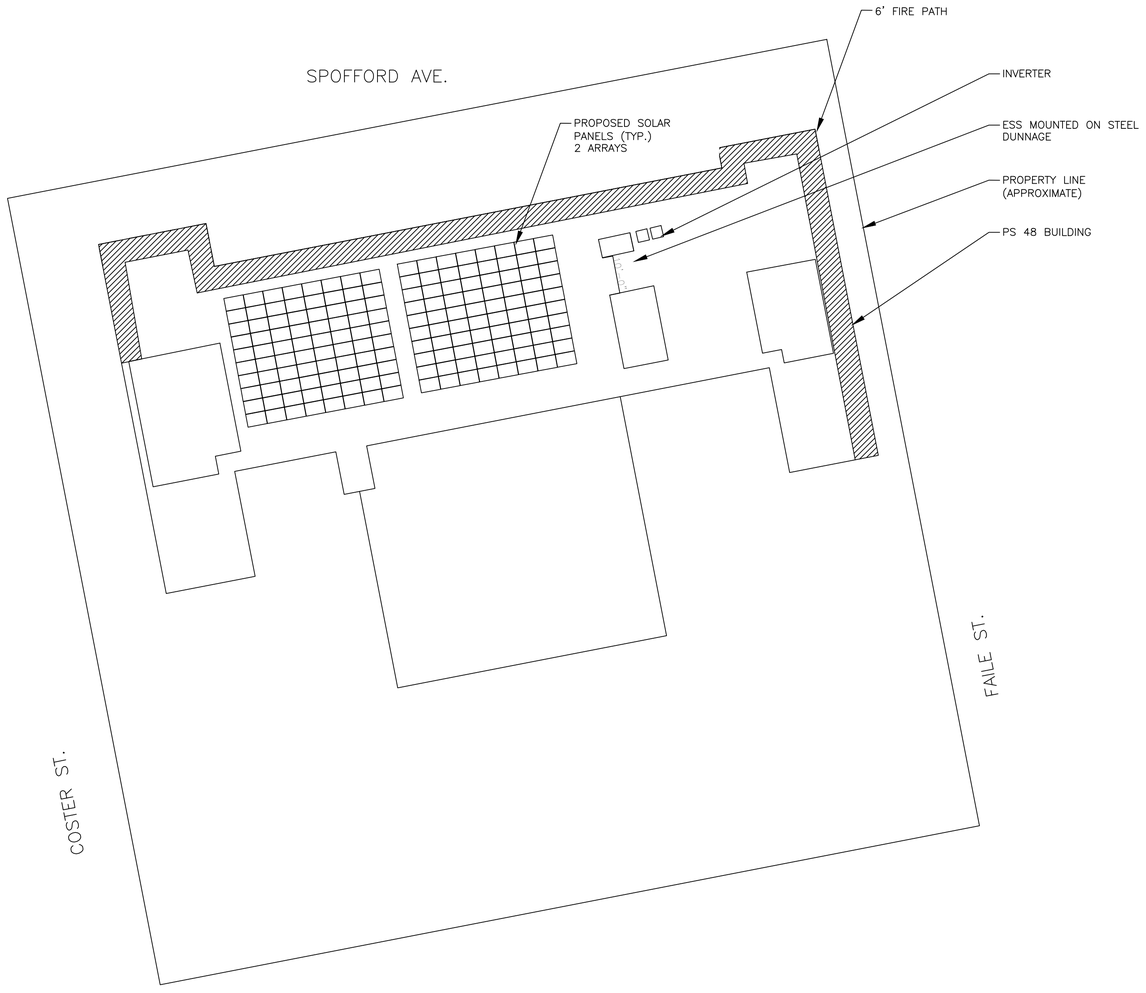
7D: Project Implementation Preliminary Schedule

APPENDIX 7A

- ESS and Solar PV at PS 48 General Arrangement Plan

NOTES

1. LOCATIONS SHOWN ARE APPROXIMATE.



PLAN

SCALE: 1" = 20'-0"

20' 10' 0 20' 40' 60'

HUNTS POINT KEYPLAN

SCALE: 1" = 2000'-0"

2000' 1000' 0 2000' 4000' 6000'

ISSUE	DATE	DESCRIPTION
A	08/31/18	CLIENT REVIEW

PROJECT MANAGER	DAN MITAS
DESIGNER	J. BRZYS
ENGINEER	-
CHECKED	D. MITAS
APPROVED	
PROJECT NUMBER	10029617

PRELIMINARY
NOT FOR CONSTRUCTION

NYCEDC
NEW YORK CITY. MAKE IT HERE.

HUNTS POINT RESILIENCY PILOT PROJECT

ESS AND SOLAR PV AT PS 48

GENERAL ARRANGEMENT PLAN

0 1" 2"

FILENAME 10029617_0GA_C107

SCALE AS NOTED

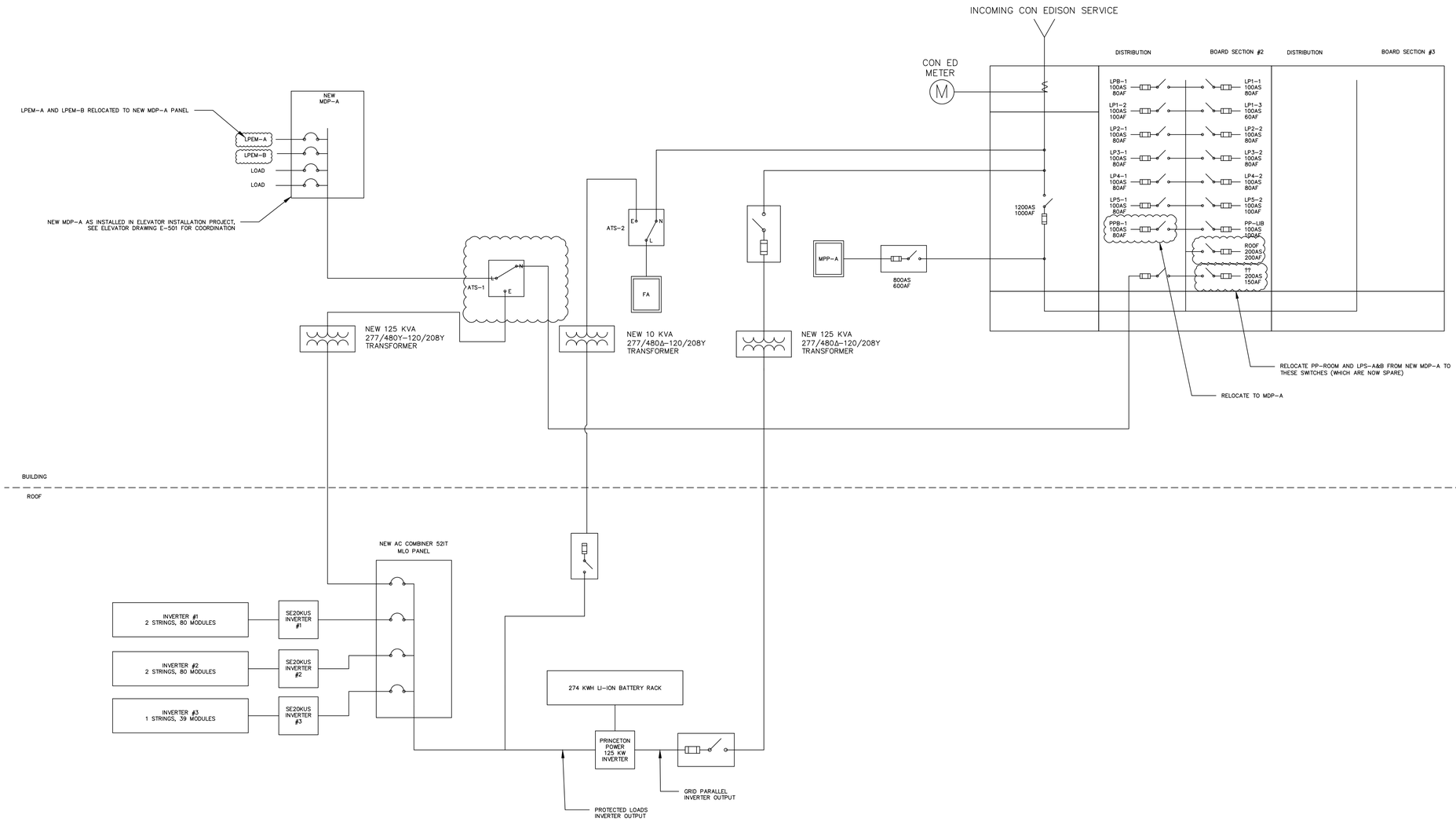
SHEET C107

APPENDIX 7B

- Power Delivery Configuration One-line Diagram

SEQUENCE OF OPERATIONS

1. IN NORMAL, GRID PARALLEL OPERATION, POWER SHALL FLOW FROM THE UTILITY/SOLAR PV, THROUGH THE BATTERY INVERTERS, AND TO PROTECTED LOADS ON NEW MDP–A.
2. DURING A UTILITY BLACKOUT, THE INVERTER SHALL SENSE LOSS OF VOLTAGE AND SHUT DOWN. THE PV INVERTERS WILL SHUT DOWN. AN INTERNAL CONTACTOR IN THE BATTERY INVERTER SHALL OPEN TO ISOLATE THE GRID OUTPUT CONNECTION.
3. WITHIN 10 SECONDS, THE BATTERY INVERTER SHALL RESTART IN ISLAND MODE, ENERGIZING NEW AC COMBINER PANEL.
4. UPON SENSING VOLTAGE ON THE EMERGENCY SOURCE TERMINALS, ATS–1,2 SHALL SWITCH TO EMERGENCY SOURCE.
5. WITHIN 300 SECONDS, THE SOLAR PV INVERTERS SHALL RESTART AND PROVIDE POWER TO THE LOADS ON MDP–A.
6. IF THE BATTERIES REACH AN ALARM LIMIT OF 30% STATE OF CHARGE, THE BATTERY SYSTEM SHALL SHUT DOWN.
7. WHEN POWER IS RESTORED, ATS–1,2 SWITCH SHALL TRANSFER TO PLACED L–N. AFTER 300 SECONDS, THE BATTERY AND PV INVERTERS SHALL RESTART IN GRID PARALLEL MODE. POWER SHALL FLOW FROM THE UTILITY/SOLAR PV, THROUGH THE BATTERY INVERTERS, AND TO PROTECTED LOADS ON NEW MDP–A.



BRIGHT POWER
Your Energy Management Partner
www.brightpower.com
11 Hanover Sq, 21st Floor
New York, NY 10005
tel.: (212) 803.5868

DOB STAMP & SIGNATURES

DOB SCAN

PROJECT NAME:

HUNTS POINT RESILIENCY STUDY

PS#8

REV	DATE	DESCRIPTION
-	-	-
4	9-27-17	UPDATED SEQUENCE OF OPERATIONS
3	9-21-18	UPDATED FA TAP AND PANEL RELOCATION
2	9-4-2018	UPDATED TO INCLUDE TRANSFER SWITCH
1	3-30-2016	ISSUED FOR CON ED REVIEW

DRAWING

SEAL & SIGNATURE

PROJECT NO: PR-4293
FILE:
DRAWN BY: MB
CHECKED BY: JB
DRAWING NO.

SHEET OF

APPENDIX 7C

- Representative Manufacturer Data Sheets

Princeton Energy Management System (PEMS-250-500)

PRINCETON POWER SYSTEMS
Clean Power Made Simple™

PEMS 250-500

1 Day Installation
Pad-Ready AC Battery System

Features

- TUV Certified to UL1741
- System Controls
- Energy Storage Bays
- Pad Cable Entry
- Side Cable Entry
- Heating & Cooling Systems

Round Trip Efficiency
True Entire System AC-AC 92%

ABOUT PRINCETON POWER SYSTEMS

Princeton Power Systems, based in New Jersey and founded in 2001, designs and manufactures state-of-the-art technology solutions for energy management, microgrid operations and electric vehicle charging. The company is a global leader working with customers and partners across North America, Europe, Africa and the Caribbean. It manufactures UL and CE-certified power electronics that are used in advanced battery operations and alternative energy, with built-in smart functions for ancillary services. The company solves power issues to allow continued growth of distributed renewable energy by providing energy storage solutions that are proven to work, even in harsh environments. Princeton Power Systems builds integrated systems and designs, commissions and operates microgrids for leading organizations, including Fortune 500 automakers and industrials, and non-profit organizations. The company proudly manufactures its products in the USA. More information about Princeton Power Systems is available at www.princetonpower.com.

ELECTRICAL

System	250 kW inverter with 500 kWh storage
Battery Chemistry	Lithium Ion
Battery Certification	UL1642, UL1973RU, UN38.3
Inverter Certification	TUV Certified to UL1741/IEEE 1547
Round-trip System Efficiency at Full Load	92%
AC Voltage	480 VAC +10%, -12%, 3-phase 3/4 wire
AC Frequency	60 Hz nominal, 59.3-60.5 Hz (per UL requirement)
Max Continuous AC Power	250 kW AC/250 KVA AC
Energy Storage Capacity measured at AC Terminals	500 kWh
3rd Party Control Interface & Protocol	TCP/RS232/RS485 Modbus

FOOTPRINT & SYSTEM CHARACTERISTICS

Enclosure	NEMA 3R
Height x Width x Depth (ft)	8.3 x 12.1 x 4.9
Weight	15,100 lbs / 6,850 kg
Operating Temperature	-20°C to 50°C / -4°F to 122°F
kWh/ft²	8.4

CONTACT US

Princeton Power Systems, Inc. | 3175 Princeton Pike, Lawrenceville, NJ 08648
Sales: +1 (609) 955-5390 | Email: sales@princetonpower.com | Web: www.princetonpower.com

INVERTERS

SolarEdge Three Phase Inverters for the 208V Grid for North America

SE9KUS / SE14.4KUS

The best choice for SolarEdge enabled systems

- Specifically designed to work with power optimizers
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Built-in module-level monitoring
- Internet connection through Ethernet or Wireless
- Small, lightweight, and easy to install outdoors or indoors on provided bracket
- Fixed voltage inverter for longer strings
- Integrated Safety Switch
- Supplied with RS485 Surge Protection Device, to better withstand lightning events

Three Phase Inverters for the 208V Grid[1] for North America

SE9KUS / SE14.4KUS

	SE9KUS	SE14.4KUS	
OUTPUT			
Rated AC Power Output	9000	14400	VA
Maximum AC Power Output	9000	14400	VA
AC Output Line Connections	4-wire WYE (L1-L2-L3-N) plus PE or 3 wire Delta		
AC Output Voltage Minimum-Nominal-Maximum[2] (L-N)	105-120-132.5		Vac
AC Output Voltage Minimum-Nominal-Maximum[2] (L-L)	183-208-229		Vac
AC Frequency Min-Nom-Max[2]	59.3 - 60 - 60.5		Hz
Max. Continuous Output Current (per Phase)	25	40	A
GFDI Threshold	1		A
Utility Monitoring, Islanding Protection, Country Configurable Set Points	Yes		
INPUT			
Maximum DC Power (Module STC)	12150	19400	W
Transformer-less, Ungrounded	Yes		
Maximum Input Voltage DC to Gnd	250	300	Vdc
Maximum Input Voltage DC+ to DC-	500	600	Vdc
Nominal Input Voltage DC to Gnd	200		Vdc
Nominal Input Voltage DC+ to DC-	400		Vdc
Maximum Input Current	26.5	38	Adc
Maximum Input Short Circuit Current	45		Adc
Reverse-Polarity Protection	Yes		
Ground-Fault Isolation Detection	1MΩ Sensitivity	350kΩ Sensitivity[3]	
CEC Weighted Efficiency	96.5	97	%
Night-time Power Consumption	< 3	< 4	W
ADDITIONAL FEATURES			
Supported Communication Interfaces	RS485, Ethernet, ZigBee (optional)		
Rapid Shutdown – NEC 2014 and 2017 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect[4]		
RS485 Surge Protection	Supplied with the inverter		
STANDARD COMPLIANCE			
Safety	UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07		
Grid Connection Standards	IEEE1547, Rule 21, Rule 14 (HI)		
Emissions	FCC part15 class B		
INSTALLATION SPECIFICATIONS			
AC output conduit size / AWG range	3/4" minimum / 12-6 AWG	3/4" minimum / 8-4 AWG	
DC input conduit size / AWG range	3/4" minimum / 12-6 AWG		
Number of DC inputs	2 pairs	3 pairs[5]	
Dimensions (H x W x D)	21 x 12.5 x 10.5 / 540 x 315 x 260		in / mm
Dimensions with Safety Switch (H x W x D)	30.5 x 12.5 x 10.5 / 775 x 315 x 260		in / mm
Weight	73.2 / 33.2	99.5 / 45	lb / kg
Weight with Safety Switch	79.7 / 36.2	106 / 48	lb / kg
Cooling	Fans (user replaceable)		
Noise	< 50	< 55	dBA
Operating Temperature Range	-40 to +140 / -40 to +60[6]		˚F / ˚C
Protection Rating	NEMA 3R		

[1] For 277/480V inverters refer to: http://www.solaredge.com/files/pdfs/products/inverters/se-three-phase-us-inverter-datasheet.pdf
[2] For other regional settings please contact SolarEdge support
[3] Where permitted by local regulations
[4] P/N SE9K-US0xxxxxx has Manual Rapid Shutdown for NEC 2014 compliance (NEC 2017 compliance with outdoor installation)
[5] Field replacement kit for 1 pair of inputs P/N: DCD-3PH-1TBK; Field replacement kit for 3 pairs of fuses and holders P/N: DCD-3PH-6FHK-S1
[6] For power de-rating information refer to: https://www.solaredge.com/sites/default/files/se-temperature-derating-note-na.pdf

RoHS

SunPower® X-Series Residential Solar Panels | X22-360

More than 22% Efficiency

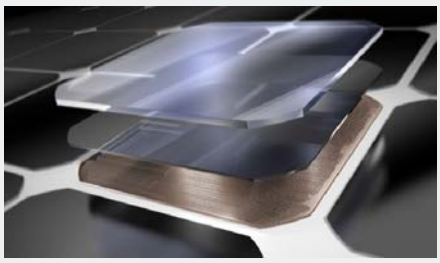
Ideal for roofs where space is at a premium or where future expansion might be needed.

Maximum Performance

Designed to deliver the most energy in demanding real-world conditions, in partial shade and hot rooftop temperatures.[1,2,4]

Premier Technology

Engineered with the newest and most powerful Maxeon technology, X-Series brings unmatched power and performance to your home.



Maxeon® Solar Cells: Fundamentally better
Engineered for performance, designed for durability.

Engineered for Peace of Mind

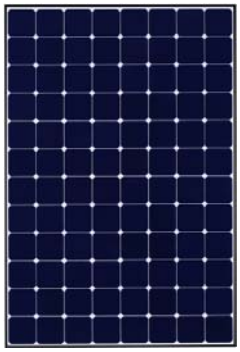
Designed to deliver consistent, trouble-free energy over a very long lifetime. [3,4]

Designed for Durability

The SunPower Maxeon Solar Cell is the only cell built on a solid copper foundation. Virtually impervious to the corrosion and cracking that degrade conventional panels. [3]

Same excellent durability as E-Series panels.
#1 Rank in Fraunhofer durability test.[9]
100% power maintained in Atlas 25+ comprehensive durability test.[10]

High Performance & Excellent Durability



SPR-X22-360

X22 SERIES

Highest Efficiency[5]

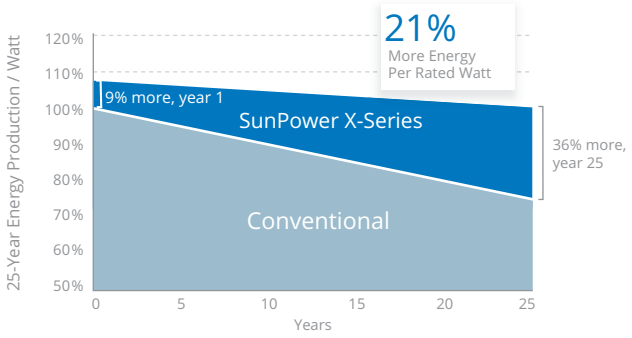
Generate more energy per square foot

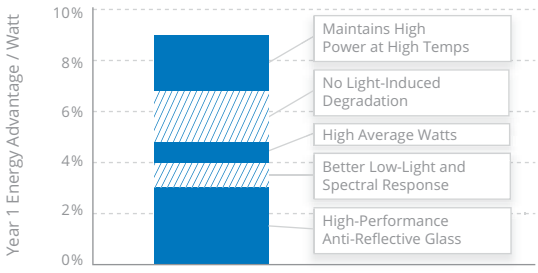
X-Series residential panels convert more sunlight to electricity by producing 38% more power per panel[1] and 70% more energy per square foot over 25 years.[1,2,3]

Highest Energy Production[6]

Produce more energy per rated watt

High year-one performance delivers 8–10% more energy per rated watt.[2] This advantage increases over time, producing 21% more energy over the first 25 years to meet your needs.[3]

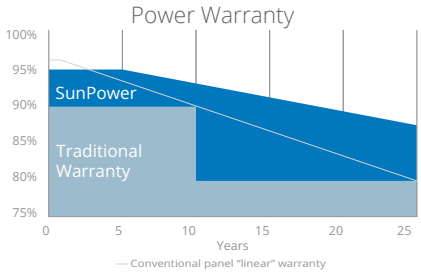




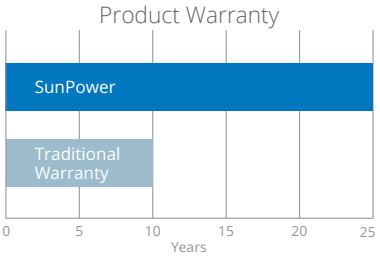
SUNPOWER®

SunPower® X-Series Residential Solar Panels | X22-360

SunPower Offers The Best Combined Power And Product Warranty



More guaranteed power: 95% for first 5 years, –0.4%/yr. to year 25 [7]

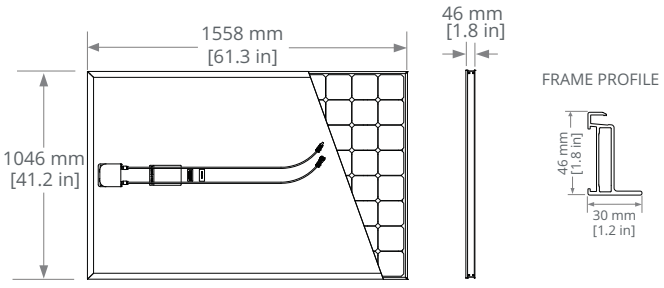


Combined Power and Product defect 25-year coverage [8]

Electrical Data	
	SPR-X22-360
Nominal Power (Pnom)[11]	360 W
Power Tolerance	+5/-0%
Avg. Panel Efficiency[12]	22.2%
Rated Voltage (Vmpp)	59.1 V
Rated Current (Impp)	6.09 A
Open-Circuit Voltage (Voc)	69.5 V
Short-Circuit Current (Isc)	6.48 A
Max. System Voltage	600 V UL & 1000 V IEC
Maximum Series Fuse	15 A
Power Temp Coef.	–0.29% / ° C
Voltage Temp Coef.	-167.4 mV / ° C
Current Temp Coef.	2.9 mA / ° C

Tests And Certifications	
Standard Tests[13]	UL1703 (Type 2 Fire Rating), IEC 61215, IEC 61730
Quality Certs	ISO 9001:2008, ISO 14001:2004
EHS Compliance	RoHS, OHSAS 18001:2007, lead free, REACH SVHC-163, PV Cycle
Sustainability	Cradle to Cradle Certified™ Silver (eligible for LEED points)[14]
Ammonia Test	IEC 62716
Desert Test	10.1109/PVSC.2013.6744437
Salt Spray Test	IEC 61701 (maximum severity)
PID Test	Potential-Induced Degradation free: 1000 V[9]
Available Listings	UL, TUV, JET, CEC

Operating Condition And Mechanical Data	
Temperature	–40° F to +185° F (–40° C to +85° C)
Impact Resistance	1 inch (25 mm) diameter hail at 52 mph (23 m/s)
Appearance	Class A+
Solar Cells	96 Monocrystalline Maxeon Gen III
Tempered Glass	High-transmission tempered anti-reflective
Junction Box	IP-65, MC4 compatible
Weight	41 lbs (18.6 kg)
Max. Load	Wind: 62 psf, 3000 Pa, 305 kg/m² front & back Snow: 125 psf, 6000 Pa, 611 kg/m² front
Frame	Class 1 black anodized (highest AAMA rating)



Please read the safety and installation guide.

REFERENCES:
1 All comparisons are SPR-X21-345 vs. a representative conventional panel: 250 W, approx. 1.6 m², 15.3% efficiency.
2 Typically 8–10% more energy per watt, BEW/DNV Engineering "SunPower Yield Report," Jan 2013.
3 SunPower 0.25%/yr degradation vs. 1.0%/yr conv. panel. Campeau, Z. et al. "SunPower Module Degradation Rate," SunPower white paper, Feb 2013; Jordan, Dirk "SunPower Test Report," NREL, Q1-2015.
4 "SunPower Module 40-Year Useful Life" SunPower white paper, May 2015. Useful life is 99 out of 100 panels operating at more than 70% of rated power.
5 Highest of over 3,200 silicon solar panels, Photon Module Survey, Feb 2014.
6 1% more energy than E-Series panels, 8% more energy than the average of the top 10 panel companies tested in 2012 (151 panels, 102 companies), Photon International, Feb 2013.
7 Compared with the top 15 manufacturers. SunPower Warranty Review, May 2015.
8 Some restrictions and exclusions may apply. See warranty for details.
9 X-Series same as E-Series, 5 of top 8 panel manufacturers tested in 2013 report, 3 additional panels in 2014. Ferrara, C., et al. "Fraunhofer PV Durability Initiative for Solar Modules: Part 2". Photovoltaics International, 2014.
10 Compared with the non-stress-tested control panel. X-Series same as E-Series, tested in Atlas 25+ Durability test report, Feb 2013.
11 Standard Test Conditions (1000 W/m² irradiance, AM 1.5, 25° C). NREL calibration Standard: SOMS current, LACCS FF and Voltage.
12 Based on average of measured power values during production.
13 Type 2 fire rating per UL1703:2013, Class C fire rating per UL1703:2002.
14 See salesperson for details.

See www.sunpower.com/facts for more reference information.
For more details, see extended datasheet: www.sunpower.com/datasheets.

Document # 514618 Rev B /LTR_US

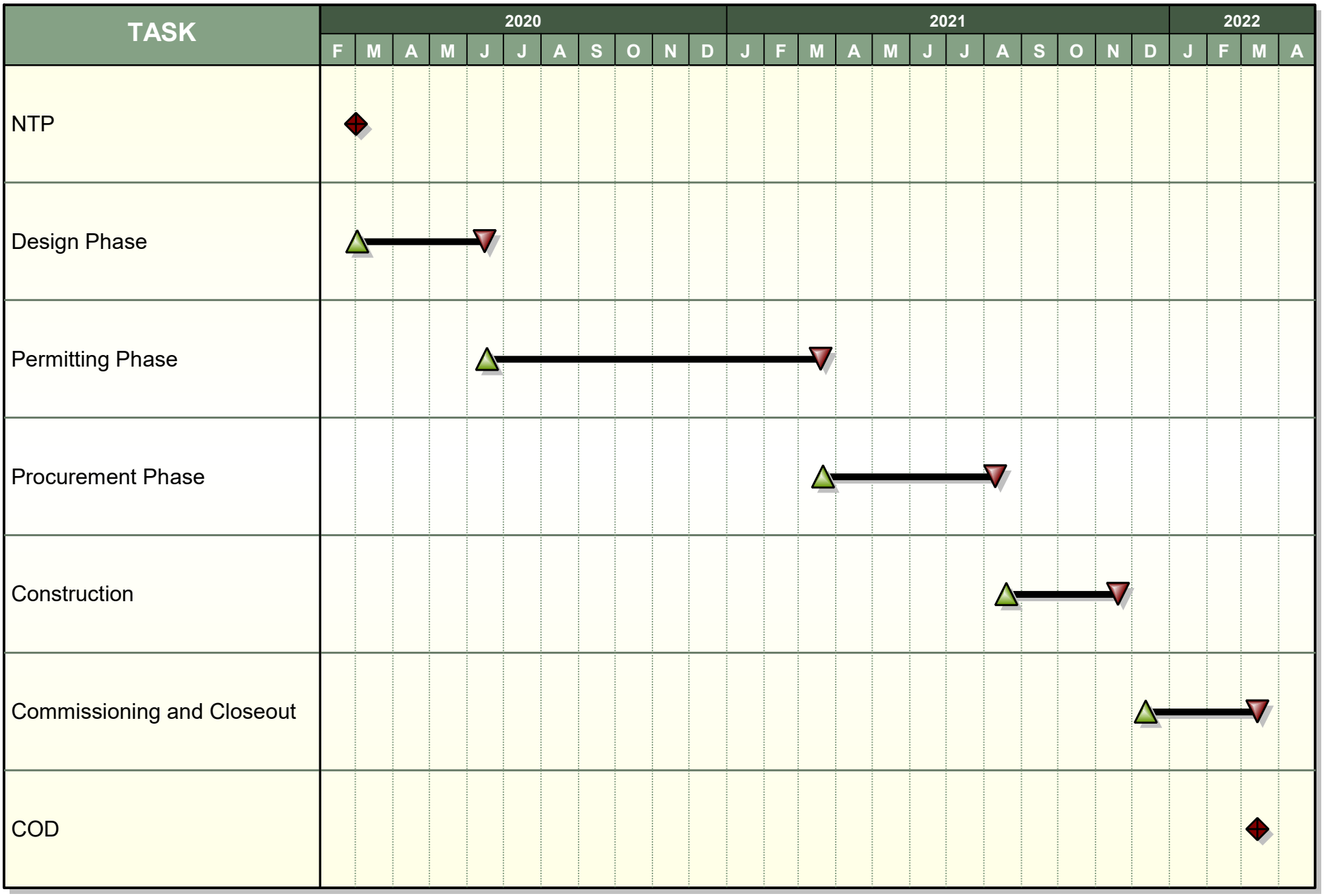
SUNPOWER®

APPENDIX 7D

- Project Implementation Preliminary Schedule

Hunts Point - PS 48
Preliminary Schedule

8/13/18



NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX C

PAYMENTS

APPENDIX C

PAYMENTS BASED ON TASKS COMPLETED

The Maximum Payment for each Portion of the Services shall be the respective amounts set forth for in the Payment Schedule annexed hereto as Exhibit 1 to this Appendix C.

Interim payments shall be made to the Consultant. The interim payments will be made no more frequently than once a month in an amount equal to the Percentage of Completion of each Portion of the Services, multiplied by the Maximum Payment for each Portion performed during the billing period, less any Retainage. The Consultant shall also be reimbursed for Allowable Additional Costs as such costs accrue. Except as may permitted under Part II, Section 2.2.1 of the Contract, Retainage will not be applied against Allowable Additional Costs.

To request an interim payment, the Consultant shall submit to the Corporation's **Accounts Payable Department**, not more than once per month, a Requisition setting forth in detail, for the period for which partial payment is requested, the following:

(i) the Percentage of Completion for each Portion of the Services performed by the Consultant during the billing period;
(ii) Allowable Additional Costs incurred during the billing period;
(iii) the amount of partial payment requested; and
(iv) a representation and warranty that, except as set forth in the Requisition, the representations and warranties made by the Consultant in Article 7 of the Contract are true and correct as of the date of the Requisition as if made on the date of the Requisition.

An EFT Enrollment Form is attached as Exhibit 2 to this Appendix C and must be completed and returned to the Corporation prior to Consultant's submission of its first Requisition.

In addition, the Consultant shall submit Progress Reports to the Director at least monthly or in accordance with any other schedule approved by the Director, or at the Director's request. Such Progress Reports shall clearly state the reasons for any actual or anticipated delays in completion of the Services.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

EXHIBIT 2 TO APPENDIX C

EFT ENROLLMENT FORM

New York City Economic Development Corporation

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION

DIRECT DEPOSIT/ELECTRONIC FUNDS TRANSFER (EFT) VENDOR PAYMENT ENROLLMENT FORM

INSTRUCTIONS: Please complete all sections of this Enrollment Form and attach a voided check or a copy of an encoded deposit slip that includes an imprinted vendor's name. See the reverse side for more information and instructions.

Mail to: New York City Economic Development Corporation, 110 William Street, 4th Floor, New York, NY 10038
Attention: Controller, Accounting Dept. or Fax to: 212-312-3914

SECTION I – VENDOR INFORMATION

1. SOCIAL SECURITY NUMBER OR TAXPAYER ID NUMBER: (AS IT APPEARS ON W-9 FORM)

2. VENDOR NAME (AS IT APPEARS ON W-9 FORM); (AS IT APPEARS ON W-9 FORM)

3. VENDOR'S PRIMARY ADDRESS:

4. VENDOR'S EMAIL ADDRESS:

5. CONTACT PERSON NAME:

6. CONTACT PERSON TELEPHONE NUMBER:

SECTION II – FINANCIAL INSTITUTION INFORMATION

1. BANK ACCOUNT NUMBER:

2. ACCOUNT NAME:

3. BANK NAME:

4. BANK BRANCH ADDRESS:

5. ROUTING TRANSIT NUMBER: (LOCATED AT THE BOTTOM OF YOUR CHECK)

6. ACCOUNTING TYPE: (CHECK ONE)
☐ CHECKING ☐ SAVINGS

7. DIRECT DEPOSIT/ACH/EFT COORDINATOR'S NAME:

8. TELEPHONE NUMBER:

SECTION III – VENDOR SIGNATURE

VENDOR SIGNATURE _____ PRINT NAME _____ DATE _____

New York City Economic Development Corporation

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION

DIRECT DEPOSIT/ELECTRONIC FUNDS TRANSFER (EFT) VENDOR PAYMENT ENROLLMENT FORM

GENERAL INSTRUCTIONS

Please complete all sections of the Direct Deposit EFT Enrollment Application and forward the completed application along with a voided check or a copy of an encoded deposit slip that includes an imprinted vendor's name to:

New York City Economic Development Corporation, 110 William St., Room 400
New York, NY 10038 – Attention: Controller, Accounting Dept or Fax to: 212-312-3914.

SECTION I – VENDOR INFORMATION

1. Enter the vendor's social security number or taxpayer ID number, the 9-digit number reported on W-9 form.
2. Provide the name of the vendor (as it appears on the W-9).
3. Enter the vendor's complete address for EFT correspondence associated with this account.
4. Provide the vendor's E-mail address, if you have one.
5. Indicate the name and telephone number of the vendor's contact person. (If you are enrolling yourself individually, you are the contact person).

SECTION II – FINANCIAL INSTITUTION INFORMATION

1. Indicate the vendor's bank account number.
2. Indicate the vendor's account name.
3. Provide bank's name.
4. Provide the complete address of your bank.
5. Indicate 9-digit routing (ABA) transit number (located at the bottom of your check).
6. Indicate type of account: (Check one box only).
7. List name and telephone number of your bank's Direct Deposit/EFT Coordinator.

SECTION III – VENDOR SIGNATURE

Sign and date where indicated.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

EXHIBIT 3 TO APPENDIX C

THE CITY OF NEW YORK • OFFICE OF THE COMPTROLLER • BUREAU OF LABOR LAW

PAYROLL REPORT

TO BE SUBMITTED WITH REQUISITION FOR PAYMENT

NAME OF PRIME CONTRACTOR			AGENCY	
NAME OF CONTRACTOR/SUBCONTRACTOR	ADDRESS	PHONE #	PAYROLL #	TAX I.D. #
CONTRACT REGISTRATION #	JOB CODE	WEEK ENDING DATE	PROJECT NAME & LOCATION	

(1)	(2)	(3)	(4)							(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
NAME ADDRESS LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER	LIST TRADE & CHECK CLASSIFICATION JOURNEYMAN APPRENTICE (NYS DOL REGISTERED) HELPER	TIME	DAY AND DATE / HOURS WORKED EACH DAY							TOTAL HOURS	BASE RATE OF PAY PER HOUR	TOTAL BASE PAY	SUPPLEMENTAL BENEFITS: RATE PER HOUR	PAID TO (Local # if Union is checked)	TOTAL BENEFITS PAID	GROSS PAY	TOTAL TAX & OTHER DEDUCTIONS	NET PAY
	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				
	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				
	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				
	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				
	☐J ☐A ☐H	RT												U Local# ____				
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	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				
	☐J ☐A ☐H	RT												U Local# ____				
		OT												E ____ O ____				

INSTRUCTIONS ON REVERSE SIDE

FALSIFICATION OF THIS STATEMENT IS A PUNISHABLE OFFENSE

This certified payroll has been prepared in accordance with the instructions contained on the reverse side of this form. I certify that the above information represents wages and supplemental benefits paid to all persons employed by my firm for construction work on the above project during the period shown. **I understand that falsification of this statement is a punishable offense.**

____________ SIGNATURE ____________ NAME (Print) ____________ TITLE ____________, 20____ DATE

Instructions for the Preparation and Submission of a Payroll Report

1. All persons who performed any on-site construction activity, during the period of the requisition, shall be listed on the Payroll Report.

2. Separate Payroll Reports shall be submitted by the prime contractor and each subcontractor who performed any on-site construction activity during the period of the requisition.

3. Failure to provide the required Payroll Report may result in the requisition for payment being returned unpaid or the payment being reduced.

4. PAYROLL REPORT HEADING: The Payroll Report Heading shall require the following information:

NAME OF PRIME CONTRACTOR: Enter the name of the firm that has entered into the contract with the New York City government agency.
NAME OF CONTRACTOR / SUBCONTRACTOR: The legal name of the firm submitting the Payroll Report shall be placed immediately below this designation. Circle either the word CONTRACTOR or SUBCONTRACTOR as applicable.
ADDRESS: Insert the current address (i.e., street, city, state and zip code) of the firm submitting the Payroll Report.
PHONE NO.: Enter the telephone number of the firm submitting the Payroll Report in the space provided.
AGENCY: Enter the name of the New York City government agency that has the contract with the Prime Contractor.
PAYROLL NO.: In the space provided, enter the Payroll Number of the Contractor or Subcontractor.
CONTRACT REG. NO.: Enter the Contract Registration Number here. This may be obtained from the "Notice of Award" and / or the "Order to Commence Work" letters.
JOB CODE: In the space provided, enter the Contractor/ Subcontractor's in-house labor distribution code or job number where applicable.
WEEK ENDING DATE: In the space provided, enter the last date of the pay-week (i.e., month, day, year).
PROJECT NAME & LOCATION: In this space, enter the Project Name and Location where contract work is being performed.
TAX I.D. NO.: Enter in this space the Federal Tax Identification Number of the firm submitting the Payroll Report.

5. For every employee who performed any on-site construction activity during the period of the Payroll Report, the following information shall be provided:

1) **NAME, ADDRESS, LAST FOUR DIGITS OF THE SOCIAL SECURITY NO.:** The legal name, current address and the last four digits of the social security number of each employee. (Employers must keep the full social security number on file for each of their covered workers.) If the employee has no social security number, please list his/her IRS Individual Taxpayer Identification Number and mark it "ITIN".
2) **LIST TRADE & CHECK WORK CLASSIFICATION:** Specify and insert the Trade applicable to the work performed by each employee. The Trade identified must be one listed on the Prevailing Wage & Supplemental Benefits Schedule of the Comptroller, i.e., Electrician, Laborer, etc. Check next to the letter J if the individual is a Journeyperson. Check next to the letter A if the person is a Registered Apprentice with the Department of Labor of the State of New York. Check next to the letter H only if the person is a Helper in a trade classification that has Helper rates listed in the Comptroller's Schedule of Prevailing Wages.
3) **TIME:** RT indicates Regular Time, and OT indicates Overtime.
4) **DAY AND DATE:** Below this heading, in the first row, enter the appropriate sequence of the contractor's pay records. MTWTFSS, for example, is the sequence to use if the workweek ends on a Sunday, and SSMTWTF is the sequence if the workweek ends on a Friday. In the second row, below each letter representing the day of the workweek, insert the corresponding date. Below the heading HOURS WORKED EACH DAY, at the intersection of the column of the particular day and date and the horizontal row of the employee's name, insert the hours worked each day in the appropriate box either for RT (Regular Time) and / or OT (Overtime). If an employee worked Shift Time, the RT (Regular Time) row shall be used and adjusted accordingly.
5) **TOTAL HOURS:** Add the hours worked for Regular and / or Shift Time with the hours worked for Overtime, and enter separate totals in this column.
6) **BASE RATE OF PAY PER HOUR:** Specify the actual base rate of pay per hour paid to the employee. Do not include supplemental benefits in this amount.
7) **TOTAL BASE PAY:** Total amount earned by the employee, not including benefits.

SUPPLEMENTAL BENEFITS:

8) **RATE PER HOUR:** Amount of supplemental benefits paid / provided per hour.
9) **PAID TO:** Place a check mark in the appropriate box: U for Union if benefits paid to a Union, E for Employee if benefits paid in cash (or check) directly to the Employee, or O for Other, if benefits are otherwise paid / provided to the employee. If U is checked, you must insert the "Local" number of the union in that box.
10) **TOTAL BENEFITS PAID:** Total amount of supplemental benefits paid / provided for the workweek to the employee.
11) **GROSS PAY:** Total amount earned for workweek: This amount comprises the Total Base Pay plus any benefit paid in cash (or check) directly to the employee [i.e., column (7) + column (9) E if Box E is checked and payment made directly to employee]. No other type of benefit should be included in this column's total.
12) **TOTAL TAX AND OTHER DEDUCTIONS:** Enter the sum total of all deductions in this column (including FICA, Federal, State and City Taxes, etc.). This does not absolve you from maintaining appropriate tax and other records required by law).
13) **NET PAY:** Total amount of pay after all deductions (i.e., the actual Take-Home Pay).

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
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NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX D

FORM OF CERTIFIED STATEMENT REGARDING USE OF NON-ORIGINAL MATERIALS

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
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APPENDIX D

FORM OF CERTIFIED STATEMENT REGARDING USE OF NON-ORIGINAL MATERIALS

STATE OF)
) ss.:
COUNTY OF)

The undersigned, being first duly sworn, deposes and states as follows:

1. I am the Principal of the Consultant named below in connection with the contract (the "Contract") identified below between the Consultant and New York City Economic Development Corporation ("NYCEDC").

2. I make this affidavit pursuant to Section 5.2.6(iii) of the Contract to verify certain information regarding non-original materials included in the Work Product (as defined in the Contract) furnished by the Consultant to NYCEDC pursuant to the Contract.

3. I hereby certify that the information set forth on the "List of Rights, Limitations and Requirements Regarding the Use and Display of Non-Original Materials Included in Consultant's Work Product" (the "Non-Original Materials List") annexed hereto and made a part hereof, and the licenses, releases, permissions, clearances and other documents (collectively, the "Licenses") annexed thereto, are complete, true and accurate as of the date of this affidavit, and I acknowledge and understand that NYCEDC shall rely thereon in connection with any use and display of such materials.

4. In particular, I hereby certify that the annexed Non-Original Materials List and Licenses set forth (i) all non-original materials included in Consultant's Work Product; (ii) all information as to the source of such materials; (iii) all information as to any durational limitations on use of such materials; (iv) all requirements as to notices that must be displayed in connection with display, including the specific owner of the rights to be credited; and (v) all other limitations on the use and display under the Licenses.

Dated: _____ Signature: _____

Consultant: _____ Printed Name: _____

NYCEDC Contract No.: _____ Title: _____

Sworn to before me this
day of , 20

Notary Public

LIST OF RIGHTS, LIMITATIONS AND REQUIREMENTS REGARDING THE USE AND DISPLAY OF NON-ORIGINAL MATERIALS INCLUDED IN CONSULTANT'S WORK PRODUCT

Non-Original Material	Source	Rights/Limitations/Requirements*

* **ATTACH COPIES OF ALL LICENSES, RELEASES, PERMISSIONS, CLEARANCES AND OTHER RELEVANT DOCUMENTS**

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
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APPENDIX E

INSURANCE REQUIREMENTS

1. **Required Policies and Amounts**
2. **Additional Insureds**
3. **Required Provisions**
4. **Sample Form of Contractor Insurance Cover Sheet, Certificate, and Endorsements**

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
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APPENDIX E

INSURANCE REQUIREMENTS

1. Required Policies and Minimum Amounts*

Workers' Compensation /Employer's Liability and Disability Benefits:	In statutory amounts
Commercial General Liability:	A minimum of $1,000,000 per occurrence, with an annual per project aggregate and products/completed operations aggregate of not less than $2,000,000 The maximum deductible or self-insured retention ("SIR") (if allowed for under Article 6.3.18) for the Commercial General Liability policy shall be $25,000. Any such self-insurance program shall provide the City and the Corporation and any other Additional Insureds with all rights that would be provided by traditional insurance required under this Article 6, including but not limited to the defense obligations that insurers are required to undertake in liability policies.
Automobile Liability:	$1,000,000 combined single limit per occurrence and aggregate. If vehicles are used for transporting any Hazardous Substances, such Automobile Liability insurance shall be endorsed to provide pollution liability broadened coverage for covered vehicles (ISO Form endorsement CA 99 48 or its reasonable equivalent, if hauling outside of New York state) as well as proof of an MCS-90 endorsement or equivalent insurance shall be obtained by the entity retained to transport such Hazardous Substances. Both shall be furnished on a primary basis with limits of liability of at least $5,000,000 providing coverage for bodily injury or property

	damage including liability for environmental restoration resulting from negligence in the operation, maintenance or use of any motor vehicle involved in the transportation of hazardous substances or any other environmentally regulated substance as required by pursuant to any federal, state or local laws, rules and regulations. A copy of each endorsement, if applicable, shall be submitted for review as part of the insurance submission showing the $5,000,000 limits if required by Corporation.
Umbrella/Excess Liability**:	$10,000,000 on a per occurrence and aggregate basis, and shall be excess of primary general, automobile and employer's primary liability limits
Professional Liability:	$5,000,000 per occurrence with a maximum deductible or SIR (if approved pursuant to Article 6.3.18) of $10,000
Employment Practices Liability:	$1,000,000 per occurrence with a maximum deductible or SIR (if allowed for under Article 6.3.18) of $10,000

If the Consultant or its Subcontractors use boats, floating equipment, barges or floats, or performs marine-related construction, the Consultant and as applicable, its Subcontractors, shall purchase and maintain additional insurance of the following types and in the following amounts in connection with the performance of the Services:

U.S. Harbor Workers' Long Shoremens' Compensation Act:	In statutory amounts
Marine Protection and Indemnity:	$25,000,000 per occurrence, but if an annual aggregate is applicable to the policy not less than $25,000,000 in the aggregate per year

If the Project is adjacent to or includes an existing railroad or subway line, the Consultant, or its Subcontractors, shall purchase and maintain the following insurance in the following amounts in connection with the performance of the Services by the Consultant and its Subcontractors, and any work incidental thereto:

Railroad Protective Liability:	As required by the railroad or subway owner

If the Consultant or any of its Subcontractors is performing asbestos or other toxic or hazardous materials remediation, removal, abatement, storage or disposal work including, without limitation, related demolition work, the Consultant or its Subcontractors shall purchase and maintain

additional insurance of the following types and in the following amounts in connection with the performance of the Services and any work incidental thereto:

Contractor Pollution Liability ("CPL") Policy and, as applicable, Asbestos Abatement Liability Policy, Lead Abatement Contractors Liability Policy, Stop Loss Policy, Professional Services Policy, Pollution Legal Liability ("PLL") Policy, Transportation Coverage and Non-Owned Disposal Site Coverage:	$5,000,000 combined single limit per occurrence for bodily injury or death, and property damage, but if an annual aggregate is applicable to the policy not less than $5,000,000 in the aggregate per year dedicated to this Project, on an "occurrence" basis, with a term of not less than ten (10) years

Such CPL and PLL policies shall be for a term of not less than (10) years, on an "occurrence" basis, and any aggregate applicable to such policies shall be dedicated to this Project. In addition, such policies shall include, without limitation, and as applicable, (a) bodily injury and defense coverage for asbestos and lead; (b) coverage for unknown UST's; (c) a definition of "property damage" that includes diminution in value of third-party properties; (d) a statement that such insurance is primary and over any surety contracts or bonds covering the Services; (e) a statement that the insured's rights will not be prejudiced if there is a failure to give notice due to the insured's belief that the occurrence was not covered; (f) coverage for products brought onto the work site where Services are being performed; (g) a definition of "stop loss" or "cleanup cost cap" that includes monitoring activities; (h) a definition of "cleanup costs" that includes any costs associated with natural resources damages; (i) a statement that exclusions for modifications of remedial action plans ("RAP") shall not include changes required by regulatory agencies (either via a change in regulations or as a result of governmental entity oversight, increased levels or quantities of pollutants within the boundary of the RAP, discovery of pollutants not identified in the exclusion, and amendments to the RAP because of a change in technological approach); and (j) coverage on a suspected release basis with no natural resource damage or non-compliance exclusions. The Consultant shall request that the disposal facility(ies) add the Consultant and the Additional Insureds to the Pollution Legal Liability Insurance policy or policies. If the facility's insurance carrier(s) agree to add such Additional Insureds, copies of applicable Certificates of Insurance, with appropriate endorsements if a Subcontractor is providing the service, received by Consultant shall be provided to the Corporation upon request.

***All required policies shall include a waiver of the right of subrogation with respect to all additional insureds named therein as well as the required Workers' Compensation coverage.**

**** Umbrella/Excess Liability coverage is not required for Subcontractors, with the exception of site inspection Subcontractor team members that are performing active site investigations.**

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
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APPENDIX E

INSURANCE REQUIREMENTS

2. Additional Insureds

For the purposes of this Contract and the requirements of Article 6 thereof including, without limitation, Section 6.3.3 (iii), the term "Additional Insureds" shall include the following individuals and entities:

New York City Economic Development Corporation
The City of New York

Add as applicable:

Construction Manager
Architect/Engineer
Environmental Consultant
Port Authority of New York and New Jersey
The State of New York
Federal Highway Administration
Federal Transit Administration
Add any other Non-Governmental Interested Parties (e.g., Port Imperial Ferry Corp. D/B/A New York Waterway, Inc.)

and their respective employees, members, officials, and officers and any such other entities and individuals as the Corporation may direct from time to time.

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APPENDIX E

INSURANCE REQUIREMENTS

3. Required Provisions

The policies required under Section 6.3.9 (ii) of the Contract shall contain the following provisions, if available:

"A. Notices from the insurer (the "Insurer") to the New York City Economic Development Corporation (the "Corporation") and the City of New York (the "City"), in connection with this policy, shall be addressed to the General Counsel, New York City Economic Development Corporation, at 110 William Street, New York, New York 10038 (with a copy to the Corporation's Contract Administrator at the same address), and to the Commissioner, New York City Department of Small Business Services, at 110 William Street, New York, New York 10038 or such other addresses as may be specified by the Corporation**;**

B. The Insurer shall accept notice of accident from the Corporation or the City as soon as practicable after receipt by an official of such Additional Insured (as identified in Appendix E of the Contract between the Corporation and the Consultant to which this policy applies) of notice of such accident as valid and timely notice under this policy;

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

D. Notice of accident or claim to the Insurer by the Consultant, the Corporation or the City shall be deemed notice by all under this policy;

E. This policy shall not be canceled, terminated or modified by the Insurer or the Consultant unless thirty (30) days prior written notice is sent by registered mail to the Corporation or the City;

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

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

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

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APPENDIX E

INSURANCE REQUIREMENTS

4. Sample Form of Contractor Insurance Cover Sheet, Certificate and Endorsements

New York City Economic Development Corporation
Contractor Insurance Documentation Cover Sheet & Checklist

This cover sheet should be completed and attached by all existing or prospective NYCEDC Contractors when submitting insurance documentation for review. ***Insurance documents submitted without this cover sheet cannot be reviewed and could delay processing of contracts and invoices.***

Contractor's Name: _____ Contract Number: -
_____

NYCEDC Project Manager:
_____

ALL Certificates of Insurance: *Please acknowledge by checking the box that the following conditions are satisfied and evidenced on all certificates:*

☐ Policy effective date is as of or prior to the date of contract execution

☐ All limits meet or exceed minimum limits required in the contract*

☐ Certificate Holder states: NYCEDC, Attn: Contracts Department, 110 William Street, New York, NY 10038

☐ Named Insured matches entity entering into contract with correct address

☐ Insurance Company Ratings comply with contract minimum rating requirement

☐ Insurers are licensed to do business in the state of New York

Liability COI Only: Please acknowledge by checking the box that the following conditions are satisfied and evidenced on the certificates:

☐ Description of Operations must include the following language:

The City of New York and the New York City Economic Development Corporation and [insert any other additional insureds as required in the contract] their employees and officers are additional insureds on a primary and non-contributory basis on the Commercial General Liability, Auto Liability and Umbrella Liability [include Pollution Liability if applicable] policies using forms [insert form numbers here]. All policies other than Professional Liability include a waiver of subrogation in favor of The City of New York and the New York City Economic Development Corporation. Coverage is equivalent to or broader than ISO CG 0 01 with no modifications to the contractual or employers' liability coverage and with no exclusion for claims arising from New York Labor Laws.

☐ General Liability Aggregate Limit applies on a per project basis

☐ Accord 855 included unless no construction/renovation/alterations/fit-out work is being done, check here if N/A: ☐

General Liability Endorsements (or their equivalents) – *Please acknowledge by checking the box that the following have been provided:*

☐ CG 20 10 & CG 20 37 – EITHER MUST NOT REQUIRE A CONTRACT BETWEEN NYCEDC AND THE CONTRACTOR OR MUST SPECIFICALLY NAME THE ADDITIONAL INSUREDS IN SCHEDULE

☐ CG 20 38 – CAN BE PROVIDED IN PLACE OF CG 20 10 (above)

☐ Primary and Non-Contributory and Waiver of Subrogation – EITHER MUST NOT REQUIRE A CONTRACT BETWEEN NYCEDC AND THE CONTRACTOR OR MUST SPECIFICALLY NAME THE ADDITIONAL INSUREDS IN SCHEDULE

Other Coverages – *Please check those that apply (evidence must be provided):*

☐ Workers Compensation / Employer's Liability – Refer to contract for forms allowed

☐ New York State Disability

☐ Builder's Risk (if applicable) – Refer to contract

☐ Professional Liability (if applicable) and/or ☐ Media Liability (if applicable) – Refer to contract

☐ Site Pollution Liability (if applicable) or ☐ Contractor's Pollution Liability (if applicable) – Refer to contract

☐ Maritime Protection & Indemnity (if applicable) and/or ☐ Maritime Hull (if applicable) – Refer to contract

☐ Railroad Protective Liability (if applicable) – Refer to contract and permit from railroad owner for limits required

☐ MCS-90 and CA9948 Pollution coverage included in Auto (if applicable) – Refer to contract

☐ Other Coverage as required by Contract, please describe:
_____

Date of Submission of Checklist:_____
Contractor/Consultant Signature: _____
Name: _____
Title: _____

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 11/11/1111

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:
Insurance Broker's Name Address	PHONE (A/C, No, Ext): FAX (A/C, No):
	E-MAIL ADDRESS:

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A :	Commercial General Liability Company	
INSURER B :	Auto Liability Company	
INSURER C :	State Insurance Fund	
INSURER D :	Umbrella Liability Company	
INSURER E :	Professional Liability Company	
INSURER F :	Builders Risk Company	

INSURED: Your Firm's Name, Address

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	GENERAL LIABILITY X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE OCCUR X Additional Insureds - City of New York; New York City Economic Development Corporation; Apple Industrial Development Corp. GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC	Y	Y	Insurance Policy #	11/11/1111	22/22/2222	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ $ $ $ 2,000,000 $
B	AUTOMOBILE LIABILITY X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS	Y	Y	Insurance Policy #	11/11/1111	22/22/2222	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
D	X UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $	Y	Y	Insurance Policy #	11/11/1111	22/22/2222	EACH OCCURRENCE AGGREGATE	$ 10,000,000 $ 10,000,000
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		Insurance Policy # *The greater of statutory amounts or $1,000,000			X WC STATU-TORY LIMITS OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000* $ $
E F G	Professional Liability (Consultant Contracts Only) Builders Risk (Construction Contracts Only) Owner's Protective Liability** (Construction Contracts Only) **In very limited situations, the City/NYCEDC/Apple may require Owner's Protective						$2,000,000 per claim and in the aggregate (100% of Maximum Contract Price)	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Referenced Project: Contract No. 1000000
Name of Project - Type of Project

MUST LIST EACH ADDITIONAL INSURED AND STATE THAT COMMERCIAL GENERAL LIABILITY AND UMBRELLA /EXCESS LIABILITY SHALL BE ON A PRIMARY AND NON-CONTRIBUTORY BASIS FOR EACH ADDITIONAL INSURED

CERTIFICATE HOLDER

New York City Economic Development Corporation
110 William Street, 6th Floor
New York, NY 10038
Attention: Contract Administration

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Signature

ACORD 25 (2010/05) The ACORD name and logo are registered marks of ACORD

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 26 04 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – DESIGNATED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):
New York City Economic Development Corporation, City of New York, and their respective members, officials, directors, officers, and employees and any other additional insureds as designated in the contract Note: For subs, coverage cannot be subject to a written contract between NYCEDC and the sub
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by your acts or omissions or the acts or omissions of those acting on your behalf:

1. In the performance of your ongoing operations; or
2. In connection with your premises owned by or rented to you.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

POLICY NUMBER: **COMMERCIAL GENERAL LIABILITY**
CG 20 10 04 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED - OWNERS, LESSEES OR CONTRACTORS - SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location(s) Of Covered Operations
New York City Economic Development Corporation, City of New York, and their respective members, officers directors, officials, amd employees and any other additional insureds as designated in the contract	Note: For subs, coverage cannot be subject to a written contract betwee EDC and the sub
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 37 04 13

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART
PRODUCTS/COMPLETED OPERATIONS LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s)	Location And Description Of Completed Operations
New York City Economic Development Corporation, City of New York, and their respective members, officials, directors, officers, and employees and any other additional insureds as designated in the contract	Note: For subs, coverage cannot be subject to a written contract between NYCEDC and the sub
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. **Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the Schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

However:

1. The insurance afforded to such additional insured only applies to the extent permitted by law; and
2. If coverage provided to the additional insured is required by a contract or agreement, the insurance afforded to such additional insured will not be broader than that which you are required by the contract or agreement to provide for such additional insured.

B. With respect to the insurance afforded to these additional insureds, the following is added to **Section III – Limits Of Insurance:**

If coverage provided to the additional insured is required by a contract or agreement, the most we will pay on behalf of the additional insured is the amount of insurance:

1. Required by the contract or agreement; or
2. Available under the applicable Limits of Insurance shown in the Declarations;

whichever is less.

This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations.

STATE OF NEW YORK
WORKERS' COMPENSATION BOARD

CERTIFICATE OF INSURANCE COVERAGE UNDER THE NYS DISABILITY BENEFITS LAW

PART 1. To be completed by Disability Benefits Carrier or Licensed Insurance Agent of that Carrier

1a. Legal Name and Address of Insured (Use street address only) Contractor or Consultant Street Address City, State Zip	1b. Business Telephone Number of Insured 123-456-7890 1c. NYS Unemployment Insurance Employer Registration Number of Insured 12345 1d. Federal Employer Identification Number of Insured or Social Security Number 12-3456789
2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) New York City Economic Development Corporation The City of New York 110 William St New York, New York 10038	3a. Name of Insurance Carrier ABC Insurance Company 3b. Policy Number of entity listed in box "1a": ABCD1234567 3c. Policy effective period: xx/xx/xx to xx/xx/xx

4. Policy covers:

a. ☒ All of the employer's employees eligible under the New York Disability Benefits Law

b. ☐ Only the following class or classes of the employer's employees:

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has NYS Disability Benefits insurance coverage as described above.

Date Signed xx/xx/xx By *Signature*
(Signature of insurance carrier's authorized representative or NYS Licensed Insurance Agent of that insurance carrier)

Telephone Number 123-457-7890 Title Title

IMPORTANT: If box "4a" is checked, and this form is signed by the insurance carrier's authorized representative or NYS Licensed Insurance Agent of that carrier, this certificate is COMPLETE. Mail it directly to the certificate holder.
If box "4b" is checked, this certificate is NOT COMPLETE for purposes of Section 220, Subd. 8 of the Disability Benefits Law. It must be mailed for completion to the Workers' Compensation Board, DB Plans Acceptance Unit, 20 Park Street, Albany, New York 12207.

PART 2. To be completed by NYS Workers' Compensation Board (Only if box "4b" of Part 1 has been checked)

State Of New York
Workers' Compensation Board

According to information maintained by the NYS Workers' Compensation Board, the above-named employer has complied with the NYS Disability Benefits Law with respect to all of his/her employees.

Date Signed_____ By_____
(Signature of NYS Workers' Compensation Board Employee)

Telephone Number_____ Title_____

Please Note: *Only insurance carriers licensed to write NYS disability benefits insurance policies and NYS licensed insurance agents of those insurance carriers are authorized to issue Form DB-120.1.* ***Insurance brokers are NOT authorized to issue this form.***

DB-120.1 (5-06)

STATE OF NEW YORK
WORKERS' COMPENSATION BOARD

CERTIFICATE OF NYS WORKERS' COMPENSATION INSURANCE COVERAGE

1a. Legal Name & Address of Insured (Use street address only) Contractor or Consultant Street Address City, State Zip Code **Work Location of Insured** *(Only required if coverage is specifically limited to certain locations in New York State, i.e., a Wrap-Up Policy)*	**1b. Business Telephone Number of Insured** 123-456-7890 **1c. NYS Unemployment Insurance Employer Registration Number of Insured** 12345 **1d. Federal Employer Identification Number of Insured or Social Security Number** 12-3456789
2. Name and Address of the Entity Requesting Proof of Coverage (Entity Being Listed as the Certificate Holder) New York City Economic Development Corporation The City of New York 110 William St New York, NY 10038	**3a. Name of Insurance Carrier** ABC Insurance Company **3b. Policy Number of entity listed in box "1a"** 1234567890 **3c. Policy effective period** xx/xx/xx to xx/xx/xx **3d. The Proprietor, Partners or Executive Officers are** ☐ **included.** **(Only check box if all partners/officers included)** ☐ **all excluded or certain partners/officers excluded.**

This certifies that the insurance carrier indicated above in box "3" insures the business referenced above in box "1a" for workers' compensation under the New York State Workers' Compensation Law. **(To use this form, New York (NY) must be listed under Item 3A on the INFORMATION PAGE of the workers' compensation insurance policy).** The Insurance Carrier or its licensed agent will send this Certificate of Insurance to the entity listed above as the certificate holder in box "2".

The Insurance Carrier will also notify the above certificate holder within 10 days IF a policy is canceled due to nonpayment of premiums or within 30 days IF there are reasons other than nonpayment of premiums that cancel the policy or eliminate the insured from the coverage indicated on this Certificate. (These notices may be sent by regular mail.) Otherwise, this Certificate is valid for one year after this form is approved by the insurance carrier or its licensed agent, or until the policy expiration date listed in box "3c", whichever is earlier.

Please Note: Upon the cancellation of the workers' compensation policy indicated on this form, if the business continues to be named on a permit, license or contract issued by a certificate holder, the business must provide that certificate holder with a new Certificate of Workers' Compensation Coverage or other authorized proof that the business is complying with the mandatory coverage requirements of the New York State Workers' Compensation Law.

Under penalty of perjury, I certify that I am an authorized representative or licensed agent of the insurance carrier referenced above and that the named insured has the coverage as depicted on this form.

Approved by: Jane Doe
(Print name of authorized representative or licensed agent of insurance carrier)

Approved by: *Signature* xx/xx/xx
(Signature) (Date)

Title: Title

Telephone Number of authorized representative or licensed agent of insurance carrier: 123-456-7890

*Please Note: Only insurance carriers and their licensed agents are authorized to issue Form C-105.2. Insurance brokers are **NOT** authorized to issue it.*

C-105.2 (9-07) www.wcb.state.ny.us

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX F

E.O. 50 SUPPLY & SERVICE RIDER

EQUAL EMPLOYMENT OPPORTUNITY

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
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APPENDIX F

E.O. 50 SUPPLY & SERVICE RIDER

EQUAL EMPLOYMENT OPPORTUNITY

[Note: for purposes of this rider, the "contractor" means the Consultant identified in this Contract]

This contract is subject to the requirements of Executive Order No. 50 (April 25, 1980) (§10-14) as revised ("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 it:

(1) will not discriminate unlawfully against any employee or applicant for employment because of race, creed, color, national origin, sex, age, handicap, marital status, sexual orientation or citizenship status 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) will not discriminate in the selection of subcontractors on the basis of the owner's, partners' or shareholders' race, color, creed, national origin, sex, age, handicap, marital status or sexual orientation or citizenship status;

(3) 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, handicap, marital status, sexual orientation or citizenship status, or it is an equal employment opportunity employer;

(4) 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 (§10-14) and the rules and regulations promulgated thereunder; and

(5) will furnish before the contract is awarded all information and reports including an Employment Report which are required by E.O. 50 (§10-14), the rules and regulations promulgated thereunder, and orders of the Director of the Division of Labor Services (the "Division"). Copies of all required reports are available upon request from the contracting agency; and

(6) will permit the Division to have access to all relevant books, records and accounts 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 such rules, regulations, or orders, such noncompliance shall constitute a material breach of the contract and noncompliance with E.O. 50 (§10-14) and the rules and regulations promulgated thereunder. After a hearing held pursuant to the rules of the Division, the Director may direct the imposition by the contracting agency head of any or all of the following sanctions:

(i) disapproval of the contractor;
(ii) suspension or termination of the contract;
(iii) declaring the contractor in default; or
(iv) in lieu of any of the foregoing sanctions, the Director may impose an employment program.

The Director of the Division may recommend to the contracting agency head that a contractor who has repeatedly failed to comply with E.O 50 (§10-14) and the rules and regulations promulgated thereunder be determined to be nonresponsible.

The contractor agrees to include the provisions of the foregoing paragraphs in every subcontract or purchase order in excess of New York City's small purchase limit established by rule of New York City's Procurement Policy Board to which it becomes a party unless exempted by E.O. 50 (§10-14) 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 the Division of Labor Services as a means of enforcing such provisions including sanctions for noncompliance.

The contractor further agrees that it will refrain from entering into any contract or contract modification subject to E.O. 50 (§10-14) and the rules and regulations promulgated thereunder with a subcontractor who is not in compliance with the requirements of E.O. 50 (§10-14) and the rules and regulations promulgated thereunder.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX G

E.O. 50 EMPLOYMENT REPORT FORM

The Consultant shall complete and submit, and if applicable, shall require its Subcontractors to complete and submit, Employment Reports (as required by E.O. 50) to the Corporation which can be found at www.nycedc.com in the following section:

"Resources/Vendor Resources"

If the Consultant cannot access or download these forms, the Corporation will, upon request, send the Consultant the required forms. The text of said section reads as follows:

Non-Construction Consulting Contracts

Non-construction consulting contracts require a Supply & Service employment report. Generally, the "under 50 employees" form should be used by companies with fewer than 50 employees, and the longer "full form" should be used for companies with more than 50 employees. Please refer to the Supply & Service instructions document to learn more about the forms.

Supply & Service Employment Report Instructions
Supply & Service – under 50 employees
Supply & Service – full form

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX H

M/WBE SUBCONTRACTORS PARTICIPATION PLAN

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
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APPENDIX I

OUTSIDE FUNDING SOURCE PROVISIONS

1. General Terms.

This Contract will be funded in whole or in part by the Funds identified in Part I, Section 4.1 of this Contract. The receipt of such Funds is conditioned upon the Consultant's compliance with certain mandatory federal, State and City terms and conditions. The Consultant must comply with all applicable mandatory terms and conditions set forth in the Applicable Requirements and Applicable Agreements including, without limitation, those set forth in Part I, Section 4.3, 4.4, this Appendix, Appendix J and in Appendix K. This Appendix shall be annexed to and made a part of any subcontract entered into by the Consultant pursuant to this Contract, and shall be binding on any Subcontractor. To the extent any terms and conditions set forth in this Appendix conflict with any other terms of this Contract, the terms and conditions of this Appendix shall govern. In the event any terms and conditions set forth in this Appendix conflict with the terms and conditions of Appendix J or Appendix K, the more stringent of the conflicting provisions shall govern.

Consultant acknowledges and agrees that the Corporation has the right to delegate the responsibilities of the Director to the City or such agency of the City as may be appropriate.

The Funds have been made available for the Project under the Applicable Requirements and Applicable Agreements including, without limitation, those listed in Part I, Section 4.4 and 4.5, and any other governing statute or agreement related to the Funds, the Project and/or the Contract.

Notwithstanding anything to the contrary in this Contract, the Corporation shall be under no obligation to make such payments except when, and to the extent, such Funds are available. The Corporation shall not be liable to the Consultant in the event any or all of such Funds are not made available.

2. Termination or Suspension Related to Unavailability of Funds.

In addition to any other right to postpone, delay suspend or terminate the Services or the Contract set forth in this Contract, if, pursuant to the Applicable Requirements or Applicable Agreements or otherwise, there shall be a suspension, termination or reduction of the Funds funding this Contract as a result of which Funds are not available for some or all payments under this Contract, the Corporation shall so notify the Consultant and the Consultant shall, and agrees to, cease to perform the activities specified in the notice (permanently or temporarily, as

specified in the notice) on the date set forth therein, which may be immediately. The Consultant shall assume no further binding obligations in connection with any Services specified in the notice to be stopped, after the date set forth in the notice, except that such cessation need only be for the period of suspension if the Services are suspended rather than terminated. The award of Funds funding this Contract may be suspended or terminated if the Consultant materially fails to comply with any term of such award. The award may also be terminated for convenience in accordance with the Applicable Requirements and Applicable Agreements.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
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APPENDIX J

APPLICABLE REQUIREMENTS

REQUIREMENTS REGARDING LOBBYING ACTIVITIES ON FEDERAL AID CONTRACTS

Federal regulations require that any contractor or firm intending to do business with the Federal government, or wishing to participate in any Contract funded with Federal money, disclose to the Federal government any lobbying activities which that Contractor or firm may have undertaken. More specifically, and in addition to disclosing lobbying efforts of any kinds, any prospective contractor or firm who expects to perform work funded with Federal moneys must certify that none of this lobbying activity has been paid for with Federal funds of any kind.

<table>
<tr>
<td>1. Type of Federal Action:

A. contract
B. grant
C. cooperative agreement
D. loan
E. loan guarantee
F. loan insurance</td>
<td>2. Status of Federal Action:

A. bid/offer/application
B. initial award
C. post-award</td>
<td>3. Report Type:

A. initial fling
B. material change
For Material Change Only:
year_____ quarter_____
date of last report_____</td>
</tr>
<tr>
<td colspan="2">4. Name and Address of Reporting Entity.

☐ Prime ☐ Subawardee
Tier _____, if known:

Congressional District, if known:</td>
<td>5. If Reporting Entity in No. 4 is Subawardee,

Enter Name and Address of Prime:

Congressional District, if known:</td>
</tr>
<tr>
<td colspan="2">6. Federal Department/Agency</td>
<td>7. Federal Program Name/Description:

CFDA Number, if applicable:</td>
</tr>
<tr>
<td colspan="2">8. Federal Action Number, if known:</td>
<td>9. Award Amount, if known:

$</td>
</tr>
<tr>
<td colspan="2">10. a. Name and Address of Lobbying Registrant:
(If individual , last name, first name MI):</td>
<td>b. Individuals Performing Services
(including address if different from No. 10a)
(last name, first name, MI)</td>
</tr>
<tr>
<td colspan="2">11. Information requested through this form is authorized by title 31 U.S.C. Section 1352. This disclosure of lobbying activities is material representation of facts upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.</td>
<td>Signature: _____

Print Name: _____

Title: _____

Telephone No: _____

Date: _____</td>
</tr>
</table>

INSTRUCTIONS FOR COMPLETION OF STANDARD FORM LLL DISCLOSURE OF LOBBYING ACTIVITIES.

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material required for each, payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or any employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identity the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow-up report caused by a material change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action Identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number, the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-001".

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/ loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full name of individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title and phone number.

CERTIFICATION OF RESTRICTION ON LOBBYING

I, _____, hereby certify on behalf
(name of authorized official)

of _____ that:
(name of bidder)

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, 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 any 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.

2. 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, the undersigned shall complete and submit Standard Form – LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance is placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making for entering into this transition imposed by Section 1352, title 31, U.S. Code. 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.

Executed this _____ day of _____, 20___

By: _____
(Signature of Authorized Official)

_____
(Signature of Authorized Official)

CERTIFICATION OF A POTENTIAL PRIME CONTRACTOR
(MAJOR THIRD PARTY CONTRACTOR)
REGARDING DEBARMENT, SUSPENSION AND OTHER RESPONSIBILITY MATTERS

The Bidder _____, certifies to the best of its knowledge and belief, that it and its principals:

1. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

2. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

3. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or Local) with commission of any of the offenses enumerated in paragraph (2) of this certification; and

4. Have not within a three-year period preceding this proposal or bid had one or more public transactions (Federal, State or Local) terminated for cause or default.

5. The Bidder agrees to provide the contracting agency with immediate written notice if, at any time, it learns that its certification was erroneous when submit ted or has become erroneous by reason of changed circumstances. Each Subcontractor or Vendor for the Contractor shall provide the same updated notice to the Contractor and the Contractor shall be solely responsible for collecting, updating and submitting updated information to the contracting agency.

NOTE: If for any reason the Bidder is unable to certify to any of the statements in this certification, the Bidder shall attach an explanation to this certification.

THE BIDDER, _____CERTIFIES OR AFFIRMS THE TRUTHFULNESS AND ACCURACY OF THE CONTENTS OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C. SECTIONS 3801 ET SEQ. ARE APPLICABLE THERETO.

_____
Signature and Title of Authorized Official

_____
Date

CERTIFICATION OF A POTENTIAL SUBCONTRACTOR/SUPPLIER REGARDING DEBARMENT, SUSPENSION AND OTHER INELIGIBILITY AND VOLUNTARY EXCLUSION

1. The potential Subcontractor/Supplier, _____ certifies, by submission of this proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2. If for any reason the potential Subcontractor/Supplier, is unable to certify to any of the statements in this certification, it shall attach a explanation to this proposal.

3. THE POTENTIAL SUBCONTRACTOR/SUPPLIER, _____, CERTIFIES OR AFFIRMS THE THRUTHFULNESS AND ACCURACY OF THE STATEMENTS SUBMITTED ON OR WITH THIS CERTIFICATION AND UNDERSTANDS THAT THE PROVISIONS OF 31 U.S.C, SECTIONS 3801 ET. SEQ ARE APPLICABLE THERETO.

4. The Subcontractor/Supplier shall provide to the NYCEDC and the Subcontractor shall provide to the Contractor immediate written notice at any time it learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

_____
Signature and Title of Authorized Official

_____
Date

Contractor Note: Contactor must require all Subcontractor/Suppliers to complete this certification and Contractor shall submit the certifications to the NYCEDC as they are received.

Section 3 Clause

All Section 3 covered contracts must include the following clause **in its entirety:**

A. The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted project covered by Section 3, shall, to the greatest extent feasible, be directed to low- and very low- income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment practices can see the notice. The notice shall described the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected, but before the contract is executed, and (2) with persons other than those to whom the regulation of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

G. With respect to work performed in connection with Section 3 covered Indian housing assistance, Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of Section 3 and Section 7(b) agree to comply with Section 3 to the maximum extent feasible, but not in derogation of compliance with Section 7(b).[1]

[1] This paragraph (G) is not applicable to the HOME Program; nonetheless, the regulations require that the Section 3 clause be included verbatim in all contracts subject to the requirements of Section 3.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX K

APPLICABLE AGREEMENTS

UNIFORM FEDERAL CONTRACT PROVISIONS RIDER FOR FEDERALLY FUNDED PROCUREMENT CONTRACTS

(Version 02.16.2018)

[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 the U.S. Department of Housing and Urban Development CDBG Program or CDBG-DR Program must also include the CDBG or CDBG-DR Rider, as applicable.]

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 (iv) 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 (iv) 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 (c), the basis of settlement shall be as provided for in subparagraph (iv) 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 (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 is currently in a state of debarment, suspension, or other ineligible status as a result of prior performance, failure, fraud, or violation of City laws. The Contractor further certifies that neither it nor

its principals is debarred, suspended, otherwise excluded from or ineligible for participation in Federal assistance programs. The City reserves the right to terminate this Contract if knowledge of debarment, suspension 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 § 200.322, Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (codified at 42 USC § 6962). 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) *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.

(9) *Records Retention.* The Contractor shall retain all books, documents, papers, and records relating to the services performed under the Contract for three years after final payment under the Contract is made and all other pending matters are closed.

(10) *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.

(11) *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.

(12) *Intangible Property*.

a. Pursuant to 2 CFR § 200.315(d), 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): If required by the federal program legislation, in Construction contracts involving an excess of $2000, and subject to any other federal program limitations, 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. If required by the federal program legislation and subject to any other federal program limitations, 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. The Copeland "Anti-Kickback" Act (18 U.S.C. § 874), as supplemented by the regulations contained in 29 CFR Part 3, requiring that all laborers and mechanics shall be paid unconditionally and not less often than once a week, and prohibiting all but "permissible" salary deductions.

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.

(2) *Equal Employment Opportunity.* Executive Order 11246, as amended by Executive Order 11375, 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, 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, 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), and (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.

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 publication, on sale or public use 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. The Contractor will file patent applications in additional countries or international patent offices within either ten months of the corresponding initial patent application or six months from the date permission is granted by the Commissioner of Patents and Trademarks to file foreign patent applications where such filing has been prohibited by a Secrecy Order.

iv. Requests for extension of the time for disclosure, election, and filing under subparagraphs (1), (2), and (3) may be granted at the discretion of the Federal Agency.

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), above, or elects not to retain title; provided that the Federal Agency may only request title within 60 calendar days after learning of the failure of the Contractor to disclose or elect within the specified times.

ii. In those countries in which the Contractor fails to file patent applications within the times specified in (c) above; provided, however, that if the Contractor has filed a patent application in a country after the times specified in (c) above, 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 application for, to pay the maintenance fees on, or defend in 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 calendar 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), above, 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 (c)(1), above. 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. The Contractor will notify the Federal Agency of any decisions not to continue the prosecution of a patent application, pay maintenance fees, or defend in a reexamination or opposition proceeding on a patent, in any country, not less than thirty calendar days before the expiration of the response period required by the relevant patent office.

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 small business firm or domestic nonprofit organization. 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.

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 Secretary may review the Contractor's licensing program and decisions regarding Small Business Firm applicants, and the Contractor will negotiate changes to its licensing policies, procedures, or practices with the Secretary when the Secretary's review discloses that the Contractor could take reasonable steps to implement more effectively the requirements of this paragraph (k)(iv).

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.

FEDERAL EXHIBIT 2

[Insert Exhibit 2 for applicable federal grant program]

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. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section l(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part

of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee 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 the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section l(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section l(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at *http://www.dol.gov/esa/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant ',to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, 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 the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than $5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds $100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(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 the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In 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 subparagraph (1) of this paragraph, 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 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee 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 contract, 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 subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph 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 subparagraphs (1) through (4) of this paragraph.

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 the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

EXHIBIT 3

INVESTIGATIONS CLAUSE, CONFLICTS OF INTEREST CLAUSE; AND EXECUTIVE ORDER NO. 50

I. Investigations Clause

A. The Contractor agrees to cooperate fully and faithfully with any investigation, audit or inquiry conducted by a State or City agency or authority that is empowered directly or by designation to compel the attendance of witnesses and to examine witnesses under oath, or conducted by 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.

B. 1. If any person who has been advised that his or her statement, and any information from such statement, will not be used against him or 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 examine witnesses under oath concerning the award of or performance under any transaction, agreement, lease, permit, contract, or license entered into with the City, or 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, or;

2. If any person refuses to testify for a reason other than the assertion of his or her privilege against self-incrimination in an investigation, audit or inquiry conducted by a City or State governmental agency or authority empowered directly or by designation to compel the attendance of witnesses and to take testimony under oath, or by the Inspector General of the governmental agency that is a party in interest in, and is seeking testimony concerning the award of, or performance under, any transaction, agreement, lease, permit, contract, or license entered into with the City, the State, or any political subdivision thereof or any local development corporation within the City, then;

C. 1. The Commissioner or Agency Head 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 (5) days' written notice to the parties involved to determine if any penalties should attach for the failure of a person to testify.

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

D. The penalties that may attach after a final determination by the Commissioner or Agency Head may include but shall not exceed:

1. The disqualification for a period not to exceed five (5) 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 the City; and/or

2. The cancellation or termination of any and all such existing City contracts, leases, permits or licenses that the refusal to testify concerns and that have not been assigned as permitted under this agreement, 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 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 City.

E. The Commissioner or Agency Head shall consider and address in reaching his or her determination and in assessing an appropriate penalty the factors in Paragraphs (1) and (2) below. He or she may also consider, if relevant and appropriate, the criteria established in Paragraphs (3) and (4) below, in addition to any other information that may be relevant and appropriate:

1. 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.

2. 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.

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

4. 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 under Paragraph D above, provided that the party or entity has given actual notice to the Commissioner or Agency Head upon the acquisition of the interest, or at the hearing called for in Paragraph (C)(1) above gives notice and proves that such interest was previously acquired. Under either circumstance, the party or entity must present evidence at the hearing demonstrating the potential adverse impact a penalty will have on such person or entity.

F. Definitions

1. The term "license" or "permit" as used in this Section 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 Section 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 Section shall be defined as any firm, partnership, corporation, association, 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 Section shall be defined as any person associated with another person or entity as a partner, director, officer, principal, or employee.

G. In addition to and notwithstanding any other provision of this agreement, the Commissioner or Agency Head may in his or her sole discretion terminate this agreement upon not less than three (3) Days written notice in the event the Contractor fails to promptly report in writing to the City Commissioner of Investigation any solicitation of money, goods, requests for future employment or other benefits or thing of value, by or on behalf of any employee of the City or other person or entity for any purpose that may be related to the procurement or obtaining of this agreement by the Contractor, or affecting the performance of this agreement.

II. Conflicts of Interest

A. The Contractor represents and warrants that neither it nor any of its directors, officers, members, partners or employees, has any interest nor shall they acquire any interest, directly or indirectly, which conflicts in any manner or degree with the performance of this agreement. The Contractor further represents and warrants that no person having such interest or possible interest shall be employed by or connected with the Contractor in the performance of this agreement.

B. Consistent with Charter § 2604 and other related provisions of the Charter, the Admin. Code and the New York State Penal Law, no elected official or other officer or employee of the City, nor any person whose salary is payable, in whole or in part, from the City Treasury, shall participate in any decision relating to this agreement which affects his or her personal interest or the interest of any corporation, partnership or other entity in which he or she is, directly or indirectly, interested; nor shall any such official, officer, employee, or person have any interest in, or in the proceeds of, this agreement. This Paragraph B shall not prevent directors, officers, members, partners, or employees of the Contractor from participating in decisions relating to this agreement where their sole personal interest is in the Contractor.

C. The Contractor shall not employ a person or permit a person to serve as a member of the Board of Directors or as an officer of the Contractor if such employment or service would violate Chapter 68 of the Charter.

III. Non-Discrimination: E.O. 50 -- Equal Employment Opportunity

A. This agreement is subject to the requirements of City Executive Order No. 50 (1980) ("E.O. 50"), as revised, and the rules set forth at 66 RCNY § 10-01 et seq. No agreement will be awarded unless and until these requirements have been complied with in their entirety. The Contractor agrees that it:

1. Will not discriminate unlawfully against any employee or applicant for employment because of race, creed, color, national origin, sex, age, disability, marital status, sexual orientation or citizenship status 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. Will not discriminate unlawfully in the selection of subcontractors on the basis of the owners', partners' or shareholders' race, color, creed, national origin, sex, age, disability, marital status, sexual orientation, or citizenship status;

3. 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 unlawful discrimination based on race, color, creed, national origin, sex, age, disability, marital status, sexual orientation or citizenship status, and that it is an equal employment opportunity employer;

4. 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;

5. Will furnish before this agreement is awarded all information and reports including an Employment Report which are required by E.O. 50, the rules and regulations promulgated thereunder, and orders of the City Department of Small Business Services, Division of Labor Services ("DLS"); and

6. Will permit DLS to have access to all relevant books, records, and accounts for the purposes of investigation to ascertain compliance with such rules, regulations, and orders.

B. The Contractor understands that in the event of its noncompliance with the nondiscrimination clauses of this agreement or with any of such rules, regulations, or orders, such noncompliance shall constitute a material breach of this agreement 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 Commissioner to impose any or all of the following sanctions:

1. Disapproval of the Contractor; and/or

2. Suspension or termination of the agreement; and/or

3. Declaring the Contractor in default; and/or

4. In lieu of any of the foregoing sanctions, imposition of an employment program.

C. Failure to comply with E.O. 50 and the rules and regulations promulgated thereunder in one or more instances may result in the Department declaring the Contractor to be non-responsible.

D. The Contractor agrees to include the provisions of the foregoing Paragraphs in every subcontract or purchase order in excess of One Hundred Thousand Dollars ($100,000) 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. A supplier of unfinished products to the Contractor needed to produce the item contracted for shall not be considered a subcontractor or vendor for purposes of this Paragraph.

E. The Contractor further agrees that it will refrain from entering into any subcontract or modification thereof 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. A supplier of unfinished products to the Contractor needed to produce the item contracted for shall not be considered a subcontractor for purposes of this Paragraph.

F. Nothing contained in this Section shall be construed to bar any religious or denominational institution or organization, or any organization operated for charitable or educational purposes, that is operated, supervised or controlled by or in connection with a religious organization, from lawfully limiting employment or lawfully giving preference to persons of the same religion or denomination or from lawfully making such selection as is calculated by such organization to promote the religious principles for which it is established or maintained.

CDBG-DR Rider

(Version 02.16.2018)

INSTRUCTIONS TO NYC AGENCIES AND OFFICES

This CDBG Rider contains supplementary general conditions for use with procurement contracts and subrecipient agreements that are funded in whole or in part by the U.S. Department of Housing and Urban Development ("HUD") under Title I of the Housing and Community Development Act of 1974 (Pub. L. 93-383) as amended. For all procurement contracts and subrecipient agreements funded by the Community Development Block Grant Disaster Recovery ("CDBG-DR") Program, ***except those funded by the regular CDBG ("CDBG") Program***, this CDBG-DR Rider must be included as an attachment, expressly made a part of, and incorporated by reference. A different rider with terms specific to the regular CDBG Program should be attached to CDBG funded procurement contracts and subrecipient agreements.

If this rider is attached to a subrecipient agreement, the agency or office must ensure that the subrecipient agreement includes the information specific to the subaward required in 2 CFR § 200.331.

FEDERAL REGISTER NOTICES

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Federal Register Notices applicable to the use of CDBG-DR Funds for Hurricane Sandy disaster recovery are available on the HUD Web site at https://www.hudexchange.info/cdbg-dr/cdbg-dr-laws-regulations-and-federal-register-notices.

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ARTICLE 1. DEFINITIONS

As used in this CDBG-DR Rider:

(a) “Act” means Title 1 of the Housing and Community Development Act of 1974 (Pub. L. 93-383) as amended.

(b) “Agency” means the entity, or entities, executing this Agreement on behalf of the City of New York.

(c) “Agreement” means either the “contract” (as defined by 2 CFR § 200.22) between the City and the Contractor or the agreement between the City and “Subrecipient” as defined by 2 CFR § 200.93 as the context requires.

(d) “City” means the City of New York.

(e) “Construction” means the building, rehabilitation, alteration, conversion, extension, demolition, painting or repair of any improvement to real property.

(f) “Contractor” and/or “Subrecipient” means the entity or entities executing this Agreement, other than the Agency.

(g) “Equipment” means tangible personal property (including information technology systems) having a useful life of more than one year and a per-unit acquisition cost which equals or exceeds $5,000.

(h) “Grant” means Community Development Block Grant Program funds provided to the City of New York by the Federal Department of Housing and Urban Development or a pass-through entity.

(i) “Hometown Plan” means a voluntary areawide plan that was developed by representatives of affected groups (usually labor unions, minority organizations, and contractors), and subsequently approved by the Office of Federal Contract Compliance (OFCC), for purposes of implementing the equal employment opportunity requirements pursuant to Executive Order 11246, as amended.

(j) “HUD” means the Secretary of Housing and Urban Development or a person authorized to act on his or her behalf.

(k) “Program” means the New York City Community Development Block Grant Program approved by HUD as the same may from time to time be amended.

(l) "Real property" means land, including land improvements, structures and appurtenances thereto, but excludes moveable machinery and moveable equipment.

(m) “Subcontractor” means any person, firm or corporation, other than employees of the Contractor or the Subrecipient, or another Subcontractor who is engaged by the Contractor or the Subrecipient to furnish (i) services, (ii) labor or (iii) services and/or labor and materials at the site of the work performed under this Agreement.

ARTICLE 2. HOUSING AND COMMUNITY DEVELOPMENT ACT AND NATIONAL ENVIRONMENTAL POLICY ACT

[Applicable to Contractors and Subrecipients]

This Agreement is subject to Title 1 of the Housing and Community Development Act of 1974 (P.L. 93-383) as amended (The Act) and all rules, regulations and requirements now issued or hereafter issued pursuant to the Act; the Agreement may be suspended and/or terminated without liability to the City if the Grant to the City pursuant to the Act is suspended or terminated, and unless and until the City or Agency receives Community Development funds in an amount that is deemed sufficient to enable it to fund this Agreement, the City or Agency is under no obligation to make any payments to the Contractor or Subrecipient. In this regard, the Agency is under no obligation to make any payments to the Contractor or Subrecipient, and shall not make any such payment, and the Contractor or Subrecipient shall not commence performance, until:

(a) the Agency has received from the City's Office of Management and Budget instructions to proceed, evidencing compliance with the National Environmental Policy Act, as amended, and with regulations of the U.S. Department of Housing and Urban Development, related thereto, found at 24 CFR Part 58, and

(b) the Contractor or Subrecipient has been notified of such instructions by the Agency. Furthermore, the Contractor or Subrecipient and the City mutually agree that the Contractor or Subrecipient shall not advance any funds, from any source without limitation, to pay for costs intended to be paid for under this Agreement prior to the receipt and notification described in this paragraph (a), and the City shall not reimburse the Contractor or Subrecipient for any costs incurred in violation of this provision.

ARTICLE 3. LABOR REQUIREMENTS

[Applicable to Contractors and Subrecipients; must be included in all subcontracts]

(a) ***Section 3.*** This Agreement is subject to Section 3 of the Housing and Urban Development Act of 1968 (P.L. 90-448) and implementing regulations at 24 CFR Part 135, as may be amended during the term of this Agreement. Pursuant to 24 CFR § 135.38, the Contractor or Subrecipient agrees to the following:

1. The work to be performed under this Agreement is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. § 1701 u (Section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by Section 3 shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

2. The parties to this Agreement agree to comply with HUD's regulations in 24 CFR Part 135, which implement Section 3. As evidenced by their execution of this Agreement, the parties to this Agreement certify that they are under no contractual or other impediments that would prevent them from complying with the Part 135 regulations.

3. The Contractor or Subrecipient agrees to send to each labor organization or representative of workers with which the Contractor or Subrecipient has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the Contractor's or Subrecipient's commitments under this Section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the Section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

4. The Contractor or Subrecipient agrees to include this Section 3 clause in every subcontract subject to compliance with regulations in 24 CFR Part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause, upon a finding that the Subcontractor is in violation of the regulations in 24 CFR Part 135. The Contractor or Subrecipient will not subcontract with any Subcontractor where the Contractor or Subrecipient has notice or knowledge that the Subcontractor has been found in violation of the regulations in 24 CFR Part 135.

5. The Contractor or Subrecipient will certify that any vacant employment positions, including training positions, that are filled (1) after the Contractor or Subrecipient is selected but before the Agreement is executed, and (2) with persons other than those to whom the regulations of 24 CFR Part 135 require employment opportunities to be directed, were not filled to circumvent the Contractor's or Subrecipient's obligations under 24 CFR Part 135.

6. Noncompliance with HUD's regulations in 24 CFR Part 135 may result in sanctions, termination of this Agreement for default, and debarment or suspension from future HUD assisted contracts.

7. With respect to work performed in connection with Section 3 covered Indian Housing Assistance, Section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this Agreement. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this Agreement that are subject to the provisions of Section 3 and Section 7(b) agree to comply with Section 3 to the maximum extent feasible, but not in derogation of compliance with Section 7(b).

8. The Contractor or Subrecipient agrees to submit, and shall cause its subcontractors to submit, quarterly reports to the Agency detailing the number of new employees hired, the number of new Section 3 employees hired, and any affirmative efforts made to direct hiring efforts to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing during the previous quarter.

(b) ***The Davis-Bacon Act (40 U.S.C. §§ 3141* et seq.*).*** In Construction contracts involving an excess of $2000, unless exclusively in connection with the rehabilitation of residential property containing fewer than 8 units, the Contractor shall pay and the Subrecipient shall cause its contractors to pay all laborers and mechanics 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 Agency. 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. **This provision supersedes section D(1)(a) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts.**

(c) ***Overtime.*** In Construction contracts involving an excess of $2000, and subject to the exception in 24 CFR section 570.603 (regarding the rehabilitation of residential property containing less than 8 units), Contractor shall comply and the Subrecipient shall cause its contractor to comply with sections 103 and 107 of the Contract Work Hours and Safe Standards Act (40 U.S.C. §§ 3701 *et seq.*), 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. 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. **This provision supersedes section D(1)(b) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts.**

ARTICLE 4. ADDITIONAL FEDERAL CONDITIONS FOR CONSTRUCTION FOR SUBRECIPIENTS

[Applicable to Subrecipients. A similar provision for Contractors is included in the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts at section D(1)(c)-(d), (2) and (3).]

If this Agreement involves Construction work, design for Construction, or Construction services, all such work or services performed by the Subrecipient and its Subcontractors shall be subject to the following requirements:

(a) ***Impermissible Salary Deductions.*** In Construction contracts of any amount, the Subrecipient shall cause its Subcontractor to comply with the Copeland "Anti-Kickback" Act (18 U.S.C. § 874), as supplemented by the regulations contained in 29 CFR Part 3, requiring that all laborers and mechanics shall be paid unconditionally and not less often than once a week, and prohibiting all but "permissible" salary deductions.

(b) ***Federal Labor Standards.*** In Construction contracts of any amount, the Subrecipient shall cause its Subcontractors to comply with the more detailed statement of Federal Labor Standards annexed hereto as FEDERAL EXHIBIT 2.

(c) ***Equal Employment Opportunity.*** In Construction contracts or subcontracts in excess of $10,000, the Subrecipient shall cause its Subcontractors to comply with Executive Order 11246, as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR chapter 60). Subrecipient shall include the following Specifications, which are required pursuant to 41 CFR § 60-4.3 in all federally assisted contracts and 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. (Federal Notice Required by 41 CFR § 60-4.3)

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 Agreement 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 Agreement 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, 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, 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).

(B) **Equal Opportunity Clause.** Subrecipient shall include the following provisions, which are required by 41 CFR § 60-1.4(b), in all federally assisted contracts and subcontracts.

> 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 HUD 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 HUD 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 HUD, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

ARTICLE 5. FEDERAL NON-DISCRIMINATION LAWS

[Applicable to Contractors and Subrecipients]

This Agreement is subject to:

(a) Section 109 of the Act, which requires that no person in the United States shall on the grounds of race, color, national origin, religion, or sex be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance made available pursuant to the Act. Section 109 also directs that the prohibitions against discrimination on the basis of age under the Age Discrimination Act and the prohibitions against discrimination on the basis of disability under Section 504 shall apply to programs or activities receiving Federal financial assistance under Title I programs. The Contractor or Subrecipient agrees to comply with provisions of 24 CFR Parts 6, 8, and 146.

(b) Title VIII of the Civil Rights Act of 1968 (P.L. 90-284; 42 U.S.C. §§ 3602-3620), as amended, which prohibits discrimination in the sale or rental of housing and in the provision of brokerage services based on race, color, religion, sex, national origin, disability, or familial status, and which requires affirmative action in the furtherance of Fair Housing objectives.

(c) Executive Order 11063, as amended by Executive Order 12259, pursuant to regulations issued at 24 CFR Part 107, which prohibits discrimination on the basis of race, color, religion, sex or national origin and requires equal opportunity in housing constructed, operated or provided with federal funds.

(d) Title VI of the Civil Rights Act of 1964 (P.L. 88-352; 42 U.S.C. §§ 2000d *et seq.*) and implementing regulations in 24 CFR Part 1, which states that no person shall, on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or otherwise be subject to discrimination under any Program or activity made possible by, or resulting from, this Agreement.

(e) 24 CFR § 5.109, "Equal participation of faith-based organizations in HUD programs and activities."

(f) Consistent with 24 CFR § 570.614, the Contractor or Subrecipient warrants that all services, programs, and/or Construction (including design and alteration) under this Agreement shall be performed in accordance with all federal, state and local laws and regulations regarding accessibility standards for persons with disabilities including, but not limited to, the following: Section 504 of the Rehabilitation Act, the Architectural Barriers Act of 1968 (42 U.S.C. § 4151-4157), the Uniform Federal Accessibility

Standards (Appendix A to 24 CFR Part 40 and Appendix A to 41 CFR Part 101-19, subpart 101-19.6), and the Americans with Disabilities Act (42 U.S.C. § 12131; 47 U.S.C. §§ 155, 201, 218, and 225).

The non-discrimination provisions in this Article shall be incorporated in and made a part of all subcontracts executed in connection with this Agreement.

(g) Subrecipients shall comply with all civil-rights related requirements, pursuant to 24 CFR § 570.503(b)(5).

ARTICLE 6. ENVIRONMENTAL PROTECTION; ENERGY EFFICIENCY; HISTORIC PRESERVATION; FLOOD PROTECTION; LEAD-BASED PAINT

[Paragraphs (a) – (e) applicable to Contractors and Subrecipients; paragraph (f) applicable to Subrecipients]

(a) For agreements, subcontracts, and subgrants of amounts in excess of $150,000, the Contractor or Subrecipient shall comply with all applicable standards, orders, or requirements issued under the Clean Air Act (42 U.S.C. § 7401, Federal Water Pollution control Act (33 U.S.C. §§ 1251, et seq.) 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).

(b) The Subrecipient and 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). Further, the Contractor or Subrecipient shall comply with the construction standards concerning energy efficiency set forth in section VI(A)(1)(a)(5) of HUD Docket No. FR-5696-N-01.

(c) This Agreement is subject to laws and authorities listed in 24 CFR § 58.5, including the Historic Preservation Act of 1966 (Section 1 of Pub. L. No. 89-665, as amended by Pub. L. No. 96-515; 54 U.S.C. §§ 100101 and 300101 *et seq.*), the Archeological and Historic Preservation Act of 1974 (P.L. 93-291; 16 U.S.C. §§ 469-469c), Executive Order 11593 and regulations at 36 CFR Part 800. In general, this requires concurrence from the State Historic Preservation Officer for all rehabilitation and demolition of historic properties that are fifty years old or older or that are included on a Federal, state, or local historic property list.

(d) This Agreement is subject to the Lead-Based Paint Poison Prevention provisions found in 24 CFR § 570.608, the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4821-4846), the Residential Lead Based Paint Hazard Reduction Act of 1992 (U.S.C. §§ 4851-4856, and 24 CFR Part 35, subparts A, B, J, K, and R. This provision is to be included in all subcontracts, for work in connection with this Agreement, which relate to residential structures.

(e) Pursuant to the provisions in 24 CFR § 570.605, Section 202(a) of the Flood Disaster Protection Act of 1973 (42 U.S.C. § 4106), and the regulations in 44 CFR Parts 59-79 apply to this Agreement.

(f) Subrecipients shall implement procedures and mechanisms to ensure that assisted property owners comply with all flood insurance requirements set forth in Section VI(B)(31) of HUD Docket No. FR-56960-N-01.

ARTICLE 7. UNIFORM RELOCATION ASSISTANCE

[Applicable to Contractors and Subrecipients]

This Agreement is subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. §§ 4601-4655) and regulations at 49 CFR Part 24 and 24 CFR section 570.606.

ARTICLE 8. UNIFORM ADMINISTRATIVE REQUIREMENTS (INCLUDING PROCUREMENT STANDARDS), COST PRINCIPLES, AND AUDIT REQUIREMENTS FOR FEDERAL AWARDS

[Subdivision (a) is applicable to Contractors and Subrecipients; subdivision (b) is applicable to Subrecipients only; subdivision (c) is applicable to Contractors only]

(a) Pursuant to 2 CFR § 2400.101 and 24 CFR § 85.1, Subrecipients and Contractors are subject to the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 CFR Part 200 (commonly referred to the "Super Circular"), as applicable.

(b) For the procurement of all subcontracts and goods contracts, Subrecipients are required to follow the procurement standards in 2 CFR §§ 200.318-200.326, except as allowed by 2 CFR § 200.110.

(c) Contractors are subject to the Uniform Federal Contract Provisions Rider, attached to this Agreement.

ARTICLE 9. UNEARNED PAYMENTS; INCOME; DOCUMENTATION OF COSTS; ACCOUNTING SYSTEM; FIDELITY BONDS; DISBURSEMENT RESTRICTIONS

[Paragraphs (a), (b), (d), and (e) are applicable to Contractors and Subrecipients; paragraph (c) is applicable to Subrecipients only]

(a) Unearned payments under this Agreement may be suspended or terminated upon refusal to accept any additional conditions that may be imposed by HUD at any time, or if the

Grant to the City under the Act is suspended or terminated. Unearned payments received by the Contractor or Subrecipient will be returned to the City.

The Contractor or Subrecipient agrees that if any income is generated from the Community Development Block Grant Program funded activities, Contractor or Subrecipient shall return such income to the City's Community Development Block Grant Program unless expressly authorized by the City. Such funds are subject to all applicable requirements governing the use of Community Development Block Grant funds, including 24 CFR § 570.503(b)(3), which provides that, at the end of the program year, the City may require remittance of all or part of any program income balances (including investments thereof) held by the Subrecipient (except those needed for immediate cash needs, cash balances of a revolving loan fund, cash balances from a lump sum drawdown, or cash or investments held for section 108 security needs). Alternative program requirements concerning the definition of "program income" are set forth in Section VI(A)(17)(a)-(b) of Docket No. FR-56960-N-01, as amended by Section II(5) of Docket No. FR-5710-N-01.

(b) All costs shall be supported by properly executed payrolls, time records, invoices, contracts, 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 readily accessible.

(c) The Subrecipient shall submit to the Agency a detailed description of its accounting, reporting and internal control systems, including but not limited to the procedures for cash receipts, cash disbursements, payrolls, personnel policies, fixed petty cash controls and other systems which are necessary under the circumstances. The Agency shall evaluate and document all systems and only upon acceptance and approval of the accounting, reporting and internal control systems by the Agency, shall funds be disbursed to the Subrecipient, other provisions of the Agreement notwithstanding.

(d) If required by the Federal awarding agency or elsewhere in this Agreement, the Agency must receive a statement from the Contractor's or Subrecipient's chief fiscal officer or its insurer assuring that all persons handling funds received or disbursed under this Agreement are covered by fidelity insurance in an amount equal to cash advances from the City. If the bond is cancelled or coverage is substantially reduced, the Contractor or Subrecipient shall promptly notify the Agency of this fact in every case not later than 48 hours. In such event, the Agency shall not disburse any more funds to the Contractor or Subrecipient until it has received assurance that adequate coverage has subsequently been obtained.

(e) No money under this Agreement shall be disbursed by the Agency to any Contractor or Subrecipient except pursuant to a written contract which incorporates the applicable Supplementary General Conditions and unless the Contractor or Subrecipient is in compliance with HUD requirements with regard to accounting and fiscal matters, to the extent they are applicable, and provided that the Agency has completed HUD requirements, including but not limited to environmental certifications pursuant to 24 CFR Part 58.

ARTICLE 10. RECORDS AND AUDITS

[Applicable to Contractors and Subrecipients]

(a) (i) The Subrecipient shall maintain records in accordance with requirements prescribed by or in 2 CFR § 200.333, HUD and/or the City with respect to all matters covered by this Agreement and retained for at least three years after the City makes final payments and all other pending matters concerning this Agreement are closed, subject to the exceptions in 2 CFR § 200.333. (ii) The Contractor shall maintain records in accordance with the requirements elsewhere in this Agreement.

(b) At such times on such forms as HUD and/or the City may require, there shall be furnished to HUD and/or the City such statements, records, reports, data and information, as HUD and/or the City may request pertaining to matters covered by this Agreement. At a minimum, such forms will include the following:

(i) Quarterly Data Collection Report forms for the purpose of including specific Program description, accomplishment, expenditure and beneficiary information in the City's Quarterly Performance Reports.

(ii) Annual Property Register forms for the purpose of tracking the use of CDBG purchased equipment.

(c) At any time during normal business hours and as often as the City, the Agency, HUD, Inspector General, U.S. General Accounting Office, and/or the Comptroller General of the United States may deem necessary, the Contractor or Subrecipient shall make available for examination to the City, HUD, Inspector General, U.S. General Accounting Office and/or representatives of the Comptroller General all of its books, accounts, records, reports, files, and other papers or property with respect to all matters covered by this Agreement and shall permit the City, HUD and/or representatives of the Comptroller General and the U.S. General Accounting Office to audit, examine, make excerpts of, and make transcriptions from such books, accounts, records, reports, files, and other papers or property and to make audits of all contracts, invoices, materials, payrolls, records or personnel, conditions of employment and other data relating to all matters covered by this Agreement.

ARTICLE 11. SUBCONTRACTORS

[Applicable to Contractors and Subrecipients]

(a) The provisions of this Agreement shall apply to Subcontractors and their officers, agents and employees in all respects as if they were employees of the Contractor or Subrecipient. The Contractor or Subrecipient shall not be discharged from its obligations and liabilities, but shall be liable for all acts and negligence of Subcontractors, and their officers, agents and employees, as if they were employees of the Contractor or Subrecipient.

(b) Employees of the Subcontractor shall be subject to the same provisions as employees of the Contractor or Subrecipient.

(c) The services furnished by Subcontractors shall be subject to the provisions hereof as if furnished directly by the Contractor or Subrecipient, and the Contractor or Subrecipient shall remain responsible therefor.

ARTICLE 12. CONFLICTS; EXHIBITS

[Applicable to Contractors and Subrecipients]

(a) If any provision in this CDBG Rider directly conflicts with any other provision in the Agreement, the provision in CDBG Rider shall be controlling.

(b) Federal Exhibits 1 and 2 are attached to, and made a part of this CDBG Rider.

ARTICLE 13. REVERSION OF ASSETS

[Applicable to Subrecipients]

(a) At the Agreement's expiration, the Subrecipient shall transfer to the City all CDBG funds on hand at the time of expiration and any accounts receivable attributable to the use of CDBG funds.

(b) Any real property under the Subrecipient's control that was acquired or improved in whole or in part with Community Development funds in excess of $25,000 must be used to either (i) meet the national objectives in Section 570.208 for a period of five years after acquisition if the property or completion of the improvements, as applicable, or (ii) disposed in a manner which results in the Program being reimbursed in the amount of the current fair market value of the property less any portion thereof attributable to expenditures of non-CDBG funds for acquisition of, or improvements to, the property.

(c) Title to all Equipment in excess of $5,000 purchased pursuant to this Agreement with CDBG funds or furnished by the City shall vest in the City and the same shall be conspicuously labeled as such.

ARTICLE 14. SMALL FIRMS, M/WBE FIRMS, AND LABOR SURPLUS AREA FIRMS

[Applicable to Subrecipients. Contractors must follow section C(11) of the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts.]

Subrecipient 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.

ARTICLE 15. INTANGIBLE PROPERTY

[Applicable to Subrecipients. A similar provision for Contractors is included in the Uniform Federal Contract Provisions Rider for Federally Funded Procurement Contracts at section C(12).]

(a) Pursuant to 2 CFR § 200.315(d), the federal 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 Agreement or subcontract; and (b) any rights of copyright to which a Subrecipient purchases ownership with grant support.

(b) Any reports, documents, data, photographs, deliverables, and/or other materials produced pursuant to the Agreement ("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 Subrecipient 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 Subrecipient shall retain no copyright or intellectual property interest in the Copyrightable Materials. The Copyrightable Materials shall be used by the Subrecipient for no purpose other than in the performance of this Agreement without the prior written permission of the City. The City may grant the Subrecipient a license to use the Copyrightable Materials on such terms as determined by the City and set forth in the license.

(c) The Subrecipient 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 Subrecipient shall fully cooperate in this effort, and agrees to provide any and all documentation necessary to accomplish this.

(d) The Subrecipient 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 Subrecipient 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 Subrecipient shall promptly and fully report to the City any discovery or invention arising out of or developed in the course of performance of this Agreement 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 Subrecipient 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.

ARTICLE 16. HATCH ACT; LOBBYING; CONFLICTS OF INTEREST

[Applicable to Subrecipients.]

(a) Hatch Act: The Subrecipient agrees that no funds provided, nor personnel employed under this Agreement, shall be in any way or to any extent engaged in the conduct of political activities in violation of Chapter 15 of Title V of the U.S.C.

(b) Lobbying: The Subrecipient certifies, to the best of its knowledge and belief, that:

1. 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;

2. 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

3. It will require that the language of this Article 16(b) be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and

contracts under grants, loans, and cooperative agreements) and that all sub-subrecipients shall certify and disclose accordingly.

4. 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.

(c) Conflict of Interest: The Subrecipient agrees to abide by the provisions of 2 CFR §§ 200.112 and 200.318(c) and 24 CFR § 570.611.

ARTICLE 17. SUSPENSION AND TERMINATION

[Applicable to Subrecipients.]

(a) The City may take enforcement action against a Subrecipient for non-compliance, as described in 2 CFR §§ 200.338 and 200.339(a)(1) & (2), including suspension or termination.

(b) The City may terminate for convenience pursuant to 2 CFR § 200.339(a)(3).

ARTICLE 18. PERFORMANCE REQUIREMENTS AND REMEDIES

[Applicable to Contractors]

The Disaster Relief Appropriations Act, 2013 (Public L. 113-2) of January 29, 2013, requires contracts to contain "performance requirements and penalties." Accordingly, Contractor shall be subject to any performance requirements and remedial provisions and/or liquidated damages set forth in this Agreement. Contractor acknowledges that negative performance evaluations may impair its ability to win future contracts with the City as follows: Under City Procurement Policy Board (PPB) Rules section 4-01, Contractor is subject to performance evaluations at least once annually. The City shall enter such performance evaluations into the VENDEX system. To the extent allowed by the PPB Rules, such performance evaluations shall be considered by the City in:

(1) making a determination of the Contractor's responsibility or non-responsibility in future City procurements, under PPB Rule section 2-08(g)(1)(ii) and

(2) deciding to renew or not to renew the Agreement, under PPB Rule section 4-04(c)(10).

FED. EXHIBIT 1

NOTICE TO BIDDERS

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246, as amended) FOR ALL HUD COMMUNITY DEVELOPMENT FUNDED 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 above.

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 non-federally 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 Agreement, the "covered area" is the City of New York.

EXHIIBIT 2

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
PROJECT CODE NO. 6111

APPENDIX L

WHISTLEBLOWER POSTER

REPORTING INFORMATION TO THE NEW YORK CITY DEPARTMENT OF INVESTIGATION

If you have information of any corrupt or fraudulent activities or unethical conduct relating to a New York City funded project or contract, contact:

Department of Investigation (DOI) Complaint Bureau
212-825-5959

or by mail or in person at:

DEPARTMENT OF INVESTIGATION
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 contractor or subcontractor that has a contract with the City or a City contractor of 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 information about fraud, false claims, corruption, criminality, conflict of interest, gross mismanagement, or abuse of authority relating to a City contract over $100,000 to DOI or to certain other government officials all of whom must forward the report to DOI.
- Any employee who has made 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.

NEW YORK CITY ECONOMIC DEVELOPMENT CORPORATION
HUNTS POINT ENERGY RESILIENCY DESIGN
PROFESSIONAL SERVICES CONSULTANT CONTRACT
FOR THE PROVISION OF CDBG-DR FUNDED DESIGN, ENGINEERING, AND RELATED CONSULTING SERVICES
NYCEDC CONTRACT NO. 61110003
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APPENDIX M

RESERVED