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The Star-Ledger, Newark

The Star-Ledger

Publication Name:
The Star-Ledger, Newark

Publication URL:
www.nj.com/starledger

Publication City and State:
Newark , NJ

Publication County:
Essex

Notice Popular Keyword Category:

Notice Keywords:
21-059

Notice Authentication Number:
202112210804477564573
3333489171

Notice URL:

Back

Notice Publish Date:
Tuesday, December 21, 2021

Notice Content

NJ TRANSIT REQUEST FOR PROPOSAL No. 21-059 FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DISTRIBUTED GENERATION (DG) PROJECT New Jersey Transit Corporation (NJ TRANSIT) is issuing this Request for Proposals (RFP) to obtain Proposals from qualified professional firms for final design, engineering and other technical services associated with the Newark Penn Station Distributed Generation (DG) Project. The goal of this RFP is to engage a Consultant to provide design, engineering, and construction assistance, as well as other technical services, to support the development of Distributed Generation at Newark Penn Station a first-of-its-kind microgrid system capable of providing reliable power to support certain critical transit infrastructure supporting bus and rail systems operated by NJ TRANSIT. All firms submitting Proposals for this project must have related experience of a similar magnitude. NJ TRANSIT is requesting Proposals from firms with the intention of awarding a contract to the organization(s) whose qualifications and Proposal offers the best value to NJ TRANSIT. Background information, project description, Scope of Services, instructions for Proposers and evaluation criteria can be obtained by contacting the Procurement Intake Unit via email at intakeunit@njtransit.com. NJ TRANSIT will not hold an in-person meeting for the Pre-Proposal Conference. The PreProposal Conference will be held utilizing a telephone and video conference via Microsoft Teams which is scheduled for 11:00 A.M., local time, on Wednesday, January 5, 2022, for the purpose of answering questions, providing directives, and providing clarification. All interested firms are urged to participate. For video conference access information, please contact Faith Blair by e-mailing fblair@njtransit.com by Tuesday, January 4, 2022. Upon confirmation of your firm's RSVP, NJ TRANSIT will forward an invitation for the video conference. Attendance at the Pre-Proposal Conference is highly recommended but not mandatory. Recipients of this RFP that do not attend may be at a disadvantage when submitting a Proposal. Potential Proposers will be required to download Microsoft Teams https://teams.microsoft.com, prior to the Pre-Proposal Conference, in order to access the web video conference and view the presentation. All interested firms are urged to participate. A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. Prospective Proposers are required to register as an interested party by completing the "Intent to Propose Form" (Exhibit 16) and submitting the Acknowledgement on or before Thursday, February 10, 2022, at 5:00 P.M. and may be emailed to the attention of the undersigned at fblair@njtransit.com. This form is required in order to submit a Proposal but does not bind a prospective Proposer in any way. Failure to timely submit the notice of intent may result in NJ TRANSIT rejecting any proposal later submitted. Technical Proposals must be received on or before Thursday, February 17, 2022 at 3:00

P.M. Proposers shall be responsible for the delivery of their Proposals. Late Proposals will not be considered. NJ TRANSIT may not award a contract unless the Proposer has provided to NJ TRANSIT a valid business registration certificate issued by the Division of Revenue and Enterprise Services within the Department of the Treasury as required by N.J.S.A. 52:32-44 for itself and any Subconsultant(s). In addition, Subconsultants shall not engage in the performance of any work under this contract without a valid business registration certificate. The successful Proposer will be required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. regarding Equal Employment Opportunity Laws and Regulations. Disadvantaged Business Enterprises, in accordance with the Department of Transportation (DOT) Regulations 49 C.F.R., Part 26, shall have the maximum opportunity to participate in the performance of this contract. A twenty-two percent (22%) Race Conscious (RC) DBE goal has been assigned to this project. All proposals, contracts, laws and related documentation will be subject to the financial assistance contract between the project sponsor and the U.S. Department of Transportation, under the Federal Transit Act of 1964, as amended, based upon availability of funds. 12/21/21 $213.90

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participation may be as subcontractors or suppliers, as protégés, or in other partnering or supporting roles. OGS hereby establishes overall goals for SDVOBs' participation under this contract as follows 6% for the H trade contractor, and 0% for the E trade contractor, based on the current availability of qualified SDVOBs. Trades with 0% goals are encouraged to make "good faith efforts" to promote and assist in the participation of SDVOBs on the Contract for the provision of services and materials.

The Bidding and Contract Documents for this Project are available for viewing and downloading from OGS Design & Construction's plan room hosting service, Bid Express. Vendors wishing to view and/or download bid documents ***must complete a one-time registration*** for the Bid Express service. There is ***no cost*** to register for Bid Express. Registration along with viewing and downloading of documents can be accessed at the following link: ***http://www.bidexpress.com***

For questions about downloading of bid documents, please send an e-mail to ***support@bidexpress.com,*** or call the Bid Express toll-free number at (888) 352-2439.

For all other questions, please send an email to ***DCPlans@ogs.ny.gov***, or call (518) 474-0203.

For additional information on this project, please use the link below and then click on the project number:
https://online.ogs.ny.gov/dnc/contractorConsultant/esb/ESBPlansAvailableIndex.asp.

OGS Design & Construction Group

NJ TRANSIT

REQUEST FOR PROPOSAL No. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DISTRIBUTED GENERATION (DG) PROJECT

New Jersey Transit Corporation (NJ TRANSIT) is issuing this Request for Proposals (RFP) to obtain Proposals from qualified professional firms for final design, engineering and other technical services associated with the Newark Penn Station Distributed Generation (DG) Project.

The goal of this RFP is to engage a Consultant to provide design, engineering, and construction assistance, as well as other technical services, to support the development of Distributed Generation at Newark Penn Station – a first-of-its-kind microgrid system capable of providing reliable power to support certain critical transit infrastructure supporting bus and rail systems operated by NJ TRANSIT.

All firms submitting Proposals for this project must have related experience of a similar magnitude. NJ TRANSIT is requesting Proposals from firms with the intention of awarding a contract to the organization(s) whose qualifications and Proposal offers the best value to NJ TRANSIT. Background information, project description, Scope of Services, instructions for Proposers and evaluation criteria can be obtained by contacting the **Procurement Intake Unit** via email at ***intakeunit@njtransit.com***.

NJ TRANSIT will not hold an in-person meeting for the Pre-Proposal Conference. The Pre-Proposal Conference will be held utilizing a telephone and video conference via Microsoft Teams which is scheduled for **11:00 A.M.**, local time, on **Wednesday, January 5, 2022**, for the purpose of answering questions, providing directives, and providing clarification. All interested firms are urged to participate. For video conference access information, please contact **Faith Blair** by e-mailing ***fblair@njtransit.com*** by **Tuesday, January 4, 2022**. Upon confirmation of your firm's RSVP, NJ TRANSIT will forward an invitation for the video conference. Attendance at the Pre-Proposal Conference is highly recommended but not mandatory. Recipients of this RFP that do not attend may be at a disadvantage when submitting a Proposal.

Potential Proposers will be required to download Microsoft Teams ***https://teams.microsoft.com***, prior to the Pre-Proposal Conference, in order to access the web video conference and view the presentation. All interested firms are urged to participate.

A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. Prospective Proposers are required to register as an interested party by completing the "Intent to Propose Form" (Exhibit 16) and submitting the Acknowledgement on or before **Thursday, February 10, 2022**, at **5:00 P.M.** and may be emailed to the attention of the undersigned at ***fblair@njtransit.com***. This form is required in order to submit a Proposal but does not bind a prospective Proposer in any way. Failure to timely submit the notice of intent may result in NJ TRANSIT rejecting any proposal later submitted. Technical Proposals must be received on or before **Thursday, February 17, 2022** at **3:00 P.M.**

Proposers shall be responsible for the delivery of their Proposals. Late Proposals will not be considered.

NJ TRANSIT may not award a contract unless the Proposer has provided to NJ TRANSIT a valid business registration certificate issued by the Division of Revenue and Enterprise Services within the Department of the Treasury as required by N.J.S.A. 52:32-44 for itself and any Subconsultant(s). In addition, Subconsultants shall not engage in the performance of any work under this contract without a valid business registration certificate.

The successful Proposer will be required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. regarding Equal Employment Opportunity Laws and Regulations. Disadvantaged Business Enterprises, in accordance with the Department of Transportation (DOT) Regulations 49 C.F.R., Part 26, shall have the maximum opportunity to participate in the performance of this contract. A **twenty-two percent (22%) Race Conscious (RC) DBE goal** has been assigned to this project.

All proposals, contracts, laws and related documentation will be subject to the financial assistance contract between the project sponsor and the U.S. Department of Transportation, under the Federal Transit Act of 1964, as amended, based upon availability of funds.

NOTICE TO BIDDERS

PLEASE TAKE NOTICE that bids for **CDTA-FAC 190-2000 Washington Western Bus Rapid Transit Station & Corridor Improvements due no later than 1:00PM EST on January 25, 2022.** Bids should be addressed to Stacy Sansky, Director of Procurement, Capital District Transportation Authority, 110 Watervliet Avenue, Albany, New York 12206. Each bid must be prepared and submitted in accordance with the submittal instructions.

Questions regarding this Invitation for Bids are to be submitted IN WRITING to Stacy Sansky, Director of Procurement (***sdsansky@cdta.org***, fax-518-437-8348 or via mailing address listed above) NO LATER than **11:00AM on January 12, 2022.**

It is the intention of CDTA to award a contract based upon bids it receives, but CDTA reserves the right to reject any and all bids.

The Authority hereby notifies all potential service providers that disadvantaged, minority and women-owned business enterprises will be afforded full opportunity to submit proposals in response to this notice and there will be no discrimination on the basis of race, creed, color, sex, national origin, disability or marital status in the award of the contract or any subcontract.

The complete Invitation for Bids may be obtained free of charge at our website ***www.cdta.org*** on or after December 20, 2021. Only vendors who complete the online vendor registration form will be able to access the IFB.

Dated: December 20, 2021

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The Times, Trenton



Publication Name:
The Times, Trenton

Publication URL:

Publication City and State:
Trenton , NJ

Publication County:
Mercer

Notice Popular Keyword Category:

Notice Keywords:
21-059

Notice Authentication Number:
202112210803467462376
3333489171

Notice URL:

Back

Notice Publish Date:
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Philip D. Murphy, Governor
Sheila Y. Oliver, Lieutenant Governor
Diane Gutierrez-Scaccetti, Commissioner
Kevin S. Corbett, President & CEO

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

December 21, 2021

To Whom It May Concern:

New Jersey Transit Corporation (NJ TRANSIT) is issuing this Request for Proposals (RFP) to obtain Proposals from qualified professional firms for final design, engineering and other technical services associated with the Newark Penn Station Distributed Generation (DG) Project.

NJ TRANSIT is requesting Proposals from firms with the intention of awarding a Contract to the organization whose qualifications and Proposal, offers the best value to NJ TRANSIT. Background information, project description, instructions for the Proposers and evaluation criteria are included in the enclosed material.

NJ TRANSIT reserves the right to reject any and all Proposal(s) in accordance with applicable law. Contract award is subject to the Consultant's agreement to NJ TRANSIT's terms and conditions set forth in this RFP and NJ TRANSIT's standard professional services contract.

NJ TRANSIT will not hold an in-person meeting for the Pre-Proposal Conference. The Pre-Proposal Conference will be held utilizing a telephone and video conference via Microsoft Teams which is scheduled for **11:00 A.M.**, local time, on **Wednesday, January 5, 2022**, for the purpose of answering questions, providing directives, and providing clarification. All interested firms are urged to participate. For access information, please contact **Faith Blair**, by e-mailing fblair@njtransit.com by **Tuesday, January 4, 2022**.

Proposers will be required to download Microsoft Teams, https://teams.microsoft.com/, prior to the Pre-Proposal Conference, in order to access the web video conference and view the presentation. Upon confirmation of your firm's RSVP, NJ TRANSIT will forward an invitation for the video conference.

A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. Prospective Proposers are required to register as an interested party by completing the "Intent to Propose Form" (Exhibit 16) and submitting the Acknowledgement on or before **Thursday, February 10, 2022**, at **5:00 P.M.** and may be emailed to the attention of the undersigned at fblair@njtransit.com. This form is required in order to submit a Proposal but does not bind a prospective Proposer in any way. Failure to timely submit the notice of intent may result in NJ TRANSIT rejecting any proposal later submitted. Technical Proposals must be

received on or before **Thursday, February 17, 2022** at **3:00 P.M.** Late proposals will not be considered.

A Technical Evaluation Committee (TEC) comprised of NJ TRANSIT staff has been appointed to review the Proposals and recommend an award to a consultant based on the evaluation criteria described herein. Upon completion of the TEC's technical evaluation of the Proposals, oral presentations will be requested from those Proposers whose Technical Proposal falls within the competitive range.

Cost Proposals will be sought from the highest technically qualified firm as further set forth in section V-D of the RFP.

All requests for information and questions concerning this project must be submitted in writing and directed to the undersigned and received by NJ TRANSIT no later than **5:00 P.M.**, on **Wednesday, January 19, 2022**. Requests for information must be emailed in a non-scanned electronic format to **Faith Blair** at fblair@njtransit.com. This RFP may be amended only in writing via addendum issued by NJ TRANSIT.

NJ TRANSIT may not award a Contract unless the Consultant has a valid Business Registration certificate issued by the Division of Revenue and Enterprise Services within the Department of the Treasury as required by N.J.S.A. 52:32-44. In addition, subconsultants shall not engage in the performance of any work under this Contract without a valid Business Registration certificate.

The successful Proposer will be required to comply with the requirements of N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. regarding Equal Employment Opportunity Laws and Regulations. Disadvantaged Business Enterprises, in accordance with the Department of Transportation (DOT) Regulations 49 C.F.R. Part 26, shall have the maximum opportunity to participate in the performance of this Contract. A **twenty-two percent (22%) Race Conscious (RC) DBE goal** has been assigned to this project.

This project is also subject to the Diane B. Allen Equal Pay Act (N.J.S.A. 34:11-56.13 et seq.) concerning the reporting of compensation and hours worked by employees categorized by gender, race, ethnicity, and job title.

All Proposals, contracts, laws and related documentation will be subject to the financial assistance contract between the project sponsor and the U.S. Department of Transportation, under the Federal Transit Act of 1964, as amended, based upon availability of funds.

NJ TRANSIT reserves the right to cancel the award of any Contract before execution if NJ TRANSIT deems such cancellation to be in its best interest. In no event will NJ TRANSIT have any liability for the cancellation of such award. The Proposer assumes sole risk and responsibility for expenses prior to execution of a Contract.

This letter should not be interpreted as an award of a Contract nor as a commitment to reimburse for any cost incurred in the preparation of a Proposal. We look forward to receiving and reviewing your Proposal.

Sincerely,



Faith Blair
Managing Contract Specialist
Procurement Department

NJ TRANSIT CORPORATION

REQUEST FOR PROPOSAL (RFP) NO. 21-059

FINAL DESIGN, ENGINEERING
AND
OTHER TECHNICAL SERVICES
FOR THE
NEWARK PENN STATION
DISTRIBUTED GENERATION (DG) PROJECT

DECEMBER 2021

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I. GENERAL PROJECT INFORMATION

A. Request for Proposal – General Information

New Jersey Transit Corporation (NJ TRANSIT) is issuing this Request for Proposals (RFP) to solicit professional firms for final design, engineering and other technical services associated with the Newark Penn Station Distributed Generation (DG) Project.

The goal of this RFP is to engage a Consultant to provide design, engineering, and other technical services, to support the development of Distributed Generation at Newark Penn Station – a first-of-its-kind microgrid system capable of providing reliable power to support certain critical transit infrastructure supporting bus and rail systems operated by NJ TRANSIT.

This Contract requires the Consultant to complete final design and provide bid assistance, that will include but not be limited to, preparing the Invitation for Bid (IFB) package and distributing it for both internal and external reviews, responding to comments generated during reviews and Request for Information (RFI) during bidding, and related activities.

The Project is consistent with Federal Transit Administration (FTA) rules and regulations. This Project is being implemented under Federal Transit Administration's Resilience Projects in response to Superstorm Sandy as shown in the Federal Register: Volume 79, No. 214 dated November 5, 2014.

NJ TRANSIT reserves the right to reject any and all Proposal(s) in accordance with applicable law. Contract award is subject to the availability of funds and the Proposer's agreement to NJ TRANSIT's standard terms and conditions. NJ TRANSIT will not reimburse Proposers for expenses incurred in responding to this RFP.

All Proposers are notified that NJ TRANSIT reserves the right to delete or modify any task from the Scope of Services at any time during the course of the Contract. NJ TRANSIT also reserves the right to approve all subconsultants.

Prior to the execution of this Contract with NJ TRANSIT and before commencing any performance hereunder, the Proposer shall provide NJ TRANSIT with the required proof(s) of insurance as set forth in Section 12 of **Exhibit 1**.

All Proposers are notified that it is NJ TRANSIT policy that consultants who do or may do, business with NJ TRANSIT must avoid all situations where proprietary or financial interest, or the opportunity for financial gain, could lead a NJ TRANSIT officer or employee to secure favored treatment for any organization or individual. Proposers must avoid all circumstances and conduct which may not constitute

actual wrongdoing, or conflict of interest, but might nevertheless appear questionable to the general public, thus compromising the integrity of NJ TRANSIT. All Proposers must comply with the NJ TRANSIT Code of Ethics for Consultants as set forth in Section 30 of **Exhibit 1**.

In addition, Proposers are advised that communications with NJ TRANSIT that in any way relate to this Project shall be conducted with or through the authorized representative of the Contracting Officer in NJ TRANSIT's Division of Procurement or Office of Business Development for DBE related inquiries. All other contacts are strictly prohibited and considered improper. Proposers are advised that violation of this prohibition may result in the removal of the Proposer from consideration for this contract and possible suspension/debarment.

B. General Definitions

Addendum (plural Addenda): Written interpretations, clarifications, and revisions to the Request For Proposals (RFP), including its Attachments and Exhibits, issued by NJ TRANSIT before the Proposal due date.

Agreement: See definition of Contract

Business Day: Any weekday excluding Saturdays, Sundays, State legal Holidays and State mandated closings, unless otherwise indicated.

Business Registration: A Business Registration certificate issued by the Department of the Treasury pursuant to N.J.S.A. 52:32-44 or such other form or verification that a Consultant or subconsultant is registered with the Department of Treasury.

Calendar Day: Each and every day shown on the calendar.

Consultant: The entity awarded the Contract under this RFP.

Contract: The written agreement executed by the Contracting Officer of NJ TRANSIT and the Consultant constituting the total agreement between the parties covering the performance of the work. The Contract, including incorporated attachments, represents the entire and integrated agreement between the parties and supersedes all prior negotiations, representations or agreements either written or oral.

Contracting Officer: NJ TRANSIT's Chief of Procurement & Support Services acting, directly or through the Chief of Procurement & Support Services authorized representative(s), within the scope of duties assigned to him or her.

Contractor: See definition of Consultant.

Cost Proposal: The preliminary cost estimate submitted by the Proposer in response to the RFP.

Days: Shall mean Calendar Days unless otherwise indicated.

Holiday(s): Specific day(s) on which NJ TRANSIT is not open for business.

May: Denotes that which is permissible or recommended not mandatory.

Must: Denotes that which is a mandatory requirement.

Notice of Award: Written notification to Proposer selected for award of the Contract.

Project: The specific services that are the subject of this Request for Proposals.

Proposal: The Proposal, or offer, submitted by the Proposer in response to the RFP.

Proposer: The entity submitting a Proposal in response to this RFP.

Shall: Denotes that which is a mandatory requirement.

Should: Denotes that which is permissible or recommended, not mandatory.

Subconsultant: Any entity having a relationship with the Consultant, whereby the Consultant uses the products and/or services of that entity to fulfill some of its obligations under the Contract.

Subcontractor: See definition of subconsultant

Technical Proposal: The specific technical requirements of the Project, submitted by the Proposer in response to the RFP.

C. Anticipated Selection Schedule

Issue RFP	December 21, 2021
Preproposal Conference	January 5, 2022
Requests for Information/Questions Due	January 19, 2022
Intent to Propose Form Due	February 10, 2022
Proposal Due Date	February 17, 2022
Oral Presentations	Week of March 13, 2022
Cost Proposals Due	Week of March 26, 2022
Begin Negotiations	Week of April 10, 2022

Selection of Firm	April 2022
Board Approval	July 2022
Contract Award	August 2022

D. Preproposal Conference

Each Proposer shall completely familiarize itself with the nature of the work to be accomplished and the type of equipment, facilities, and skills required to meet the Scope of Services and Contract specifications.

In order to discuss the Project and to address questions, NJ TRANSIT will hold a Pre-Proposal Conference on **Wednesday, January 5, 2022 at 11:00 A.M**. NJ TRANSIT will not hold an in-person meeting for the Pre-Proposal Conference. The Pre-Proposal Conference will be held utilizing a telephone and video conference via Microsoft Teams. Attendance at the Pre-Proposal Conference is highly recommended but not mandatory. Recipients of this RFP that do not attend may be at a disadvantage when submitting a Proposal.

Potential Proposers will be required to download Microsoft Teams https://teams.microsoft.com/, prior to the Pre-Proposal Conference, in order to access the web video conference and view the presentation. All interested firms are urged to participate. For video conference access information, please contact **Faith Blair** by e-mailing fblair@njtransit.com by **Tuesday, January 4, 2022**. Upon confirmation of your firm's RSVP, NJ TRANSIT will forward an invitation for the video conference.

E. Request for Information and Addenda

The Proposer shall examine carefully all the RFP documents in the RFP package and conditions noted therein affecting the work. By submitting a Proposal, the Proposer acknowledges that it has carefully examined the RFP package and satisfied itself as to the conditions affecting the work. NJ TRANSIT assumes no responsibility for any conclusions or interpretations made by the Proposer on the basis of the information made available by NJ TRANSIT.

1. Inquiries regarding any part of the RFP package shall be emailed to the **Faith Blair** at fblair@njtransit.com.

2. To be given consideration, all such inquiries must adhere to the following:

   a. Be received in writing no later than **5:00 P.M., January 19, 2022;**
   b. Reference RFP name and number, section and page number;
   c. Requests for information must be emailed in a non-scanned electronic format to **Faith Blair** at fblair@njtransit.com.

The Proposer shall also carefully review NJ TRANSIT's Professional Services Agreement (Contract) (**Exhibit 1**). The Proposer must identify and submit any questions, requests for clarifications, exceptions or proposed modifications to the Agreement, with suggested changes to the Agreement and the reasons(s) therefor, during the Request for Information period. Failure to submit changes to **Exhibit 1** during the Request for Information period shall preclude the Proposer from requesting changes during any negotiations period.

Any response to requests for information or clarification that NJ TRANSIT may choose to make will be by a written Addendum to the RFP and said addenda will be made available via Microsoft One Drive and all listed holders of the RFP will receive an email when they are uploaded. NJ TRANSIT will not be bound by any informal explanation, clarification, or interpretation, oral or written, by whomever made, that is not incorporated into an Addendum. Copies of all such Addenda will be made available via Microsoft One Drive. Receipt of the Addenda by the Proposer shall be acknowledged as specified below.

A Proposer's failure to request a clarification, interpretation, correction or amendment will preclude such Proposer from, thereafter, claiming any ambiguity, inconsistency or error which should have been discovered by a reasonably prudent Proposer.

NJ TRANSIT reserves the right to amend the RFP package prior to the date set for receipt of Proposals. Such revisions, if any, will be announced by Addenda to this RFP. Copies of all such Addenda will be made available via Microsoft One Drive. The date set for receipt of Proposals may be postponed by such number of days as in the opinion of the Contracting Officer will enable Proposers to revise their Proposal submission. In such cases, the Addenda will include the new date for receipt of Proposals.

Proposers are required to acknowledge receipt of all Addenda by signing the "Acknowledgement of Receipt of Addenda" form. This form (**Exhibit 2**) shall be included as part of the Technical Proposal. Failure to acknowledge receipt of all Addenda may render the Proposal non-responsive.

F. Contract Duration

The anticipated duration of the Contract, subject to continuing satisfactory performance and availability of funds, is thirty (30) months.

G. Joint Venture

A Proposer consisting of more than one (1) business entity must clearly identify itself in the Proposal as a joint venture. Each party to a joint venture shall provide financial data (i.e.: financial statement, D&B report, etc.) as a separate business entity. Each

party to a joint venture shall bear, jointly and severally, the entire responsibility for Contract performance. The enclosed Statement of Joint Venture (**Exhibit 5**) shall be executed by the joint venturers and submitted with its Proposal.

H. Equal Employment Opportunity Requirements

The Consultant will be required to comply with State Equal Employment Opportunity requirements contained in N.J.S.A. 10:5-31 et seq. (P.L. 1975, c.127) and N.J.A.C. 17:27 et seq. A Proposer is further required to comply with all other Equal Employment Opportunity requirements as described herein as well as any other applicable Federal or State statutes or regulations. (See **Exhibit 4**) Pursuant to N.J.S.A. 10:2-1 et seq, the Consultant agrees that:

H1. In the hiring of persons for the performance of work under this Contract or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this Contract, no consultant, nor any person acting on behalf of such consultant or subconsultant, shall, by reason of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

H2. No consultant, subconsultant, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this Contract or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such Contract, on account of race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation or sex;

H3. There may be deducted from the amount payable to the consultant by the contracting public agency, under this Contract, a penalty of $50.00 for each person for each Calendar Day during which such person is discriminated against or intimidated in violation of the provisions of the Contract; and

H4. This Contract may be canceled or terminated by the contracting public agency and all money due or to become due hereunder may be forfeited, for the violation of this section of the Contract occurring after notice to the consultant from the contracting public agency of any prior violation of this section of the Contract.

I. Disadvantaged Business Enterprise (DBE) Goal Assignment

As an aid in meeting the commitment of its Disadvantaged Business Enterprise (DBE) Program, NJ TRANSIT has assigned a **twenty-two percent (22%) Race**

Conscious (RC) DBE goal on the gross sum amount of the Proposal or contract for DBE subcontracting participation. All NJ Unified Certification Program (NJUCP) certified DBE firms, including suppliers, are eligible to participate in this contract.

NJ TRANSIT's DBE Program is accorded the same priority as compliance with all other legal obligations required by the United States Department of Transportation (USDOT). Contractors/consultants shall comply with the DBE Program requirements in the award and administration of NJ TRANSIT contracts. Failure by the contractor/consultant to carry out these requirements shall constitute a breach of the contract, which may result in the termination of the Contract or other such remedy, as NJ TRANSIT deems appropriate.

DBE Program Compliance Requirements

The Proposer shall refer to NJ TRANSIT's "DBE Requirements for Race Neutral Federal Procurement Activities" attached to this RFP as **Exhibit 3**, for instructions, guidance, and explanations for DBE program obligations for contracts and subcontracts.

For this Contract, the Proposer shall identify all DBE and non-DBE subcontractors/ subconsultants, and suppliers proposed to participate in and those solicited for this Contract, and shall complete and submit the mandatory DBE Forms A, A1, A2, and B. The Proposer shall also print and submit the DBE firm's current DBE Certification Profile from the NJUCP DBE Business Directory at https//njucp.dbesystems.com. Additionally, the Proposer shall submit any applicable supplemental forms (AA, AA1, AA2, BB, DBE Certification Profile, and D). **All required DBE forms and Certification Profiles shall be submitted by the Proposer with its Cost Proposal or within five (5) Calendar Days after the Cost Proposal due date**. However, Proposers are strongly encouraged to submit all mandatory douments with the Proposal to prevent delay of the Contract award. Proposers shall review carefully and complete the forms entirely, with no blank fields.

Notwithstanding the date of submission of the mandatory DBE forms, all negotiations between a Proposer and any potential DBE subcontractor, subconsultant, or supplier shall be completed prior to the Cost Proposal due date. All DBE forms are included in the RFP package, specifically in **Exhibit 3**.

Failure to submit any and all mandatory DBE documentation **within five (5) Calendar Days after the Cost Proposal due date** shall result in a rejection of a Proposer as non-responsible.

Any questions regarding the DBE requirements or the mandatory required forms for this Contract should be directed to:

Jacquelin Rush-Gilbert
Senior Contract Compliance

973-491-8061
jrush-gilbert@njtransit.com

The Proposer can refer to https://njucp.dbesystem.com, which is a search engine of firms certified by the New Jersey Department of Transportation, the New Jersey Transit Corporation and the Port Authority of New York and New Jersey as Disadvantaged Business Enterprises. This listing is intended as an aid in identifying DBE firms to potential Proposers and is not meant to be an all-inclusive listing of DBE firms available for subcontracting. The Proposer may identify other firms; however, all DBE firms must be properly certified prior to award of the Contract. At the time of Proposal submission, only DBE firms certified in the New Jersey Unified Certified Program (NJUCP) shall satisfy the assigned DBE goal on this RFP.

J. Business Registration Certificate

Pursuant to N.J.S.A. 52:32-44, NJ TRANSIT is prohibited from entering into a contract with an entity unless the Proposer and each subcontractor/subconsultant that is required by law to be named in a Proposal has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury.

Prior to Contract award or authorization, the Contractor/Consultant shall provide NJ TRANSIT with its proof of Business Registration and that of any named subcontractor(s)/subconsultant(s).

Subcontractors/subconsultants named in a Proposal shall provide proof of Business Registration to the Proposer, who in turn, shall provide it to NJ TRANSIT prior to the time a Contract, purchase order, or other contracting document is awarded or authorized.

During the course of Contract performance:

(1) the Contractor/Consultant shall not enter into a contract with a Subcontractor/Subconsultant unless the subcontractor/subconsultant first provides the Contractor/Consultant with a valid proof of Business Registration.
(2) the Contractor/Consultant shall maintain and submit to NJ TRANSIT a list of subcontractors/subconsultants and their addresses that may be updated from time to time.
(3) the Contractor/Consultant and any Subcontractor/Subconsultant providing goods or performing services under the Contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered to the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

Before final payment is made under the Contract, the Contractor/Consultant shall submit to NJ TRANSIT a complete and accurate list of all subcontractors/subconsultants used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a Business Registration as required, or that provides false business registration information, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000, for each proof of Business Registration not properly provided under a contract with NJ TRANSIT.

Accordingly, the Proposer should submit with its Technical Proposal, the Business Registration Certificates for all team members, but no later than the date of Contract award.

K. Technical Evaluation Committee

A Technical Evaluation Committee (TEC) comprised of NJ TRANSIT staff will be responsible for reviewing and evaluating the Technical Proposals, participating in Oral Presentations, and assisting with negotiations, if requested, with a Proposer for award of the Contract. The TEC will analyze the submitted Technical Proposals, which must include project manpower estimates for the respective tasks outlined in the Scope of Services. In order to adequately evaluate the capability of Proposers, the Proposal must address all tasks outlined in the Scope of Services. In order to adequately evaluate Proposer's capability, the Proposal must address all tasks as set forth in Scope of Services of this RFP. The Proposer should include the level of detail it determines necessary to assist the TEC in its review and evaluation of its Proposal.

L. Modification or Withdrawal

Proposal modifications submitted will be considered if received in electronic format by the NJ TRANSIT contract specialist, by the specified date and time set for receipt of Proposals. The modification shall be duly executed by the Proposer or its authorized representative and shall be clearly labeled as a modification. Modifications received after the time specified for receipt of Proposals will not be considered. Fax or mailed modifications will not be considered.

Modifications of Proposals shall be submitted, prior to the Proposal receipt date, in a electronic file, clearly marked with the RFP number and project title, Proposal due date and name of Proposer. Proposers shall assume that its failure to comply with these requirements may result in the modification being opened prematurely, or not opened at all.

Proposals may be withdrawn at any time prior to the time specified for the opening of Proposals by filing a written withdrawal with NJ TRANSIT, duly executed by the Proposer or its authorized representative. The withdrawal of a Proposal does not

prejudice the right of the Proposer to file a new Proposal. Withdrawals received after the time specified for the opening of Proposals will not be considered nor may any Proposal be withdrawn after that time.

Unless a Proposal is withdrawn as specified above, NJ TRANSIT will consider all Proposals firm offers until such time as NJ TRANSIT executes a Contract with the successful Proposer.

M. Disqualification of Proposers/Proposals

Submission of more than one (1) Proposal from an individual, firm, partnership, corporation or combination thereof under the same or different names shall be cause for disqualification of the Proposals submitted by such entities. Reasonable grounds for believing that any individual, firm, partnership, corporation or combination thereof is interested as a principal in more than one (1) Proposal for the procurement contemplated may cause the rejection of all Proposals submitted by such individual, firm, partnership, corporation or combination thereof.

N. Disclosure of Investment Activities in Iran

Pursuant to N.J.S.A. 52:32-55 et seq., a Proposer that, at the time of contract award, is identified on a list created pursuant to such law by the New Jersey Department of the Treasury as a person or entity engaging in investment activities in Iran as described in such law, shall be ineligible to, and shall not, propose on or enter in to a Contract with NJ TRANSIT. As required by such law, the Proposer must complete and submit prior to contract award, the certification **(Exhibit 9)** to attest under penalty of perjury, that neither the person, nor entity nor any of its parents, subsidiaries or affiliates are identified on the Department of Treasury's Chapter 25 list as a person or entity engaging in investment activities in Iran. Failure to complete and submit this certification will preclude award of a contract.

O. Ownership Disclosure

Pursuant to N.J.S.A. 52:25-24.2, in the event the Proposer is a corporation, partnership or limited liability company, the Proposer must complete a current, Ownership Disclosure Form prior to the receipt of the Proposal or accompanying the Proposal. The Ownership Disclosure Form must set forth the names and addresses of all stockholders in a corporation who own ten percent (10%) or more of its stock, or of all the individual partners in the partnership who own a ten percent (10%) or greater interest, or of all the members in the limited liability company who own a ten percent (10%) or greater interest. If one or more stockholders, partners, or members is itself a corporation, partnership, or limited liability company, the stockholders holding ten percent (10%) of more of that corporation's stock, or the individual partners owning ten percent (10%) or greater interest in that partnership, or the members owning ten percent (10%) of greater interest in the limited liability company, shall also be listed.

To comply with this requirement, a Proposer with any direct or indirect parent entity which is publicly-traded may submit the name and address of each publicly-traded entity and the name and address of each person that holds a ten percent (10%) or greater beneficial interest in the publicly traded entity as of the last annual filing with the Securities and Exchange Commission, and, if there is any person that holds a ten percent (10%) or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a ten percent (10%) or greater beneficial interest.

Failure to submit the form prior to or with the Proposal will result in the rejection of the Proposal. (**Exhibit 6**)

P. Contractor's Certification of Eligibility

The Proposer shall certify on the Contractor's Certification of Eligibility (**Exhibit 10**) that neither it nor any of its Subconsultants are included on the State of New Jersey, Department of Treasury, Consolidated Debarment Report or on the State of New Jersey, Department of Labor and Workforce Development, Division of Wage and Hour Compliance, Prevailing Wage Debarment List.

The Proposer shall also certify that neither it nor any of its Subconsultants, have any exclusions with the System for Award Management (SAM) on www.SAM.gov. If the Proposer or any of its Subconsultants are included on such report, the Proposer may not be eligible for award of Contract.

Q. Source Disclosure Requirements

Under N.J.S.A. 52:34-13.2, all contracts primarily for services awarded by NJ TRANSIT shall be performed within the United States, except when the Contracting Officer certifies in writing a finding that a required service cannot be provided by a Consultant or Subconsultant within the United States and the certification is approved by the President and CEO (Executive Director).

All Proposers seeking a Contract primarily for services with NJ TRANSIT must disclose the location, by country, where services under the Contract, including subcontracted services, will be performed.

If any of the services cannot be performed within the United States, the Proposer shall state with specificity the reasons why the services cannot be so performed. NJ TRANSIT's Contracting Officer shall determine whether sufficient justification has been provided by the Proposer to form the basis of his certification that the services cannot be performed in the United States and whether to seek the approval of the President and CEO (Executive Director).

Accordingly, the Proposer should submit with its Proposal the attached Source

Disclosure Certification form (**Exhibit 7**). If the information is not submitted with the Proposal, it shall be submitted within five (5) Business Days of NJ TRANSIT's request.

Failure to submit sourcing information when requested by NJ TRANSIT shall preclude award of a Contract to the Proposer.

Breach of Contract for Shift of Services Outside the United States

If, during the term of the Contract, the Consultant or Subconsultant, who had on Contract award declared that its services would be performed within the United States, proceeds to shift the performance of the services to outside the United States, the Consultant shall be deemed to be in breach of its Contract. The Contract shall then be subject to termination for cause pursuant to Article 16 of Agreement unless previously approved by the Contracting Officer and the President and CEO (Executive Director).

R. Political Contribution Disclosure (P.L. 2005, C.271)

Consultant is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.27 (P.L. 2005, c.271, section 3) if the Consultant receives contracts in excess of $50,000 from a public entity in a calendar year. It is the Consultant responsibility to determine if filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at http://www.elec.state.nj.us.

S. Notice of Executive Order 125 Requirement for Posting of Winning Proposal and Contract Documents

Pursuant to Executive Order No. 125, signed by Governor Christie on February 8, 2013, the Office of the State Comptroller ("OSC") is required to make all approved State contracts for the allocation and expenditure of federal reconstruction resources available to the public by posting such contracts on an appropriate State website. Such contracts are posted on the New Jersey Sandy Transparency website located at:
https://nj.gov/comptroller/sandytransparency/contracts/sandy/approved/contracts.html

The Contract resulting from this RFP is subject to the requirements of Executive Order No. 125. Accordingly, the OSC will post a copy of the Contract, including the RFP, the winning Proposal and other related contract documents for the above contract on the Sandy Transparency website.

In submitting its Proposal, a Proposer may designate specific information as not

subject to disclosure. However, such Proposer must have a good-faith legal and/ or factual basis to assert that such designated portions of its Proposal (i) are proprietary and confidential financial or commercial information or trade secrets or (ii) must not be disclosed to protect the personal privacy of an identified individual. The location in the Proposal of any such designation should be clearly stated in a cover letter, and a redacted copy of the Proposal should be provided. A Proposer's failure to designate such information as confidential in submitting a proposal shall result in a waiver of such claim.

The State reserves the right to make the determination as to what is proprietary or confidential and will advise the winning Proposer accordingly. The State will not honor any attempt by a winning Proposer to designate its entire Proposal as proprietary, confidential and/or to claim copyright protection for its entire Proposal. In the event of any challenge to the winning Proposer's assertion of confidentiality with which the State does not concur, the Proposer shall be solely responsible for defending its designation.

T. Equal Pay Act

Pursuant to N.J.S.A. 34:11-56.14(a), any employer, regardless of the location of the employer, who enters into a contract with a public body to perform qualifying services to the public body shall provide a report to the Commissioner of the New Jersey Department of Labor and Workforce Development, in a form promulgated by the Commissioner, of information regarding the compensation and hours worked by employees categorized by gender, race, ethnicity and job category.

Information regarding the Diane B. Allen Equal Pay Act and its requirements may be obtained from the New Jersey Department of Labor and Workforce Development (LWD) web site at: https://nj.gov/labor/equalpay/equalpay.html

LWD forms may be obtained from the online web site at:

https://nj.gov/labor/forms_pdfs/equalpayact/mw563(6-18)annualequalpay.pdf

U. Certification of No Tax Liability or Felony Conviction

As a condition of any contract award, a private corporation, partnership, trust, joint-stock company, sole proprietorship, or any other business association, including each participant in a joint venture, must certify, under penalty of perjury, that it has no unpaid federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

As a condition of any contract award, any such entity must also certify that it has not been convicted of any felony criminal violation under any federal law within the twenty-four (24) months preceding the date of contract award.

Furthermore, any such entity awarded a contract by NJ TRANSIT is responsible for flowing down the requirements of the above two (2) paragraphs to all lower tier subcontractors or subconsultants (including sub-subcontractors and subsubconsultants, etc.), without regard to the value of any such subagreement (or sub-subagreement, etc.).

The certification required hereunder is attached as **Exhibit 15**, and the conditions and obligations stated therein are continuing through and until the date of any contract award. If any of the conditions stated in the certification change prior to the date of contract award, for the prospective awardee or for any subcontractor or subconsultant (or sub-subcontractor or sub-subconsultant, etc.), the prospective awardee shall immediately notify the NJ TRANSIT contracting officer. Failure to complete the Certification will render the Proposal non-responsive.

V. Notice of Executive Order No. 271 Requirements Relating to COVID-19

NJ TRANSIT is dedicated to a culture where safety and health are fundamental values, adopted and practiced throughout the agency. Accordingly, in consideration of the health, safety, and welfare of the agency employees and the general public, NJ TRANSIT will require that the Consultant and its Subconsultants abide by Governor Murphy's Executive Order No. 271, included as **Exhibit 17**, pertaining to safety precautions required as a result of Coronavirus disease 2019 ("COVID-19) and all guidance and/or best practices regarding COVID-19 that were established by the Centers for Disease Control and Prevention (CDC). Selected Respondents are required to execute the Certification included with **Exhibit 17** and return with their Proposal.

II. PROJECT BACKGROUND AND DESCRIPTION

Refer to **Attachment C** of this RFP for the detailed description of tasks.

III. SCOPE OF SERVICES – GENERAL

NJ TRANSIT reserves the right to cancel the project or reduce the scope of work for the Consultant without cause at any time.

The Consultant shall complete the 100% Design and bid ready documents twelve (12) months following Notice to Proceed (NTP).

If during the course of this Project, it is determined by NJ TRANSIT that an extension of time is required to meet new or modified project demands, NJ TRANSIT reserves the right to extend this Agreement for a period agreeable to both parties.

The Consultant shall perform services for NJ TRANSIT, and attend and assist at all meetings required to inform and coordinate work with NJ TRANSIT staff and relevant agencies.

The Consultant shall provide a work plan with timelines and milestones for the management of these services to NJ TRANSIT's Project Director. In addition, the Consultant shall keep NJ TRANSIT's Project Director routinely informed of its progress during the needs analysis, network(s) design and implementation strategy, in written format, as required, during the work.

The Consultant shall maintain and make available, as requested, all documents, records and other evidence pertaining to service and costs thereof for a period of five (5) years from the final payment under the Contract.

When plans and specifications are required, the approval of drawings by NJ TRANSIT is not to be construed as authority to violate, cancel or set aside any provisions of applicable Municipal, County, State or Federal codes, laws, rules and regulations. Nothing contained in this RFP or any resultant contract is intended to relieve the Consultant of responsibility for maintaining adequate supervision/responsible charge over the design to endeavor to guard NJ TRANSIT against deficiencies in the design work.

Proposers are reminded that it shall be necessary to monitor and/or coordinate with other relevant major projects and local developments during the conduct of this Project. These may include:

- Amtrak 's projects including: The 5th Track in New Jersey Segments of the North East Corridore (NEC), and the NJ Gateway Connections.
- Projects being coordinated as part of NJ TRANSIT Superstorm Sandy Recovery and Resilience Program ("SSRRP") and other NJ TRANSIT Capital Program activities to ensure that existing or contemplated projects do not preclude integration with Distributed Generation. The Consultant may be asked to review design drawings for SSRRP and other Capital Program projects, to the extent there is a possibility of overlap or need for coordination between projects.

The NJ TRANSIT-DG Project is a pivotal element of the NJ TRANSIT SSRRP. Consequently, all Project communications, reports and submittals shall conform with programmatic standards and requirements as developed by NJ TRANSIT for the Superstorm Sandy Recovery and Resilience Program.

In no way is the material in the succeeding sections of this solicitation intended to prescribe the exact requirements of the Contract. Rather, the Contract shall require

preparation of design/engineering documentation demonstrating compliance with Project goals, environmental and regulatory requirements as well as risk assessments in conformance with all relevant rules and regulations and industry norms and standards, for the production of such documents as may be required by the U.S. Department of Transportation(USDOT), the Federal Transit Administration (FTA), the Federal Railroad Administration (FRA), U.S. Department of Energy (USDOE), Federal Energy Regulatory Commission (FERC), New Jersey Board of Public Utilities (NJBPU), New Jersey Department of Environmental Protection(NJDEP), United States Army Corps Of Engineers (USACOE), United States Coast Guard (USCG), PJM Interconnection LLC (PJM), Amtrak and any other agencies with jurisdiction. Any deficiencies in the Consultant work products identified by any reviewing agency – State or Federal – shall be the sole responsibility of the Consultant to cure, at its own cost and without recourse to NJ TRANSIT. The material herein is intended to establish minimum standards for content and form of material and data required to be gathered, analyzed, and presented to comply with provisions of the Project Federal, Categorical Exclusion as well as any applicable Federal and State regulations as they apply to the design, construction and operation of the Project.

IV. SCOPE OF SERVICES – DETAILED DESCRIPTION OF TASKS

Refer to **Attachment C** of this RFP for the detailed description of tasks.

V. PROPOSAL REQUIREMENTS

A. General

A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. The Technical Proposals and Consultant Certifications shall be uploaded separately to the provided Microsoft OneDrive link no later than **3:00 P.M.**, **Thursday, February 17, 2022**. Proposers are requested to begin each file name with the abbreviated RFP Number, name of firm and include content description or Attachment Number, if applicable. (For example, RFP No. XX-XXX – Firm ABC – Technical Proposal). While detailed file names are requested, please also avoid lengthy file names and abbreviate when possible.

NJ TRANSIT requires that all prospective Proposers advise NJ TRANSIT of their intent to either submit or not submit a proposal by e-mailing the “Intent to Propose Form”, included as **Exhibit 16**, and submitting the Acknowledgement on or before **Thursday, February 10, 2022**, at **5:00 P.M.** and must be emailed to **Faith Blair** at fblair@njtransit.com. This form is required in order to submit a Proposal but does not bind a prospective Proposer in any way. Failure to timely submit the notice of intent may result in NJ TRANSIT rejecting any Proposal later submitted.

Once the “Intent to Propose Form” has been received from the Proposer, the Proposer will receive an email with a link to Microsoft OneDrive. Upon clicking the link, the Proposer will be asked to confirm and enter the email address the link was sent to or perform a code verification request, which will be sent to the Proposer’s email address. **Proposers are required to provide and use the email address(es) of the person(s) who will need access to the site.** Once instructions have been received, it is recommended that Proposers review the instructions and upload a test file to ensure there are no issues or questions with uploading.

This RFP is the property of NJ TRANSIT. It is to be used solely by those organizations and individuals to whom copies have been sent and solely for the purpose of preparing proposals for the services described in the RFP. No distribution of this RFP may be made without prior written approval of NJ TRANSIT.

Clear and concise Proposals are recommended. Elaborate Proposals and artwork, expensive paper and bindings, and expensive visual and other preparation aids are not necessary or desirable.

Proposals shall be valid for the period of time it takes to negotiate an agreement and execute a Contract with the successful Proposer. Said period of time is not expected to exceed six (6) months from the date of Proposal receipt, but may be longer. A duly authorized official of the Proposer or joint venture must sign the Proposal.

A1. Open Public Records Act

As part of its Proposal, a Proposer may designate any data or material it asserts are exempt from public disclosure under the Open Public Records Act (OPRA), N.J.S.A. 47:1A-1 et seq., N.J.A.C. 16:72-1.11, and/or the common law, provided it explains the basis for any such assertions. When the Proposal contains a negotiation component, the Proposal will not be subject to public disclosure until a notice of intent to award is announced. The Proposer must provide a detailed statement clearly identifying those sections of the Proposal that it claims are exempt from production, and the legal and factual basis that support said exemption(s) as a matter of law. **Assertions that the entire Proposal, and/or prices contained therein, are exempt from public disclosure under OPRA, the common law, or the U.S. Copyright Act are overbroad and will not be honored by NJ TRANSIT.** In the event that a public request is made for materials that the Proposer has identified as confidential, NJ TRANSIT shall have the final authority to determine whether the materials are exempt from public disclosure under OPRA and shall take action as required by applicable law. Furthermore, in the event of any challenge to Proposer’s assertion of confidentiality with which NJ TRANSIT does not concur, the Proposer shall be solely responsible for defending its

designation, but in doing so, all costs and expenses associated therewith shall be the responsibility of the Proposer. In which case, the Proposer shall defend, indemnify, protect and save harmless NJ TRANSIT from and against all suits, actions, claims, demands or damages of whatsoever kind arising as a result of the Proposer's designation, including court costs, counsel fees, settlements, judgments or otherwise.

A2. Proposed Additional Terms

A Proposer may submit additional terms as part of its Proposal and Proposals including proposed terms and conditions may be accepted, but proposed terms or conditions that conflict with those contained in the RFP or that diminish NJ TRANSIT'S rights under any Contract resulting from the RFP, may render a Proposal non-responsive. It is incumbent upon the Proposer to identify and remove its conflicting proposed terms and conditions prior to Proposal submission. Where additional terms are submitted they may be accepted, rejected, or negotiated, in whole or in part, at NJ TRANSIT'S sole discretion where the terms do not conflict with material terms of the RFP or do not diminish NJ TRANSIT's rights under the Contract resulting from the RFP.

In the event that a Proposer intends to propose terms and conditions that conflict with the RFP, those proposed terms and conditions shall only be considered if submitted and agreed to pursuant to the "Request for Information and Addenda" set forth in Section I Subparagraph E of this RFP.

After award of the Contract, if a conflict arises between a Proposer's additional terms included in the Proposal and a term or condition of the RFP, the term or condition of the RFP will prevail.

B. Technical Proposal Format

Technical Proposals shall include the necessary information to establish the proposer's expertise and qualifications to accomplish all Tasks as set forth in the Scope of Services of this RFP. Technical Proposals shall reflect and include the necessary level of effort required to advance the project through completion. Proposers are urged to be clear and concise in the preparation of Proposals.

Technical Proposals shall follow the format outlined below.

Section 1 - Cover Letter:

The cover letter should summarize key points of the Proposal and include any introductory or explanatory remarks. The Proposer shall demonstrate an understanding of the overall project objectives, areas of concern and technical/managerial approaches to be emphasized in pursuing this work.

Section 2 - Qualifications of Proposer(s):

This section shall contain pertinent information about the project organizational structure of Proposer's team and the number of personnel required for the project. The Proposer shall show the availability of professional and technical staff exclusively for this Project. Also, the section shall show anticipated workload for the duration of this Project, taking into account resources involved with existing proposals and active projects.

This section shall also contain the Proposer's certification that a full-time office will be maintained during the Project period, and that the Proposer's Project Manager can be reached through this office during regular working hours. Also, the Proposer shall identify other offices, their proximity in miles to the sites where work will be performed and the type and amount of work to be performed at these locations.

Section 3 - Qualifications of Individuals:

This section shall contain the names and concise experience records of the Proposer's Project Manager and other key managerial and technical personnel assigned to the project. The number of person-hours each will devote to individual project tasks must be shown. Specific design, skills or strengths and any other relevant experience should be highlighted. In describing related experience, explain the role of each individual's and firm's assignment in the context of the overall project, study, program, etc.

Resumes for the Proposer's Project Manager and other key managerial and technical personnel assigned to the project shall be included in this section and shall cite formal education, professional licenses and certifications, work history, and training in industry skills.

This section must contain a certification that the listed key personnel are presently employed by the Proposer, or will be on board, and shall be assigned to the project in the manner prescribed.

Section 4 – References:

Reference checks will be made based on the information supplied in this section, and the information gathered will be used to validate information contained in the Technical Proposal and evaluate the abilities of the Proposer in all the aspects of quality, budget, responsiveness, and expertise. Listed references, therefore, should be pertinent and recent (within the last five (5) years), and the contact person should have had direct involvement with the Proposer and the project.

A minimum of three (3) client references must be provided for each Consultant or Subconsultant on the Proposer's consulting team for completed assignments similar in scope and magnitude to the NJ TRANSIT project to be undertaken.

A minimum of three (3) client references must be provided for the Proposer's Project Manager.

A minimum of three (3) client references must be provided for each key project staff/task member. References must include client firm/agency name, client project contact name, title, current address and telephone number, name of project, start and end dates of assignment, key firm personnel involved, and a description of the assignment.

In addition, each Proposer having performed services for NJ TRANSIT, as a prime Consultant or Subconsultant, must provide references as stated above for all prior NJ TRANSIT projects.

Proposers having performed services for NJ TRANSIT will be evaluated on the basis of their history of compliance with all Contract provisions, including but not limited to: quality assurance, budget adherence, insurance and indemnification responsibility provisions.

References should include client name, client contact name, title and involvement on the project, address, telephone number, name of project worked on, start and end dates of assignment, and description of the assignment including firm's role/responsibility.

Section 5 -Technical Section:

This section shall contain the Proposer's work plan for accomplishing the Project. The work plan shall address all tasks described in this RFP and shall include a description of how the Proposer's time schedule for project completion will at least meet or better the time frames provided. This section most importantly shall contain each key individual's past work experience that demonstrates their ability of a project of similar scope and magnitude.

The Proposer is encouraged to provide additional narrative on the services to be performed, which can be used to evaluate the Proposer's understanding of the objectives and overall purpose of the project; the Proposer's relative specialized experience; technical competence and application of innovative techniques in connection with particular tasks and activities; and the Proposer's ability to progress the project in a systematic, straightforward, logical manner.

Suggested improvements on the work plan as described in this RFP should be noted in this section.

Section 6 - Team Organization/Resource Allocation:

This section shall address the proposed management structure, manpower allocation, and assigned individuals for performing the work. The Proposer must

include a clear description of how the management structure and assigned personnel fit into each task as set forth in the Scope of Services of this RFP, how staff assignments will vary over the Project time frame and an explanation of the relationship of the Project Manager to the top management of the Proposer, and the extent of his/her authority and responsibility. All other Project positions and relationships comprising the Project's organizational structure will be presented. The following information shall be included in this section:

a. Team organization chart showing the reporting and contractual relationships of all firms included in the Proposal;

b. Matrix of person-hours by Proposer showing, by task, the total person-hours for the entire team and separately for each firm included in the team. In addition, the percentage of person-hours allocated to DBE firms, by Phase and task shall be shown;

c. Organization and staffing chart showing the organization of key personnel by name, title and reporting relationship, and

d. Matrix of person-hours by individuals showing, for each project staff member, the number of person-hours proposed for each task. Professional staff includes all key staff members, including: project manager, task leaders, discipline leaders, and all project engineers and technical support personnel. Separate categories will be used to show labor hours for each of the following classifications: technicians, drafting, clerical/word processing. Individuals need not be named for these categories. The percentage of person-hours allocated to DBE firms shall also be shown.

Section 7- Quality Assurance Plan:

This section shall describe the Proposer's Quality Assurance/Quality Control ("QA/QC") Plan as it relates to this Project as well as the Proposer's overall QA/QC Program. This section is not intended for inclusion of the complete QA/QC Plan but should be detailed enough to provide for a clear understanding of the Proposer's process. NOTE: Upon award of this Contract, the successful Proposer shall submit for approval to NJ TRANSIT, its detailed QA/QC Program for all of the services to be provided under this RFP.

Section 8 - Conflict of Interest:

An organizational conflict of interest occurs where a Proposer is unable, or potentially unable, to render impartial assistance or advice due to activities, relationships, contracts, or circumstances which may impair the Proposer's objectivity; or a Proposer has an unfair competitive advantage. If the Proposer or any employee, agent or subcontractor of the Proposer may have or may give the appearance of a possible conflict of interest, the Proposer shall include in its Proposal a statement indicating the nature of the conflict.

Also, the Proposer must provide a description of how the Proposer avoids or addresses potential conflicts of interest. If the Proposer does not have such conflicts, then that shall be stated in this section with sufficient detail in support of such statement. This statement must be on company letterhead and signed by an authorized representative of Proposer. NJ TRANSIT will determine whether the Proposer or any employee, agent or subcontractor has a conflict or potential conflict of interest on a case-by-case basis. NJ TRANSIT reserves the right to disqualify the Proposer if, in its sole discretion, any interest disclosed from any source could create, or give the appearance of, a conflict of interest. NJ TRANSIT's determination regarding any question(s) of conflict of interest shall be final.

The Proposer or any employee, agent or subcontractor of the Proposer shall also identify any projects, past or present, it has performed for NJ TRANSIT relating to the services requested in this RFP including the dates of the project, the contract number, the project supervisor, and a brief description of the scope of work.

To the extent that this RFP involves a potential for follow-up work, for example, construction or construction management of a project, the Proposers, its subsidiaries and affiliates, joint ventures involving the Proposer, and any employee, agent or subcontractor may be precluded from participating in any follow-up work so as to avoid a conflict of interest, such as an unfair competitive advantage or potential bias. See FAR Subpart 9.507 (FAR 9.507)

THE PROPOSER MUST PROVIDE ONE (1) ORIGINAL COPY OF THE FOLLOWING IN A SEPARATE SEALED ENVELOPE:

Consultant Certifications

All Proposers shall include one (1) original signed copy of the certifications and affidavits required under this solicitation.

Proposers **must** submit the following with the Technical Proposal:

- **Exhibit 2** - Acknowledgment of Receipt of Addenda
- **Exhibit 5** - Statement of Joint Venture (if applicable)
- **Exhibit 6** - Ownership Disclosure Form
- **Exhibit 10** - Contractor's Certification of Eligibility
- **Exhibit 11** - Non-Collusion Affidavit
- **Exhibit 12** - Affidavit of Compliance (Code of Vendor Ethics)
- **Exhibit 13** - Certification of Contracts, Grants & Loans Cooperative Agreements (Byrd Anti-Lobbying Certification).
- **Exhibit 17** - Notice of Executive Order No. 271 Requirements Relating to COVID-19

Proposers **should** submit the following with the Technical Proposal but **must** submit within the indicated time frame:

- **Exhibit 7** - Source Disclosure Certificate Form (must be submitted within five (5) Business Days of request)
- Business Registration Certificate (must be submitted before the date of Contract award)

- **Exhibit 8 "NOT USED"**
- **Exhibit 9** - Disclosure of Investment Activities in Iran (must be submitted before the date of Contract award)

Proposers from whom a Cost Proposal is requested, **should** also submit the following with the Cost Proposal but **must** submit within the indicated time frame:

- **Exhibit 3** - NJ TRANSIT Corporation's DBE Requirements for Procurement and Professional Services (must be submitted within five (5) Calendar Days after the Cost Proposal due date).

C. Oral Presentation Format

Oral Presentations shall be made before the Technical Evaluation Committee (TEC) and shall consist of an introduction of the Proposer's project team, a general discussion of why the team should be selected for the Project, and a detailed account of the particular experience of each major team member. The Oral Presentations shall also include the methodology and approach that the Proposer intends to use for the intended scope of services and explain in necessary detail the basis why this approach was chosen as well as any applicable projects where this approach was used in the past.

The oral presentation period will be scheduled for a maximum of one (1) hour for each Proposer. Each Proposer will be granted up to thirty (30) minutes for highlighting significant points of interest to NJ TRANSIT. The balance of the presentation shall be reserved for discussions, with the TEC members, on any and all subjects in regards to the written proposal, oral presentation, and other project issues as deemed relevant by the TEC.

Members of the Proposer's team who will play the key and significant roles in managing the Project, shall attend and participate in the oral presentation. Attendance shall enable each TEC member to become acquainted with the individuals so designated.

D. Method of Selection

1. Proposal Distribution

Upon receipt of the Technical Proposals, NJ TRANSIT will provide a copy of the Technical Proposals to each member of the TEC. This committee will consist of members from various departments within NJ TRANSIT.

Duties of the TEC will include:

- Review of Technical Proposals
- Complete technical evaluations and score proposals
- Participate in Oral Presentations
- Assist the Procurement Department, as required, with negotiations.

2. Proposal Evaluation

Each individual on the TEC will review and evaluate the written Technical Proposals based on the quality and substance of the submitted Proposal. Written Technical Proposals will be evaluated against the technical evaluation criteria enumerated in **Attachment A** of this RFP.

Written Technical Proposal evaluations will be used by NJ TRANSIT to determine the competitive range. Reference checks will be performed for each Proposer deemed within the competitive range and the results furnished to the TEC. Although the reference checks will not be scored per se, they will be used to validate information contained in the Technical Proposals.

3. Oral Presentations

The TEC will conduct the Oral Presentations. Oral Presentations will be requested from at least three (3) qualified Proposers within the competitive range, except NJ TRANSIT may select fewer Proposers if fewer Proposers responded to the solicitation or meet the qualifications for the project.

Oral Presentations will provide an opportunity for the Proposers to clarify its written Technical Proposal. Clarifications cannot correct any deficiencies or material omissions, or revise or modify a Proposal. The TEC will use the Oral Presentations to confirm and/or reassess its understanding of the written Technical Proposals and incorporate that information into its evaluation by revising the written technical evaluation scores accordingly.

NJ TRANSIT reserves the right to assess and reassess its understanding of Proposals and revise the rating and ranking of such Proposals at any time prior to selection.

4. Cost Proposals

After evaluating the Technical Proposals, NJ TRANSIT will request a Cost Proposal from the highest technically qualified Proposer in the competitive range. Cost Proposals shall reflect and include the necessary level of effort required to advance the project through completion. All proposed expenses will be evaluated to determine their reasonableness and whether they are allowable and allocable. The Federal Transit Administration Cost Standards (Federal Acquisition Regulations Part 31) will be used as the guideline in determining the reasonableness of the Proposer's costs.

The highest technically qualified Proposer shall submit one (1) original of a Cost Proposal in .pdf format via email to **Faith Blair** at fblair@njtransit.com. The Proposer must provide a detailed Cost Proposal within seven (7) Calendar Days of the receipt of the written or verbal notification from NJ TRANSIT regarding their selection. If a Proposer cannot provide its Cost Proposal within seven (7) Calendar Days of request, NJ TRANSIT reserves the right to begin negotiations with the next highest-ranked Proposer. The Cost Proposal shall be presented in a person-hour allocation format by discipline and title and shall be separated by salary rate as indicated below.

Person-hours by discipline and title shall be separated by task and by salary rate. Direct expenses shall be itemized separately by category for each Phase, Task, and Subtask. Direct expenses to the Proposer are in addition to the compensation for payroll additives, salaries, and profit, and include actual expenditures made by the Proposer's technical employees and professional consultants for such expenses as:

1. Travel, sustenance, and lodging - NJ TRANSIT shall reimburse the Proposer in accordance with the NJ TRANSIT Travel Policy. Please refer to **Exhibit 14**: Travel, Subsistence and Lodging Reimbursement Guidelines.
2. Reproduction expenses.
3. Subcontracts less than $10,000.00.
4. Expense of the premium portion for overtime work requiring higher than regular rates, when pre-approved and authorized in writing by NJ TRANSIT.

The person-hours and direct expenses shall be summarized by task and by Consultant and Subconsultant in the Proposer's Cost Proposal and include overhead, profit, etc. Overhead and profit assumptions shall be shown as per **Attachment B**. Direct salary cost is defined as base salary paid to technical employees (excluding mandatory and customary benefits such as statutory employees' benefits, insurance, sick leave, holidays and vacations, pensions and similar benefits). Escalation of direct labor rates is

subject to a 3% yearly maximum to be applied on the contract anniversary date. Technical employees include engineers, designers, job captains, draftsmen, specification writers, in consultation, research, inspection, design, drawing production, specification development and other similar services pertaining to the project. Non-technical employees include, but are not limited to, administrative and clerical personnel.

If clerical support is required and if it is not included in overhead or direct expenses, it must be itemized in the same fashion as other staff in the proposed cost detail.

The Proposer must submit the following Cost Proposal forms: A summary of the Cost Proposal for the Consultant and each Subconsultant included in the Proposal is required, showing fees for the tasks as set forth in **Attachment B-1** "Cost and Fee By Consultant And Each Subconsultant Recap - Team Summary." A team summary, arranged by task, for the entire Proposal is also required as shown in **Attachment B-2** "Cost And Fee Tasks Recap - Team Summary." The same summary, arranged by task, is also required from the Consultant, as shown in **Attachment B-3** "Cost And Fee Tasks Recap - For Each Consultant And Subconsultant." The required Cost Proposal forms are as follows:

- **Attachment B-1**: Cost And Fee By Consultant And Each Subconsultant Recap - Team Summary
- **Attachment B-2**: Cost And Fee Tasks Recap -Team Summary
- **Attachment B-3**: Cost And Fee Tasks Recap - For Each Consultant And Subconsultant
- **Attachment B-4**: Personnel Team Detail
- **Attachment B-5**: Staffing Schedule - By Consultant And Each Subconsultant

After evaluation of the technical proposals, NJ TRANSIT will request the above Cost Proposal forms from the highest technically qualified Proposer.

The Contract shall be a cost plus fixed fee type with a maximum amount not to be exceeded. The profit (fixed fee) shall be negotiable on a task-by-task basis and shall not exceed ten percent (10%) on labor, overhead and fringe costs; there should be no profit on direct expenses. No overhead burden of profit (fixed fee) is allowed on subcontracting or direct costs.

Each task in this Contract shall have a specified amount identified equal to the negotiated proposed cost for each phase, task, and subtask. Expenditures greater than the identified amount and incurred by the Proposer during the course of the execution of the Contract shall not be reimbursed unless previously approved by NJ TRANSIT prior to the performance of the work.

The Proposer must demonstrate its financial capability, including financial resources to sustain operations between the time expenses, are incurred and the time payment is made. The Proposal shall include the latest year-end financial statement as prepared by an independent auditing firm.

The Proposer's team also must submit a listing of the items charged to the project overhead rate and the corresponding percentages for the Consultant and Subconsultant firms. Overhead rates are not restricted but must be documented by a recent (within the past three (3) years) State, Federal or independent certified accounting firm audit. The Proposer must also submit its overhead projections in schedule format for the duration of the project.

All costs, including indirect cost items, are subject to negotiation. NJ TRANSIT intends to negotiate provisional indirect cost rates, which are subject to audit and downward adjustment only.

DBE Forms & Affidavits

The required DBE forms and affidavits shall also be included in the Cost Proposal. The Proposer shall refer to the DBE Requirements for Federally Funded Procurement Activities (**Exhibit 3**) included in the RFP for the requirements concerning the DBE obligations and mandatory submissions for this Contract.

5. Negotiation

NJ TRANSIT reserves the right to:

- Pursuant to applicable law, reject all Proposals submitted if in the best interest of NJ TRANSIT.
- Accept any Proposal as submitted without negotiations.
- Reject, without entertaining revisions, a Proposal with major substantive deficiencies.

NJ TRANSIT will enter into negotiations with the highest technically qualified Proposer to reach an agreement on scope of services and fees. During the course of negotiations, NJ TRANSIT may require revisions to, correction of, or other changes to any Proposal submitted as a condition to it being given any further consideration. If in the opinion of NJ TRANSIT a satisfactory Proposal cannot be negotiated with a selected Proposer, NJ TRANSIT will formally end negotiations and initiate negotiations with the next most technically qualified Proposer.

This negotiation procedure will be followed until a satisfactory Proposal is

negotiated. NJ TRANSIT considers all elements of the Proposer's Proposal subject to negotiation.

6. Approval and Award

Once negotiations have been completed, a recommendation for the award of the Contract will be issued for approval by NJ TRANSIT's Board of Directors for the Proposer whose Proposal provides the best value to NJ TRANSIT. Upon approval of the recommendation for award of a Contract, NJ TRANSIT will enter into a Contract found in **Exhibit 1**.

Within ten (10) Business Days of receipt of Notice of Award, the successful Proposer shall properly execute two (2) copies of the Contract and deliver to NJ TRANSIT both signed copies of the Contract, the specified insurance certificates, and any other document as may be specified in the Contract agreement. NJ TRANSIT will execute both copies of the Contract and will return one (1) executed copy to the selected Proposer/Consultant.

NJ TRANSIT reserves the right to cancel the award of a Contract before execution if NJ TRANSIT deems such cancellation to be in its best interests. In no event will NJ TRANSIT have any liability for the cancellation of such award. The Proposer assumes the sole risk and responsibility for expenses incurred prior to execution of the Contract and shall not commence work until receipt of a Notice to Proceed.

E. Protest Procedure

A. Definitions

1. "File or Submit" means date of receipt by NJ TRANSIT's Contracting Officer.

2. "Federal Law or Regulation" means any valid requirement imposed by Federal statute or regulation governing contracts awarded pursuant to the grant agreement. This includes the requirements as stated in FTA Circular 4220.1F

3. "Interested Party" means an actual or prospective Proposer, an offeror or party whose direct economic interest would be affected by the award or failure to award the contract at issue.

B. Parties

Only an Interested Party may file a protest.

C. Types of Protests/Time Limits

1. Protests based upon a challenge to the specifications or alleged improprieties in NJ TRANSIT'S procurement process must be filed no later than fourteen (14) Calendar Days prior to the Proposal submission date.

2. Protests based upon rejection of a Proposal shall be filed no later than five (5) business days after the Protestor receives notification of rejection from NJ TRANSIT.

3. Protests based upon the award of a contract shall be filed no later than five (5) Business Days after the receipt of NJ TRANSIT's Notice of Intent to Award.

4. All protests must be filed in writing. Oral protests will not be accepted.

D. Where to File

Protests must be filed directly with NJ TRANSIT'S Contracting Officer, or designee, at the address of 1 Penn Plaza East, Sixth Floor, Newark, New Jersey 07105, and identifying the RFP number.

E. The Protest

The protest must contain the following information:

1. The name, address, and telephone number of the protestor.

2. Identity of the RFP (by number and description).

3. A statement of the specific grounds for protest and any supporting documentation. Additional materials in support of the protest will only be considered if filed within the time limits set in Section C.

4. An indication of the ruling or relief desired from NJ TRANSIT.

F. Confidentiality of Protest

Materials submitted by a protestor will not be withheld from any interested party, except to the extent that the withholding of information is permitted or required by law or regulation. If the protestor believes the protest and any supporting documentation contains proprietary material that should be withheld, the protestor shall submit a statement advising of this fact affixed to the front page of the protest documents and the alleged proprietary information must be so identified wherever it appears. In the event that a public request is made for materials that the protestor has identified as confidential, NJ TRANSIT shall have the sole discretion and final authority to determine whether the materials are exempt from public disclosure and shall take action as required by applicable law.

G. Protest Procedures: Challenges to a Specification

1. An Interested Party finding cause to challenge a specification contained within the RFP may submit a written protest to NJ TRANSIT's Contracting Officer setting forth in detail the grounds for such protest;

2. A written protest may be submitted by an Interested Party only after NJ TRANSIT has formally responded to any questions raised by prospective Proposers and must be submitted at least fourteen (14) Calendar Days prior to the Proposal submission date to permit a review of the merits of the protest and to take appropriate action, as may be necessary, prior to the scheduled deadline for Proposal submission.

3. A protest of a specification of the advertised RFP shall contain the following:

    i. The RFP number and description; and

    ii. The specification(s) at issue and the specific grounds for challenging the cited specification(s), including all arguments, materials, or other documentation in support of the protestor's position.

4. NJ TRANSIT's Contracting Officer may disregard a protest not containing all of the items set forth in 3 above.

5. NJ TRANSIT's Contracting Officer may, upon timely receipt of a protest of a specification, issue a final written decision on the protest prior to the Proposal submission date. Where a decision is issued, such determination shall be a final agency decision. NJ TRANSIT's Contracting Officer has the sole discretion to determine if an in-person presentation by the protestor is necessary to reach an informed decision on the protest.

6. NJ TRANSIT's Contracting Officer may resolve a protest of a specification by

amending the RFP and extending the deadline for Proposal submission, by canceling the procurement, or by any other appropriate means.

H. Protest Procedures: Challenges to Rejection of a Proposal or Contract Award

1. An Interested Party finding cause to challenge the rejection of a Proposal, or award of the Contract for this RFP may submit a written protest to NJ TRANSIT's Contracting Officer setting forth in detail the grounds for such protest.

2. All written protests must conform to the time requirements as set forth above. Failure to timely submit a protest may result in the disregard of a protest.

3. A protest under this section shall contain the following information:

    i. The RFP number and description;

    ii. The specific grounds for the protest including all arguments, materials, or other documentation in support of the protestor's position; and

    iii. A statement as to whether the protestor requests an opportunity for an in-person hearing and the reason(s) for the request. The opportunity for an in-person presentation is at the sole discretion of the NJ TRANSIT Contracting Officer and subject to the terms set forth below.

4. Failure by a protestor to include all required information may result in a dismissal of the protest.

5. Protests accepted by NJ TRANSIT shall be resolved in writing on the basis of NJ TRANSIT's review of the record, including, but not limited to, the written protest, the terms, conditions, and requirements of the RFP, pertinent administrative rules, statutes, and case law, and any associated documentation NJ TRANSIT deems appropriate. In cases where no in-person hearing is held, the written record shall, in and of itself, constitute a hearing. The determination by NJ TRANSIT shall be a final agency decision.

    i. NJ TRANSIT has the sole discretion to determine if an in-person presentation by the protestor is necessary to reach an informed decision on the matter(s) of the protest. In-person presentations are for the benefit of NJ TRANSIT. NJ TRANSIT also has the discretion to limit attendance at an in-person presentation, when granted.

    ii. NJ TRANSIT's decision will address only the issues raised originally by the protestor.

I. Request for Additional Information

1. NJ TRANSIT's Contracting Officer, or designee, is entitled to request, receive, and review copies of any and all records and documents deemed appropriate and relevant to the issues and arguments set forth in the protest. Upon receipt of a request by NJ TRANSIT's Contracting Officer, or designee, the protestor shall promptly provide the requested records and documents free of charge within the time frame specified by NJ TRANSIT.

2. If a protestor fails to comply with the provisions of this section, such failure may constitute a reasonable basis for NJ TRANSIT to resolve the protest against the protestor. Failure of a protestor to comply expeditiously with a request for information as specified by NJ TRANSIT's Contracting Officer, or designee, may also result in determination of the protest without consideration of the additional information.
3. NJ TRANSIT'S Contracting Officer, or designee, may also consider relevant information requested and received from other parties deemed appropriate by NJ TRANSIT.

J. Procurement Process Status

Upon timely receipt of a protest, NJ TRANSIT will delay the opening of Proposals until after resolution of the protest for protests filed prior to the Proposal submission date, or withhold award until after resolution of the protest for protests filed after Proposal receipt. However, NJ TRANSIT may open Proposals, or award a contract whenever NJ TRANSIT, at its sole discretion, determines that:

1. The items or work to be procured are urgently required; or

2. Delivery or performance will be unduly delayed by failure to make the award promptly; or

3. Failure to make prompt award will otherwise cause undue harm to NJ TRANSIT or the Federal Government.

K. Federal Transit Administration (FTA) Involvement

Where procurements are funded by the FTA, the protestor may protest to the FTA only where the protest alleges that NJ TRANSIT failed to have or to adhere to its protest procedures, failed to review a complaint or protest, or alleges a violation of a Federal law or regulation. Any protest to the FTA must be filed in accordance with FTA Circular 4220.1F.

ATTACHMENTS

ATTACHMENT A
Technical Proposal
Evaluation Criteria

ATTACHMENT A

TECHNICAL PROPOSAL EVALUATION CRITERIA

The following criteria, listed in order of descending importance, will be used in evaluating the written Proposals for **Final Design, Engineering, and other Technical Services for the Newark Penn Station Distributed Generation (DG) Project.**

1. **Qualifications of Proposer (s)** Has the proposer successfully designed and saw through similar projects? Does the firm have adequate resources and demonstrated technical expertise to sustain the contract?

2. **Qualifications of the Proposed Project Manager:** Does the proposed Project Manager have the demonstrated minimum ten (10) years of relevant project experience with similar projects? Has the Consultant adequately dedicated the Project Manger's time to successfully advance the Project?

3. **Qualifications of Key Individuals:** Do the proposed task leaders/key staff members have the appropriate background, skills, experience to successfully advance the Project ? What is the time availability of these individuals? Are key staff members readily available without significant travel?

4. **Technical Proposal**: Does the Proposal demonstrate an understanding of the project? Was the scope of each task developed? Is the Proposal responsive to the RFP, complete and thorough, clearly organized and well written?

5. **Person-power/Hours Allocation:** Is the size and structure of the proposal team adequate to perform the contract services for this project? Does the Proposal have the appropriate person hour allocation for each task? Are DBE firms effectively employed in the technical work and have goals been proposed to meet the assigned DBE goal?

6. **Budget/Project Management**: Does the management/control structure convincingly show that the team can deliver this type of construction project on time, within budget and with high quality? Has the firm established a reasonable internal structure for processing a task assignment, including billing and progress reporting?

Sample Oral Presentation (if required) Questions.

1. Will the Proposer help to achieve NJ TRANSIT's objectives for this contract?

2. Did the presenters have roles in the presentation that corresponded to their roles in project organization?

3. Did the project team demonstrate expertise and prior experience in the technical aspects of the project?

4. Did the team display an understanding of the objectives and demonstrate technical skills and past experience to meet those objectives and deliver quality products?

5. Did the team demonstrate its ability to work effectively together and with NJ TRANSIT project staff in a supportive manner?

6. Did key staff demonstrate their ability to make clear and effective presentations to diverse audiences?

7. If applicable, are the responses to the situational questions relevant and compelling given the anticipated work requirements and the purposes of this Contract?

Sample reference check questions:

1. Was the reference accurate and applicable to this assignment and proposed staff?
2. How would the reference rank the overall performance of the Proposer?
3. Would the reference hire the Proposer again?
4. Would they recommend the Proposer to perform this type of analysis?
5. Was the reference satisfied with the quality of the deliverables and work effort?
6. Did the firm maintain the availability of the individuals offered in the Proposal?
7. Did the firm satisfactorily comply with all Contract provisions including: quality assurance, bonding, insurance and indemnification provisions?
8. Were there any significant problems with the work and how were the problems resolved?
9. Was the firm responsive and easy to work with?
10. Did the firm meet schedules?
11. Did the firm adhere to budgets?
12. Did the firm anticipate needs and keep the reference informed in a timely way about budget, schedule and problems?
13. Was the project manager effective in managing the work, representing the team and technically proficient?
14. Did the firm perform well in meetings and presentations?
15. If the firm was a prime contractor, did it manage its subcontractors well?

ATTACHMENT B
Cost Proposal Forms

NEW JERSEY TRANSIT CORPORATION
REQUEST FOR PROPOSAL NO. 21-059

ATTACHMENT B-1

COST AND FEE BY CONSULTANT AND EACH SUBCONSULTANT RECAP - TEAM SUMMARY

NAME THE CONSULTANT AND EACH SUBCONSULTANT	PERSON - HOURS	TOTAL DIRECT LABOR COST	INDIRECT LABOR COST (OVERHEAD) @ XXX.XX%	SUBTOTAL	FIXED FEE @ XX%	DIRECT EXPENSES	TOTAL COST
PRIME CONSULTANT							
SUBCONSULTANT 1							
SUBCONSULTANT 2							
SUBCONSULTANT 3							
SUBCONSULTANT 4							
SUBCONSULTANT 5							
TOTAL							

NEW JERSEY TRANSIT CORPORATION

REQUEST FOR PROPOSAL NO. 21-059

ATTACHMENT B-2

COST AND FEE TASKS RECAP - TEAM SUMMARY

TASK	DESCRIPTION	PERSON - HOURS	TOTAL DIRECT LABOR COST	INDIRECT LABOR COST (OVERHEAD) @ XXX.XX%	SUBTOTAL	FIXED FEE @ XX%	DIRECT EXPENSES	TOTAL COST
Task 1								
Task 2								
Task 3								
Task 4								
Task 4								
Task 5								
Task 6								
Task 7								
TEAM TOTALS								

NEW JERSEY TRANSIT CORPORATION

REQUEST FOR PROPOSAL NO. 21-059

ATTACHMENT B-3

COST AND FEE TASKS RECAP FOR EACH CONSULTANT AND SUBCONSULTANT

NAME:_____

	TASK DESCRIPTION	TOTAL PERSON - HOURS PER TASK	DIRECT LABOR COST	INDIRECT LABOR COST (OVERHEAD) @ XXX.XX%	SUBTOTAL	FIXED FEE @ XX%	DIRECT EXPENSES	TOTAL COST
Task 1								
Task 2								
Task 3								
Task 4								
Task 5								
Task 6								
Task 7								
TOTAL								

NEW JERSEY TRANSIT CORPORATION
REQUEST FOR PROPOSAL NO. 21-059
ATTACHMENT B-4
PERSONNEL TEAM DETAIL

TASK: _____ **NAME:** Consultant/Subconsultant

STAFF				
STAFF PERSON/ CLASSIFICATION	PROJECT TITLE OR DISCIPLINE	ESTIMATED HOURS	HOURLY RATE	TOTAL SALARY
	Project Manager			
	Deputy Project Manager			
	Senior Engineer			
	Engineer			
	Senior Consultant			
	Project Specilist			
	Procurement Specialist			
	Quality/Safety Manager			
	Cost Estimator			
TOTAL ESTIMATED HOURS				

TOTAL SALARY (BARE COST)		
OVERHEAD @ XXX.XX% OF BARE COST		
SUBTOTAL -- SALARY + OVERHEAD		
FIXED FEE @ XX % OF BARE COST + OVERHEAD		
DIRECT EXPENSES ITEMIZED		
	$	
	$	
	$	
TOTAL DIRECT EXPENSES	$	
TOTAL THIS TASK		

NEW JERSEY TRANSIT CORPORATION
REQUEST FOR PROPOSAL NO. 21-059

ATTACHMENT B-5
STAFFING SCHEDULE BY
CONSULTANT AND EACH SUBCONSULTANT

NAME:_____

STAFF PERSON or CLASSIFICATION	PROJECT TITLE OR DISCIPLINE	HOURLY RATE	TASK 1 HRS	TASK 2 HRS	TASK 3 HRS	TASK 4 HRS	TASK 5 HRS	TASK 6 HRS	TOTAL HOURS	TOTAL DIRECT LABOR COST	INDIRECT LABOR COST (OVERHEAD) @XXX.XX%	TOTAL LABOR COST
TOTAL												

ATTACHMENT C
Detailed Scope of Services

ATTACHMENT C

RFP NO. 21-059
FINAL DESIGN, ENGINEERING, AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DISTRIBUTED GENERATION (DG) PROJECT

PROJECT BACKGROUND & DETAILED SCOPE OF SERVICES

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I. PROJECT BACKGROUND AND DESCRIPTION

Need for Project

Superstorm Sandy significantly impacted New Jersey's public transit systems. Commuter rail service was disrupted for months in what has been described by the President's Hurricane Sandy Rebuilding Task Force as "the worst disaster for public transit systems (e.g., bus, subway, commuter rail) in the nation's history." NJ TRANSIT's rail network experienced substation inundation, track washouts, downed catenary wires, and damage to signal and communications systems. Prolonged and diffuse electrical outages also significantly hampered the system's recovery. As the heaviest traveled portion of the Northeast Corridor, damage to NJ TRANSIT's systems had significant ripple effects across the region, impacting thousands of customers and doubling or tripling commuter travel time.

Since Superstorm Sandy, NJ TRANSIT has focused on making immediate repairs to restore service, planning for long-term repair and replacement of key NJ TRANSIT assets, and identifying opportunities to incorporate mitigation and resilience elements, allowing the system to better withstand storm surge associated flooding from future extreme weather events and other hazards.

NJ TRANSIT's energy systems and ability to power locomotives, stations, and critical facilities, however, remain vulnerable to future outages. Superstorm Sandy, Hurricane Irene, Hurricane Floyd, the 2003 Northeast Blackout, and other events demonstrate that a reliable source of electric power for traction, signals, switches, and railroad communications, as well as power for other related transportation infrastructure including bus garages and ferry operations, all key components of system-wide resiliency, remain beyond NJ TRANSIT's control. New and innovative solutions are needed to address these energy vulnerabilities.

Project Development

To address energy vulnerabilities, on August 19, 2013, NJ TRANSIT, the U.S. Department of Energy ("USDOE"), and the New Jersey Board of Public Utilities ("NJBPU") entered into a Memorandum of Understanding to collaborate to develop and conceptually design an advanced microgrid system known as NJ TRANSIT-DG in consultation with USDOE's Sandia National Laboratories ("Sandia").

Under the terms of the Memorandum of Understanding, NJ TRANSIT, USDOE, and NJBPU agreed to study the energy needs of NJ TRANSIT's commuter operations (including rail, bus and ferry services) in the Northeast region of New Jersey that provide critical interconnections between New Jersey communities and New York City, and that form part of the larger Northeast Corridor that Amtrak utilizes. USDOE agreed to engage Sandia in performing a conceptual design study of an advanced microgrid system to support NJ TRANSIT's operations. In performing this work, Sandia would employ its Energy Surety Design Methodology ("ESDM"), which is a quantitative risk based assessment approach developed to help communities evaluate regional critical and priority energy needs and identify advanced solutions to attain energy system performance goals. The conceptual design of NJ TRANSIT-DG would represent the first transportation system application of ESDM in the nation.

Over the course of six (6) months, NJ TRANSIT worked with Sandia, the New Jersey Governor's Office of Recovery and Rebuilding, USDOE, NJBPU, and other State agencies to advance the conceptual design. To inform the effort, in collaboration with Rutgers University, NJ TRANSIT modeled transportation capacity to identify target locations including select Passenger stations, operations support facilities and Ferry boat service between Manhattan and New Jersey, that would need to be powered in order to maximize available service. NJ TRANSIT worked with Sandia to define system boundaries, identify the Design Basis Threat (DBT) to the system, determine performance objectives, and to review energy usage needs and data over an extended period of time. NJ TRANSIT worked with two (2) regional partners to explore potential for partnership on the project: Amtrak and the Port Authority of New York & New Jersey's Trans-Hudson System (PATH). NJ TRANSIT also sought input from PSE&G, the Environmental Defense Fund, and other regional stakeholders.

This effort culminated in Sandia's issuance of a feasibility study report in February 2014 (A. Ellis et al., *Sandia Report: Feasibility Study* (Feb. 2014, SAND2014-1100)).

The Sandia Report and other information were submitted for consideration to the U.S. Department of Transportation's Federal Transit Administration ("FTA") in March 2014 as part of a thirteen-state resiliency competition. NJ TRANSIT is coordinating the project with other FTA-funded activities as part of NJ TRANSIT's Superstorm Sandy Recovery and Resilience Program.

Project Technical Overview

As detailed in the Sandia Report[1], NJ TRANSIT-DG would protect the "inner core" rail system from regional power blackouts, by supplying independently generated electric power directly to the constituent systems, through engineered control technology that can deliver reliable and consistent power as required for the NJ TRANSIT Morris & Essex lines, a portion of Amtrak's Northeast Corridor Line, NJ TRANSIT's Hudson-Bergen Light Rail system, and several NJ TRANSIT bus, station, maintenance and ferry facilities. By retaining critical inner-core rail, light rail and bus service, the region shall retain a level of functionality in the event of a major power disruption.

Distributed generation designed with micro-grid controls to enable off-grid capabilities allows a facility to continue operations during a utility power failure and can supply continuous base load power throughout the year resulting in energy cost savings. A well-designed system will supply the majority of the facility's energy needs and draw power from the utility grid to make up for any energy deficits. When the utility grid is down, the distributed generation system will transfer seamlessly to operate in off-grid mode or "islanded mode" and supply power to designated critical load allowing for continued operations.

As currently contemplated, the distributed generation aspect of the NJ TRANSIT-DG, Newark Penn Station shall be designed, constructed, and operated as an on-site distributed generation and distribution resource, with islanding mode capabilities. The implementation and continuous operation of distributed generation technologies may also offset consumption of power from the bulk electric power grid, thereby replacing it with cost effective clean technology that result in a cleaner emissions profile. When the utility grid is compromised, these distributed generation resources shall be able to operate in island mode and supply power to the facility in support of the NJ TRANSIT public transit system and limited Northeast Corridor Rail Passenger Service.

The referenced Program feasibility study contemplates that the critical loads of key facilities would be supplied power through individual or combinations where most efficient, of photovoltaic power generation, of energy storage and heat recovery units. This generation infrastructure would be located at a select facility where electric power demand would optimize the use of these technologies.

The DG type that can be considered for a particular location depends on a number of facility-specific factors such as load magnitude, space availability, structural integrity, and thermal load availability. Photo Voltaic (PV), possibly coupled with energy

[1] The Sandia Report explores multiple DG configuration scenarios.

storage, is a possible option to consider for small loads, such as ferry, light-rail, and even maintenance facilities terminals. Combine Heat and Power (CHP), or cogeneration, is the use of a prime mover to simultaneously generate electricity and useful heat. Several CHP technologies can be considered. Fuel cells have the advantage of being compact, have a low emissions profile, are electricity efficient and easier to integrate into an existing facility. The selected Newark Penn Station baseline generation portfolio is discussed below.

Nevertheless, opportunities to implement energy efficiency and demand response measures should be considered where technically feasible. Final design and engineering will support safe and reliable system operation and the design shall include an extensive communication, control, and protection infrastructure, with robust cybersecurity protocols.

Project Transportation Objective

The fundamental purpose of the NJ TRANSIT-DG is to support a sustainable level of transit service as contemplated by the "Incident Transportation Plan" immediately following a major event that negatively impacts the supply of electric power to transit facilities.

The overall service goal is to transport as many people as possible to greater Newark, the New Jersey Hudson River Waterfront in Hudson County, or the Manhattan Central Business District (south of 59th Street) utilizing an array of bus, commuter rail, light rail, rail rapid transit and ferry services. While some services shall operate in a limited manner because of available electrical power, and some shall operate fully, all shall benefit from the implementation of Distributed Generation.

Within New Jersey, a limited portion of the NJ TRANSIT commuter rail system in northern New Jersey shall have electrical power provided to it from the NJ TRANSIT-DG to sustain a core system operation. NJ TRANSIT's intrastate bus services shall be operating, and interstate bus services shall be redirected to locations where travelers can transfer to available trans-Hudson services. NJ TRANSIT shall be operating the Hudson Bergen Light Rail Line to provide transit service to the New Jersey Hudson River Waterfront in Hudson County, New Jersey. There are four (4) primary locations where trans-Hudson travelers shall be able to board public transit into Manhattan: Hoboken Terminal, Secaucus Junction, Weehawken Ferry Terminal, and Newark Penn Station. There are also a few smaller locations where travelers shall be able to access lower-capacity private ferry services. While the focus is on AM peak period demand, it is assumed a PM peak period service shall also be provided where historically, demand is more spread out.

Technical Services Contemplated in this RFP

The Technical Services contemplated in this RFP shall inform NJ TRANSIT's project development strategy through the review, validation and/or modification of prior studies and assumptions, ultimately resulting in the development of a 100% Design bid package for procuring construction, including potentially through build, operate and maintain procurement or other procurement vehicle as warranted by the project.

The Technical Services in this RFP includes the preparation of a 100% Design bid package, generally based upon previously developed Concept Design as described in the Sandia Report, information contained in the NJ TRANSIT-Project Grant Application dated March 25, 2014 and the Preliminary 20% Design performed by AECOM included in the Appendix. In addition, Technical Services in this RFP includes Environmental/regulatory compliance technical engineering support and documents for this project as directed by NJ TRANSIT to support Permit Applications and Regulatory Approvals prepared by others.

Technical Services in this RFP also include the development and implementation of bid assistance support, contract packaging, and procurement support during the bid process.

In addition, RFP Technical Services include identification of Project task risks and a recommended mitigation program along with other NJ TRANSIT Superstorm Sandy programmatic requirements.

The initial NTP shall be for completion of Final Design and bid assistance as described above. The Consultant's technical proposal shall provide a detailed scope of services for the completion of final design and bid assistance as specified above. Accordingly, the Consultant's cost proposal shall provide a cost proposal for the provision of services described above.

Required "Team" Organizational Structure

- The Consultant shall provide an organizational structure of a Project Team, which shall address each Task, identified herein; control the budget, schedule, and product quality; and advance the Project to a successful completion.
- The Consultant shall organize and staff a project office in New Jersey accessible to NJ TRANSIT Project staff and reasonably near the Project Area, with adequate staffing, hardware and support to successfully manage and complete the

requirements for the Project.

- The Consultant shall receive written approval from NJ TRANSIT prior to any change in the Consultant's organization, key personnel, and/or manpower structure subsequent to Contract Award.
- The Consultant shall perform services for, attend and assist at required meetings and coordinate work, with NJ TRANSIT and other Project participants and relevant state, federal, regional regulatory authorities and local governmental entities as directed by NJ TRANSIT. The Consultant shall be responsible for identifying any other stakeholders including agencies, community groups, associations or organizations that must be coordinated with in connection with the Project. All communication with all outside agencies shall be accomplished solely through NJ TRANSIT. The Consultant shall NOT contact outside agencies or stakeholders directly. Draft Meeting minutes shall be prepared and distributed in accordance with the requirements of sub-task 1.6. Final Meeting Minutes shall be approved by NJ TRANSIT and subsequently distributed to participants upon NJ TRANSIT request.

This work shall be directed by a designated Consultant Project Manager, who is employed full-time by the Consultant on the Project, and who shall coordinate all efforts and serve as liaison between all parties implementing this Project. This Consultant Project Manager shall be a licensed Professional Engineer and shall be supported by principals of the consultant and other specialists as required.

Project Manager Responsibilities

- The Consultant Project Manager shall represent the entire Consultant team and be responsible for all communications with NJ TRANSIT. It shall be the responsibility of this individual to coordinate the activities of the multi-disciplined effort to provide NJ TRANSIT with a completed Project within the established schedule and cost.
- The Consultant Project Manager shall conduct review meetings, progress meetings and attend workshops or meetings with other consultants performing work for NJ TRANSIT, bi-weekly, monthly, or as often as required by NJ TRANSIT and shall ensure minutes of the same are taken and provided to NJ TRANSIT.

Required Project Manager Capabilities

The Consultant Project Manager (PM) shall have demonstrated experience of ten (10) years or more in the design, construction, and commissioning of Distributed Energy Resources. This experience shall also include experience and working knowledge of

advanced, smart-grid technologies to improve the reliability, security, and resiliency of the electric grid during a disruptive event.

Required Deputy Project Manager Capabilities

The Consultant Deputy Project Manager (DPM) shall have demonstrated experience of ten (10) years or more working with commuter rail or inter-city rail environments. Specifically, the DPM shall have experience working with passenger rail design and engineering as related to the civil, structural, geotechnical engineering, design and construction of electrical power transmission/interconnection compatible with existing commuter rail infrastructure in the Project Area. The DPM shall demonstrate requisite prior experience that shall ensure the successful integration of NJ TRANSIT's Newark Penn Station operations with Distributed Generation aspects of the NJ TRANSIT-DG electric power systems as outlined in this RFP.

Required Consultant Team Capabilities

Proposers should be thoroughly familiar with the most recent Federal and State guidance on the conduct and preparation of design and engineering efforts as well as associated environmental and regulatory compliance requirements for design, construction and operation of renewable and energy efficiency elements, including, large-scale PV generation, high-efficiency CHP, and energy efficiency technologies such as the implementation of fuel cell power generation technology, distributed power generation to selected transportation and support facilities as well as rail projects as prescribed by Federal Energy Regulatory Commission ("FERC"), North American Electric Reliability Corporation ("NERC"), New Jersey Board of Public Utilities ("NJBPU"), Northeast Power Coordinating Council ("NPCC"), Pennsylvania, Jersey, Maryland Interconnection LLC (PJM) regulations and practices, as well as other Regional Entity Reliability Standards, the Federal Railroad Administration (FRA) policies and regulations and other applicable agencies or jurisdictions including the Federal Transit Administration (FTA).

The Consultant Team must possess a working knowledge and expertise in the areas of Regulatory Compliance as applicable to the registration, certification and operation of DG power generating equipment as well as the distribution of such electric power. The ensuing discussion shall not be considered exhaustive but provides an initial background characterization of required work elements to be provided by the successful Consultant Team, to the extent applicable to the Project. The RFP's reference to any specific statute, regulation, order, reporting form, or requirement does not indicate that NJ TRANSIT has determined that the statute, regulation, order, reporting form, or requirement is applicable to the Project.

In addition to the foregoing technical expertise, consultants must demonstrate a capability to design and assist NJ TRANSIT in selecting and implementing optimal renewable and energy efficiency elements where technically and financially feasible as determined by NJ TRANIST. Such technologies may include; large-scale PV generation, other distributed generation solutions that might include stationary fuel cell systems using one of three fuel cell technologies that are currently available to support power generation and CHP stationary systems: proton exchange membrane fuel cell (PEM) systems; molten carbonate fuel cell (MCFC) systems and solid oxide fuel cell (SOFC) systems, connection to natural gas supply as necessary, equipment commissioning and operation along with power transmission inter-connection to the regional power grid if appropriate.

Furthermore, the Consultant teams responding to this RFP shall be able to demonstrate relevant experience, working with commuter rail or inter-city rail environments, as well design experience related to freshwater wetlands, riverine environments and regulated floodplains, as well as brownfield settings.

The Consultant team shall have multidisciplinary staff resources with experience and expertise in such aspects as:

- Management and successful completion of engineering of distributed generation, Photovoltaic electric power generation and storage, facility power distribution, electric power control architecture including industry standard software (including cyber-security) and hardware design, as well as.
- Experience and working knowledge of advanced, smart-grid technologies to improve the reliability, security, and resiliency of the electric grid during a disruptive event. Advanced or smart design approaches use modem communication and energy-management and energy-control technologies to enable distribution system feeders to operate both "grid-tied" and "islanded" modes using natural gas photovoltaic energy storage and combinations of multiple technologies resulting in hybrid energy resource systems. Such design shall support facility reliability and resiliency when islanded.
- Where applicable, determination of environmental and compliance impacts as well as mitigation techniques with respect to noise and vibration, air quality, aesthetics, energy, archeology/historic preservation, wetlands, development in the floodplains (hydraulic, net fill, riparian mitigation and storm-water management), parks and recreation areas, water resources, wildlife and vegetation and the development of associated mitigation measures along with an ability to fully support NJ TRANSIT Project Federal and State permit and agency approval efforts. The selected Consultant will support NJ TRANSIT’s efforts (as and where applicable) in.
- Facility/Plant Operations and maintenance cost estimation.

- Experience and knowledge of wholesale electricity markets.
- Engineering and capital cost estimation for selected facility DG power generation resiliency enhancements, associated distribution and interconnection infrastructure if applicable and related transit facilities, structures and utilities, at preliminary levels of design.
- Civil, structural, geotechnical engineering, studies for design and implementation of natural gas fired electric CHP power generation enhancements along with PV and energy storage solutions where applicable and cost efficient, electrical power distribution/interconnection compatible with existing commuter rail passenger stations in the Project Area as well as the commercial power grid supplying the electric power to the Project Area;
- Utility relocation/construction.
- Hazardous waste as well as regulated soil and ground and surface water testing, analysis, cleanup and/or remediation planning and cost estimation
- Stakeholder participation and agency coordination for major projects under and through NJ TRANSIT direction.
- NJDEP/USACOE rules and regulations pertaining to Project construction impacts, Electric Traction demand analysis and forecasting.
- Surveying, mapping, right-of-way identification and title research.
- Report preparation and presentation graphics.
- Development and operation of an electronic project document control and data management system.

II. SCOPE OF SERVICES - DETAILED DESCRIPTION OF TASKS

Project Management and Engineering

The Project Management and Engineering Phase of the Project includes design elements for the implementation and operation of distributed generation resources at Newark Penn Station, facility-wide power distribution and infrastructure for the electric power generated, associated control and management with inter-connection to the Regional Commercial Power Grid where technically feasible and desired by NJ TRANSIT. In addition, this effort shall require, all structural and infrastructure components and control elements necessary to maintain a defined level of operations at Newark Penn Station, complementing regional transportation of patrons along NJ TRANSIT Rail and Light Rail Lines. Not included in this RFP is the progression of the separate Microgrid Central Facility (MCF) and associated transmission and distribution infrastructure, design, construction, commissioning, financing as well as its operations and maintenance in support of limited passenger rail service along the NEC, the M&E and the Hudson Bergen Light Rail.

Related Field Activities

- The Consultant may be required to secure the right to enter upon, cross over, under or above the property of owners owning land adjacent to the proposed Project as directed by NJ TRANSIT. The Consultant shall therefore obtain written approval to enter upon this property from said owners prior to any entry onto the property by the Consultant following permission by and coordination with NJ TRANSIT. Furthermore, the Consultant shall upon direction by NJ TRANSIT, secure approval to enter Amtrak property.
- The Federal Roadway Worker Safety Act requires "Roadway Worker Protection (RWP)" training for anyone working on or near an active railroad. Satisfaction of this requirement is the responsibility of the Consultant. A certification to this effect must be presented to NJ TRANSIT prior to any Consultant or Sub-consultant's employee entering onto or near the R-O-W. If the Consultant does not have the required training, NJ TRANSIT can and shall provide it relative to entry upon NJ TRANSIT right-of-way. All contractors entering upon Amtrak property are required to attend Amtrak contractor safety training annually.
- All requirements of 49 CFR 214 shall be followed as applicable.
- When working within the Project site, the Consultant shall be governed by the following Site Work Procedures;

    i. The Consultant shall limit work to the areas necessary for the performance of such inspections and shall not interfere with the operation of adjacent commercial activities, the bus, ferry and railroad and associated infrastructure without first obtaining specific approval from NJ TRANSIT. Any activity that requires access to the rail road right of way must be conducted with personnel that have the relevant and current rail safety training as a minimum, but not limited to, Roadway Worker Protection (RWP) training.
    ii. During all periods of time when not performing operations at the field work site, the Consultant shall store all equipment being used for the inspection in pre-approved areas and shall provide all security required for such equipment. The Consultant shall not permit any objects or pieces of equipment to lie unattended on sidewalks, roadways, passageways, corridors, stairways, platforms or structures at any time.
    iii. Survey work (as qualified as necessary by NJ TRANSIT), within the existing Right-of-Way (ROW) of the railroad or NJ TRANSIT property shall be performed at the site only between the hours of 9:30 AM and 3:30 PM, Monday through Friday, unless otherwise directed by the NJ TRANSIT Project Director or designee. Subsequent references to the "Project Manager approval" in this RFP are meant to identify the

appropriate NJ TRANSIT Project Director or his designee.

iv. The Consultant shall coordinate all site work necessary to conduct the inspection and survey work, (as required in this RFP with NJ TRANSIT approval) will be coordinated with the NJ TRANSIT Project Director. Such work shall only advance following approval by the NJ TRANSIT Project Director.

v. The Consultant shall provide the NJ TRANSIT Project Director with a minimum of two (2) working days of notice prior to the intent to conduct site inspections on NJ TRANSIT property (prepare and submit SSWP as required in sufficient time prior to such notice) and fourteen (14) working days' notice for access to Amtrak or privately owned property. At that time, the Consultant shall provide details relevant to the character and nature of the inspections planned and prepare a SSWP if required. Work shall only commence following the approval of the SSWP by the subject Railroad.

- Work within the fouling limits of the railroad (defined as within 18 feet of the centerline of track on NJ TRANSIT's right-of-way and within 25 feet of the centerline on Amtrak's right-of-way), shall require appropriate flag protection. The Consultant is not to work within the fouling limits of the railroad without flag protection cost of which will be accommodated by NJ TRANSIT. Track fouling shall be coordinated through NJ TRANSIT but fouling time cannot be guaranteed by either Railroad.

The deliverables of each task shall be provided in the form of camera-ready originals as applicable and electronically in their native format and in Adobe pdf format. All reports, drawings and text material shall be provided in hard copy, electronic transmission and on CD Rom as directed by the NJ TRANSIT Project Director.

TASK 1 - PROJECT MANAGEMENT AND ADMINISTRATION

The objective of this task is to keep NJ TRANSIT informed in a timely fashion with regard to both technical progress and financial status of the Project. Project management shall anticipate problems and delays as best as possible and address them before they reach crisis level. Another objective is to maintain a continuous and timely dialogue and flow of information between the Consultant and NJ TRANSIT. Coordination and assistance with Amtrak, utilities and other related jurisdictional agency reviews is required subject to NJ TRANSIT direction.

The Consultant shall provide an experienced, integrated team with the specific combination of technical and management expertise across all required disciplines necessary to meet all Contract requirements.

To these ends, the project management team shall implement and maintain a three-step approach to project management and control:

Subtask 1.1 Project Management Plan

A Project Management Plan (PMP) shall be prepared and implemented by the Consultant and NJ TRANSIT at the outset of the Project. The plan shall clearly define the roles and responsibilities of all parties involved. Formal lines of communication shall be outlined, budgets shall be established, schedules agreed upon, quality control procedures identified and invoicing procedures established.

The Consultant shall prepare a comprehensive PMP for the Project, fully addressing the means, methodologies, procedures and resources to be applied by both NJ TRANSIT and the Consultant in achieving the Project Management objectives stated above. The PMP shall work in conjunction with the Quality Management Plan as described later in this Scope.

The PMP shall be prepared in accordance with the established guidelines of the FTA and shall be of sufficient detail to monitor the Project's planning, engineering, and third party coordination throughout the duration of the Contract. NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJ TRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the PMP submission shall be available to the Contractor subsequent to Contract award. The Consultant shall submit a draft of the PMP within four (4) weeks of NTP, and the final PMP within eight (8) weeks of the NTP after receiving comments from NJ TRANSIT including comments from the FTA representative. Updates to the PMP shall be made periodically or as directed by NJ TRANSIT.

The PMP shall include appropriate charts and narrative to describe the organization, relationships, responsibilities, and procedures to be implemented to manage all aspects of the Project. At a minimum, the PMP shall address the following:

- Roles and Responsibilities
- Project Controls Management – schedule and budget
- Communications Protocol
- Design Management – internal reviews and checking procedures
- Configuration Management
- Interface and Integration Management
- Third Party Coordination / Third Party Agreements management
- Records Management

Subtask 1.2 Project Control

The Consultant, after discussion with NJ TRANSIT, shall establish a formal Critical Path Method (CPM) project schedule (min. Primavera 6) for the accomplishment of all tasks in this RFP. CPM updates shall be provided to NJ TRANSIT on a monthly basis or upon request. In addition, the Consultant shall establish a system of monthly progress and cost control reports attached to monthly invoices (see Appendix Four for Sample Invoice Report). All sub-consultants employed shall be required to render invoices for the same general time periods that are utilized by the prime consultant. FAILURE TO SUBMIT THE INVOICES IN THE PRESCRIBED MANNER SHALL RESULT IN SUCH INVOICES BEING HELD UNTIL THE FOLLOWING INVOICE PERIOD. Exceptions identified following NJ TRANSIT invoice review must be resolved to NJ TRANSIT's satisfaction within two (2) working days. Absent such resolution, disputed invoice amounts shall be deducted from that invoice. The report form as well as invoice(s) shall include a written description of current technical, budget and schedule status as well as a comparison of this information to the preceding month, project-to-date and projected future work efforts as applicable. Milestones, decisions made, issues and action items shall be highlighted. Any unanticipated delays or gains or cost adjustments driven by unforeseen circumstances should be discussed in terms of completing the overall project on time and within budget. The Consultant shall provide a summary of all invoice costs in a format depicting values as described in Appendix Four .

Subtask 1.2.1 Final Scoping/Final Design (FE) Schedule

Timely and successful completion of FE is pivotal to the advancement of subsequent contracts and phases as well as regulatory compliance documentation including but not limited to the Project Federal CE, Federal and State Permits, etc. The Consultant shall develop and maintain a detailed project schedule, representing a practical plan to complete the Contract scope of work, and to meet the overall schedule objective of achieving Bid Ready status by NTP plus twelve(12) months. Additionally, the Consultant shall prepare a projected construction schedule(s) for the work required to complete the NJ TRANSIT-DG Newark Penn Station component and have it fully operational.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJTRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the Project Schedule submission shall be available to the Contractor subsequent to Contract award.

The purpose of the schedule is to provide an effective management tool by which the Consultant and NJ TRANSIT can measure progress of the work, identify areas of

schedule risk, and mitigate against any potential delays on a timely basis. The actual number of activities in the schedule shall, in the judgment of NJ TRANSIT, be sufficient to assure adequate planning of the Project and to permit monitoring and evaluation of progress and the analysis of time impacts.

The FE Schedule shall be detailed and correlate with the work plan described in the PMP and organized based on the tasks and major elements of the Project. The Phase I schedule shall identify all activities and milestones associated with the PE Contract's scope of work.

The Consultant shall use Project Primavera 6.0, or NJ TRANSIT approved equal. The format of the schedule shall include bar chart plots and shall show columns for:

- Activity ID
- Activity Description
- Original Duration
- Early Start, Late Start, Early Finish and Late Finish
- Total Floats.

Timescale shall be shown in calendar days.

Initial Scheduling Meetings and Schedule Update Meetings shall be held to review, agree and approve all schedule deliverables.

The Work Breakdow Structure (WBS) codes shall be presented in organizational-chart format for approval prior to developing the Contract Schedule. Consultant shall code the Baseline Schedule using no more than 8 alpha-numeric characters for the Activity ID, and shall utilize the approved WBS.

The Consultant shall submit the draft Baseline Schedule without status within three (3) weeks of the NTP. The Baseline Schedule shall be accompanied by a narrative outlining the assumptions made, formatting approach, definitions of terminology to be used in monthly reporting, estimates of original durations, calendar types used, explanation of resources and the production rates, relevant drawings or charts.

The Consultant shall make all corrections to the draft Baseline Schedule requested by NJ TRANSIT and resubmit within two (2) weeks of receiving comments. If the Consultant does not agree with NJ TRANSIT's comments, the Consultant shall provide written notice of disagreement within five (5) days from the receipt of the comments. The items in disagreement will be resolved in a meeting held for that purpose, if necessary.

The Baseline Schedule shall show the sequence and interdependence of activities required for complete performance of the Project beginning with the date of the NTP, and concluding with the date of acceptance of the Project and shall list specifically:

- Interim milestone completion dates required by the Contract shall be characterized. Phasing of all design activities as specified shall be prominently identified. Particular attention shall be given to design submittals.
- Submittal and review of design submittals and other deliverables shall include review time for designated reviewers.
- Submittals to, and reviews by outside agencies
- shall allow sufficient time for review.
- Interface coordination and dependencies with proceeding, concurrent, and follow on contracts shall be developed.
- NJ TRANSIT designated milestones shall be developed.
- NJ TRANSIT, Amtrak, Third Party Commercial and Regulatory milestones, as required to achieve approval into Final Design shall be developed .
- Acceptance of the Project, including completion of unfinished items prior to completion of any Contract milestones shall be noted.
- Work to be performed by other Consultants and agencies that affect the schedule and shall allow reasonable time for completion shall be noted.
- Acquisition of permits and related environmental approval, licenses, agreements, and coordination with, municipalities, other agencies and community groups shall be noted.

The Consultant shall accurately develop the schedule logic and activity interdependencies, such that the schedule can fully convey an understanding of the Critical Path.

The Progress Schedule shall include all information current as of the status date. The Progress Schedule submittal to NJ TRANSIT shall be accompanied by a Schedule Status Report. This narrative report shall describe activities completed and progressed during the report period, activities planned for the forthcoming report period, potential issues, delay chain analysis as required, and actions required to correct any negative float (actual or predicted). The report shall include an explanation of potential delays and problems, their estimated impact on performance, and their estimated impact on the Contract completion date. In addition, alternatives for possible schedule recovery, complete with a narrative rationale, to mitigate any potential delay shall be included for consideration by NJ TRANSIT.

Every Progress Schedule shall be submitted for approval at least five (5) days prior to the NJ TRANSIT designated Progress Schedule Meeting. The Progress Meeting shall include consultant percentage complete, actual start/finish, earned values and remaining

duration. Upon approval of the Progress Schedule, it shall be included in the Monthly Report. The status date of the Progress Schedule shall be the last day of each month.

Timely progress reporting and review by the Consultant's management team shall be critical in avoiding schedule creep or delays which shall be detrimental to the schedule given the objectives of the project. Progress Reports shall include;

- Consultant's Transmittal Letter;
- Description of Problem Areas;
- Current and Anticipated Delays; and the following information;
- Cause of the delay;
- Corrective action and schedule adjustments to correct the delay; and
- Impact of the delay on other activities, milestones, and completion dates.
- Pending Items and Status Thereof, regarding the following requirements:
    - Permits;
    - Commercial agreements with Third Parties, i.e. natural gas pipeline supply connections, interconnections with PJM, etc.
    - Change Order;
    - Time extensions; and
    - Interim Milestone Dates and Contract Completion Dates Status
- Discussion of critical path for month and any changes to critical path since the last report;
- Progress during period and plans for Project in forthcoming period.

Planned schedule percentage complete versus actual percentage achieved and earned value versus planned usage for each resource shall be computed in tabular format from the resource and price loading developed for this RFP and Contract execution.
An overall cumulative progress curve shall be plotted with the horizontal axis in calendar months.

A schedule found to be unsatisfactory, or otherwise not in compliance with Contract documents shall be revised by the Consultant and resubmitted. Re-submittals shall conform to the same requirements as original submittals.

Use of float suppression techniques such as preferential sequencing, special lead/lag logic restraints, negative lags, long lags, extended activity times, or imposed or constrained dates, shall be cause for rejection of the Detailed CPM Schedule and any revisions or updates.

The Consultant shall schedule submittals for review by NJ TRANSIT in a manner that distributes reviews across time to avoid concentration of reviews in any discipline.

Whenever it becomes apparent in the course of the current Progress Schedule Meeting or from the Progress Schedule itself that interim milestones, constraints, or submittal dates shall not be met, the Consultant shall identify remedial actions through a Recovery Plan & Schedule, to be included as supplement/attachment to the Schedule Status Report. The Recovery Schedule shall be a separate discrete “break-out” schedule, which shall include activities as required to achieve the final milestones that shall coincide with the approved Baseline Schedule. Prior to executing remedial actions, the Consultant shall immediately notify NJ TRANSIT, and obtain approval before proceeding with same.

If original Baseline Schedule dates cannot be maintained, then the Consultant shall obtain approval from NJ TRANSIT prior to incorporating any revised dates into the next Progress Schedule submittal.

The last updated schedule submitted shall be identified as the “Final Progress Schedule.” This schedule shall reflect the exact manner in which the Contract was actually completed (including start and completion dates, activities, actual duration’s, sequences, and logic), and shall be signed and certified by the Consultant’s Project Manager and the Consultant’s scheduler as being a true reflection of the way in which the Contract was actually completed.

Deliverables:
Work Breakdown Structure Codes
Baseline Schedule – draft and final
Monthly Progress Schedule and Schedule Status Report
Recovery Plan and Schedule, as required
As-Built Schedule

In addition to routine reporting, the Consultant shall create and maintain an intra-project, password protected web-site through which NJ TRANSIT and the Consultant can communicate and share data, drawings and reports rapidly and efficiently. This shall help the Consultant operate proactively to both inform NJ TRANSIT of emerging issues and facilitate rapid resolution to maintain schedule and budget. This system shall also be utilized as the Project’s file cabinet and for archiving all project documents and correspondence. The said system shall be compatible with the document control records management system outlined below. Upon completion of the Project or at such time as directed by NJ TRANSIT, the Consultant shall provide all data contained therein to NJ TRANSIT using computer hardware storage approved by NJ TRANSIT for incorporation into the NJ TRANSIT computer network system.

Subtask 1.2.2 - Records Management Control System

The Consultant shall develop and maintain a system to identify and manage correspondence, business documents, current revision of instructions, procedures, drawings, specifications, reports and analyses, etc. The document database developed on this project shall be kept current throughout the term of the Contract, and provided to NJ TRANSIT in a condition suitable for use by others without need for additional licenses for another five (5) years from Project Completion and be in compliance with the Consultant's Configuration Management Plan. NJ TRANSIT's objective is to establish a "paperless" project to the extent as practicable.

The system at a minimum shall provide the following definition and components:

a) A system designed around the Consultant's evaluation and analysis of NJ TRANSIT's work flow and business practices;
b) An electronic interface ("desktop") that requires nominal user training and provides quick response time for document creation, storage, and retrieval;
c) A highly secure system that can assign different access clearances for staff and project stakeholders;
d) A system that is fully compatible with and utilizes the same assumptions as the NJ TRANSIT Enterprise Content Management System (ECMS) document control system.

The system must manage manual and electronic documents including:

- General correspondence
- Contracts, specifications, progress reports, invoices
- Budget & finance data
- Drawings, plans, & images
- Email messages & attachments
- CDs, DVDs, and other hard media
- Native files & image files of all documents

The system must provide the following features:

- Central clearinghouse for all project documents
- Categorization of inbound traffic
- Marking of each document with (at a minimum):
  - Originating date
  - Received date
  - From organization
  - To organization

    - Subject
    - Unique sequence number
- Scanning and indexing
- Posting of scanned documents for retrieval
- Email notification to document recipients
- Maintenance of the document database
- On-site printing capability for all document sizes and formats
- Filing of original hardcopy
- Transmitting of original hardcopy to offsite records warehouse (If needed for compliance with New Jersey Department of Archives and Records Management (NJDARM) requirements)

The system shall also provide a fully-integrated Electronic Content Management (ECM) system, including the following components:

- Digital Mailroom (DM) - or future project field office
- Scan, index & distribute
- Electronic Document Management System (EDMS) - web-based
- Electronic Document posting & notification
- Document collaboration capabilities
- Email management including forced classifications
- Check-in and check-out protocols
- Revision control
- Audit trail
- Security (document by user/group)
- Watermarking for printed copies
- Administrator reports
- Workflow
- Records Management (RM)
- Retention schedules
- Notification of destruction

NJ TRANSIT is using an in house ECMS, using Open Text Live Link as the platform. Upon request by NJ TRANSIT, the Consultant shall provide personnel at a designated NJ TRANSIT Office to assist NJ TRANSIT in data entry as well as down loading and up loading of documents into the NJ TRANSIT ECMS. The schedule for data uploads to the NJ TRANSIT ECMS shall be determined subsequent to Contract award. However, such uploads shall occur at a minimum on a monthly basis. It is anticipated that the Consultant shall employ an ftp site or similar portal to transfer documents between NJT's ECMS and the Consultant's document system. The personnel should be cognizant of DARM regulations concerning document scanning and management

procedures.

Deliverable:

Records Document Management System and identification of appropriate support staff subject to NJ TRANSIT approval.

Subtask 1.2.3 - Monthly Progress Reporting

The Consultant shall carefully monitor the progress of the Project during design and provide NJ TRANSIT with Monthly Progress Reports. The approved schedules shall be used by the Consultant to ensure adequate planning, scheduling, management, and execution of the Project and to enable NJ TRANSIT to evaluate Project progress and requests for payments by the Consultant.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJ TRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the Project Monthly Progress Report submission shall be available to the Contractor subsequent to Contract award. Upon direction by NJ TRANSIT, the Consultant shall assist and provide support to NJ TRANSIT staff in the preparation and submittal of Project reports to the FTA.

The Consultant shall submit one (1) hard copy and one (1) electronic copy of the Monthly Progress Report to NJ TRANSIT by the 7th day of each month that shall cover a reporting period for the preceding month. The Monthly Progress Report shall be submitted by the Consultant's principal and shall include as a minimum the following:

- A written review of progress of the progress achieved for that month with specific reference to the activities detailed on the Baseline Schedule and detailed progress on each stage of the design during the reporting period.
- Details of any delays shall be specifically highlighted together with details of the Consultant's actions/proposals for corrective action and schedule recovery.
- Areas of concern and proposed resolution.
- Per task, planned schedule percentage complete versus actual percentage achieved and earned value versus planned usage for each resource shall be computed in tabular format from the resource and price loading. An overall cumulative progress curve shall be plotted with the horizontal axis in calendar months.
- Comparative progress curves and histograms showing actual versus planned performance in respect to major activities as may be required by NJ TRANSIT.
- A monthly update of the overall progress curve (or S curve) versus baseline progress curve.

- Updates of the Consultant's labor curve/table showing actual and planned labor, including sub-consultant labor.
- Status of DBE participation.
- An up-to-date copy of the Delivery Submittal Schedule to NJ TRANSIT.
- Other content as directed by NJ TRANSIT.

A certificate signed by the Quality Manager certifying for the previous month that:

- All work, including that of sub-consultants at all tiers, has been checked and/or inspected by the Consultant's quality staff and that all work, except as specifically noted in the certification, conforms to the requirements of the Contract.
- The Quality Management Plan (QMP) and all measures and procedures provided therein are functioning properly and are being followed, except as specifically noted in the certification.

Deliverables:
Monthly Progress Report
Monthly Quality Certificate

Subtask 1.3 - Quality Control

A QMP shall cover not only the Consultant but also all sub-consultants; the procedures shall be uniformly applied to all phases of the Project. The QMP requires the completion, checking, and correcting of work products before releasing them, to ensure accuracy, completeness, and ability to be understood by target audience.

Subtask 1.3.1 - Quality Management Plan

The Consultant shall develop a comprehensive QMP for the work defined in this RFP for the Distributed Generation Project. The Consultant shall be responsible for conducting an ongoing quality program during the entire period of performance of the Contract based upon the QMP approved by NJ TRANSIT. An effective quality program is fundamental to all work performed by the Consultant.

The QMP shall require the completion, checking, and correcting of work products before releasing them, to ensure accuracy, completeness, and ability to be understood by target audience.

The purpose of the quality program is to effectively and economically assure technical quality in the design of the Project, thus reducing the potential for:

- Adverse schedule and cost impacts.
- A poor quality design.

- Poor quality products.
- Interface and integration problems among various design elements.
- overall interface with elements of the NJ TRANSIT SANDY Resiliency Program and Amtrak NEC/Gateway Program.
- Personal and public safety problems.

The QMP shall document how the Consultant shall execute the Project to assure that:

- The Consultant's design process translates NJ TRANSIT's needs and requirements into an acceptable design.
- The Project is properly completed and furnished to NJ TRANSIT on time.

During the term of the Contract, the Consultant shall exercise positive control over the entire Project including the work of its subcontractors and sub-consultants as described in the approved QMP.

Subtask 1.3.2 - Quality Management Plan Requirements

The QMP shall be prepared in general accordance with the established guidelines of the FTA, which essentially follow article 4.0 of the ISO 9001:2000 and ISO 10013 guides, and are further discussed below. The QMP shall be an executable system of processes defined and established for the Project. At a minimum, the QMP shall include a Quality Policy and Procedures, and reference other plans as may be specified herein and elsewhere in the Contract.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJTRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the Project QMP submission shall be available to the Contractor subsequent to Contract award.

The QMP shall be approved by the Principal-In-Charge in the Consultant's organization having primary responsibility for the Contract. The Consultant shall submit a draft within four (4) weeks of NTP, and a final within eight (8) weeks of the NTP, incorporating comments from NJ TRANSIT and other stakeholders as applicable. The QMP shall be revised, updated, and approved as necessary throughout the term of the Contract to reflect the management system being currently used as the means for executing the Contract.

Implementation of the QMP shall be subject to NJ TRANSIT audit throughout the term of the Contract.

Subtask 1.3.3 - ISO 9001 Requirements

Certification of the Consultant under ISO 9001:2000 is not required for this Contract; however, the quality principles established by ISO 9001:2000, as set forth herein, form the basis for the quality system and Quality Management Plan required to be established by the Consultant.

The quality standards applicable to the Project under the Contract include the following:

- ISO 9001:2000: Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation and Servicing.
- ISO 10013:2000: Guidelines for Developing Quality Manuals
- ISO 8402: 2000: Quality Management and Quality Assurance – Vocabulary

Subtask 1.3.4 - Quality Manager and Other Resources

The Consultant shall appoint an experienced, qualified Quality Manager trained in accordance with established quality management standards, requirements and regulations. The selection of this individual is subject to NJ TRANSIT's approval. The Quality Manager shall perform as the Consultant management representative and shall:

- Be responsible for implementing the QMP and shall have the authority to stop the Project. There shall be a clearly articulated Quality Policy approved by the Executive(s) of the Consultant and it shall be widely publicized and known throughout the project team.
- Report directly to the Consultant's Project Support Manager or more senior employee.
- Have direct access to a senior executive in the selected Consultant's Executive Management team.
- Be responsible for ensuring that the Quality Management effort is effective in ensuring that all Contract requirements are satisfied.
- Have direct access to and by NJ TRANSIT's Quality Director.

An Internal Quality Management Review shall occur at least bimonthly. A report regarding the results of the review shall be forwarded to NJ TRANSIT. Organizational and technical interfaces shall be defined in a manner that assures inter-discipline coordination and communication among and between designers and major subcontractors and sub-consultants and NJ TRANSIT.

Subtask 1.3.5 - Design Control

The Consultant shall develop a Design Control Plan (DCP), establishing design control procedures that shall be integrated and consistent with the requirements described throughout this RFP. The Plan shall visibly track and report the status of design products to be submitted by the Consultant for NJ TRANSIT review. The Consultant shall revise, update, and submit for approval the Plan as required. The Plan shall:

- Define procedures for completing internal verification prior to the submission of documents to NJ TRANSIT for its review. Design Verification Activities shall include checking and back-checking calculations, drawings, and other design elements without reliance on review and comments from NJ TRANSIT and shall be conducted before providing each design submittal to NJ TRANSIT.
- Define how design inputs and changes shall be managed by the Consultant in a manner that assures Contract and Consultant requirements are correctly translated into the drawings and specifications.
- Include a Design Review Schedule which shall be revised as needed as the design progresses.
- Be consistent with and follow from the QMP and shall specifically track all design and design verification activities included in the approved QMP .
- Be in a format that allows the Consultant and NJ TRANSIT to reasonably understand the means by which each design element of the project is being completed. It shall provide planned versus actual schedule performance and be accurate and useful as a means for NJ TRANSIT to determine how the design is proceeding throughout the design phase of the Project.
- Include subcontracted design elements, if appropriate.

The Consultant shall be liable to NJ TRANSIT for any costs incurred during the Construction Phase to correct, modify or redesign any drawings completed by the Consultant that are later found to be defective, or not in accordance with the provisions of this agreement as a result of any act, error or omission on the part of the Consultant or its agents, servants or employees. The Consultant shall be given reasonable opportunity to correct any deficiencies at no additional cost to NJT.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJTRANSIT’s Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to Design Control submissions shall be available to the Contractor subsequent to Contract award.

Subtask 1.3.6 - Control of Quality Records

The Consultant shall establish and implement procedures to identify, collect, index, file, store and retrieve all quality records required by the Contract and generated pursuant to the QMP and shall include the records of sub-consultants and subcontractors, as appropriate. These procedures shall include an electronic database to track and maintain control over all quality records generated by the Contract, which shall be part of the Records Management System and subject to data transfer to the NJ TRANSIT ECMS system referenced above.

Quality records shall be stored and maintained in such a way that they are readily retrievable and provided with a suitable environment that shall minimize deterioration or damage, and prevent unauthorized alteration or loss.

Quality control records shall be legible, reproducible, and identifiable with the item involved, and contain the date of origination and identity of the originator, verifier, and/or responsible supervisor.

The Consultant shall retain all quality records for a period of seven (7) years from the date of completion of the Project unless otherwise specified in the Contract. All quality records shall be made available to NJ TRANSIT throughout the retention period.

Subtask 1.3.7 - Internal Quality Audits

The Contactor shall establish a procedure for conducting internal quality audits throughout the period of performance of the Contact as follows:

- Perform internal audits at least quarterly.
- Identify in the audit any deficiencies found in the quality system, the causes of deficiencies and the status of corrective action or preventive action, when appropriate.
- Provide the audit results to NJ TRANSIT within five (5) days of the completion of the audit, including required corrective actions.
- Provide a final report to NJ TRANSIT confirming the completion of required corrective actions within thirty (30) days of the audit.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJTRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the Project Quality Audit Reports submissions shall be available to the Contractor subsequent to Contract award.

Deliverables:
Quality Management Plan
Design Control Plan
Internal Quality Management Review reports
Audit Reports
Report of Completion of Corrective Actions

Subtask 1.4 -Configuration Management

The Consultant shall be responsible for configuration management and document change control for its design for the duration of the Project. The Consultant shall prepare and submit to NJ TRANSIT for its approval, a Configuration Management Plan (CMP) which is in accordance with the requirements of ISO 10000. The CMP shall utilize a proven, auditable electronic based configuration management system to its design of the Project. Configuration management of drawings, specifications, documents, reports and analyses is the responsibility of the Consultant. The Consultant shall maintain document change control, including engineering plans, drawings and specifications and shall update all project documents as the design progresses. Configuration management shall provide an accurate historical record that can trace decisions made throughout the life of the Project.

The Consultant shall develop and maintain a Contract Documents Log created in an electronic data base format acceptable to NJ TRANSIT for NJ TRANSIT's review and approval. The Log shall list all design drawings, specifications, design calculations, analyses, reports and other documents to be prepared by the Consultant. Only one (1) version of a document may be effective at any one time. The Log shall function to keep a history of each document created by the Consultant and its evolutionary status. The Log shall form an integrated part of the Records Management System.

At the end of the Project, the Consultant shall provide NJ TRANSIT in electronic format, a complete configuration management history, fully documenting all required project information, including the final revision status of all design elements that shall allow for the progress of the Project design to proceed.

Deliverables:
Configuration Management Plan – draft and final
Contract Document Log

Subtask 1.5 - Project Meetings

This provision specifies the requirements for project meetings to be held during the term of the Contract. The Consultant shall attend and participate in the meetings set forth

herein with NJ TRANSIT, its representatives, government officials or other parties interested in the Project as may be determined by NJ TRANSIT.

The Consultant shall prepare a record of the meetings stating: the date and place, meeting purpose, names and titles of those present, a brief description of the matters discussed, agreements reached/decisions made, action items and the party responsible for taking the identified action. Meeting minutes shall be prepared and provided within seven (7) calendar days from the meeting date to NJ TRANSIT for review and comments. Final meeting minutes shall be issued to all appropriate parties within fourteen (14) calendar days of the meeting date.

NJ TRANSIT shall schedule a kickoff meeting with the Consultant within ten (10) days of issuance of the NTP for the Contract. The purpose of meeting shall be to review the parties' responsibilities, major project milestones, procedures and submittals and personnel assignments. This meeting shall be chaired by NJ TRANSIT and be attended by representatives of NJ TRANSIT, all key personnel identified by the Consultant and all major sub-consultants proposed by the Consultant. Agenda items shall include:

- Consultant's personnel roster
- Identification of all sub-consultants
- Consultant's project schedule, WBS, critical paths and major milestones
- Project Management Plan
- Design Control Plan
- Interface and Integration Management Plan
- Configuration Management Plan
- Quality Management Plan, including quality documents & records to be generated
- Procedures for processing design decisions and approvals
- Procedure for processing applications for payment
- Mobilization Issues

The Consultant shall conduct monthly (or more frequently if deemed necessary by NJ TRANSIT) systems interface and integration meetings throughout the design process in order to ensure that all of the design elements properly interface with each other, and also to assure that the elements properly interface and are integrated with the other elements of the NJ TRANSIT Superstorm Sandy Recovery and Resilience Program and other NJ TRANSIT Capital Programs as well as the Amtrak Raceway & Gateway Programs where applicable (and as provided by other consultants or parties). The basis for conducting these meetings is to implement and monitor the Consultant's Interface Management Plan. These meetings shall be attended by the Consultant, NJ TRANSIT and all other parties whose design activities shall interface with the CE/PE Consultant.

The Consultant shall conduct monthly progress meetings with NJ TRANSIT on a regularly established date, convenient for all parties involved (or more frequently if deemed necessary by NJ TRANSIT). Progress meetings shall be held in addition to other specific meetings held for other purposes. The meeting shall address technical and administrative issues of concern, determine courses of action, develop appropriate deadlines for resolution of issues, and assign individuals responsible for resolution of those issues. The Consultant and NJ TRANSIT shall determine who, in addition to themselves, shall attend the meetings. Additional attendees may include other parties as deemed appropriate for the success of the Project.

Agenda items shall include matters of significance that could affect progress such as:

- Review of the previous meetings minutes and resolution of open items.
- Consultant's FE, bid package support schedule.
- Interface requirements and coordination with other Amtrak/Yard Consultants.
- Requests for information and/or approvals.
- Changes
- Invoices and Payment Procedures

Status meetings shall be held prior to the submittal of the Consultant's Application for Payment. The purpose of the meetings is to determine that the status of activities as stated in Consultant's Monthly Progress Report and Progress Schedule. This meeting shall be attended by NJ TRANSIT and the Consultant. NJ TRANSIT disposition on the matter shall be documented. The Consultant shall prepare meeting minutes.

Deliverables:
Kickoff Meeting Minutes
Interface and Integration Management Meeting Minutes
Progress Meeting Minutes

Subtask 1.6 - Payment Procedures

This provision specifies the procedures for the Consultant's submission of Applications for Payments under this Contract and NJ TRANSIT's processing of those applications.

The Consultant shall bill monthly and be eligible to receive payment upon successfully achieving verifiable progress and compliance with the requirements of this provision and any other applicable provisions of the Contract.

The Consultant shall notify NJ TRANSIT in writing that it has achieved verifiable progress and requests reimbursement in connection with said progress. NJ TRANSIT shall

ascertain whether the claimed progress has been achieved or not during the status review meetings and by review of valid Progress Reports as prescribed above.

Applications for payment shall at a minimum contain:

- The Consultant's name and address.
- The remittance address or bank to which payment is to be made.
- The Contract name or title and Contract number.
- An actual invoice for the amount identified above plus any other amounts due the Consultant under any other provision of the Contract signed by the Consultants Project Support Manager.
- The Consultant's certification that the amount requested is due and payable under the Contract and has not been previously invoiced or paid
- Certified Payrolls (timesheets not required).
- Supporting documentation for all expenses incurred.
- DBE participation levels.

NJ TRANSIT shall promptly review the Consultant's Application for Payment upon receipt for accuracy and conformance with the above and shall prepare and issue a Payment certificate, with a copy provided to the Consultant, showing the amount payable by NJ TRANSIT to the Consultant.

NJ TRANSIT may, by any payment, make any correction or modification that should properly be made to any amount previously considered due and paid by NJ TRANSIT.

A payment issued by NJ TRANSIT shall not be construed as waiving any rights of NJ TRANSIT under the Contract or to be an acceptance of the Project or any portion thereof nor shall it relieve the Consultant from any requirement or responsibility under the Contract or from replacing or revising unsatisfactory work for which it is responsible.

Deliverables:
Applications of Payment
Final Invoice

TASK 2 - ENGINEERING

The engineering of major elements of the Project shall be required, including value engineering analysis. This design effort shall generally be progressed to the 30%, 60%, 90% and 100%design level. However, the actual level for each element shall be coordinated with the National Environmental Policy Act (NEPA), Permitting and Regulatory Compliance engineering data requirements as well as Risk Assessment, and

Contract Packaging tasks to produce the best value for NJ TRANSIT to move the project forward to completion.

Newark Penn Station will not be connected to the Main Central Facility (MCF) and thus, will require separate Distributed Energy Resources (DER) for power generation. (For the purposes of this section and continuing discussions throughout this document, the term DER refers to any energy systems, equipment or processes that are small, modular, and decentralized to provide onsite power as opposed to the customer obtaining power from the grid from a larger centralized power.). Energy storage alone is not cost-effective due to the size of the demand and the performance requirements (a 7 day outage); however, if determined to be economically and technically feasible, storage could be used in combination with PV or other distributed generation (DG). (For the purposes of this section and continuing discussions throughout this document, the term DG refers to the on-site generation portion of DER.)

The Consultant shall advise NJ TRANSIT and confirm which DG technology can be considered, accounting for facility-specific factors such as load magnitude, and variation, operational constraints space availability, structural integrity, and thermal load availability. PV, possibly coupled with energy storage, may be considered for small loads..

The required design elements include, but are not limited to, an engineering review of Newark Penn Station for the implementation of distributed energy resources. This review shall account for facility structural characteristics that support the implementation of such electrical power generation, resiliency, foundations, earthwork, facility enclosures, natural gas supply and facility interconnections, and distribution infrastructure (including, but not limited to, circuits, i.e. cabling, transformers, as applicable), facility function and control architecture and hardware. The Consultant shall use this information to develop cost analyses to determine the efficacy of applied resiliency technologies, also accounting for reconstruction and modification costs of existing structures and infrastructure as necessary. In addition, the Consultant shall perform analysis of critical operations to be maintained during islanded operations including but not limited to evaluation of facility power demands, in turn, selection of appropriate power generation technology, i.e. CHP, solar power generation, energy storage or a combination thereof. The electrical power supply to support facility operations must accommodate facility critical loads including, but not limited to, emergency lighting, ventilation, pumps, compressors, and communications where applicable.

Required design elements shall also include methods for satisfaction of project environmental, regulatory compliance requirements, staging options and cost implications to Project Design and Construction. A proposed construction schedule for DG related modifications, i.e. operating windows, shall also be developed as part of this task. The format of the proposed Construction Schedule shall be consistent with NJ

TRANSIT's Superstorm Sandy Recovery and Resilience Program requirements. Such requirements shall be available subsequent to Contract award.

Project General Plan and Specification Requirements:

As applicable, the Consultant shall provide all necessary architectural, engineering and professional services required to prepare all contract plans, technical specifications, special provisions, and a detailed cost estimate and bid documents for all sections of the proposed work. The construction plans shall be on 24" x 36" with standard NJ TRANSIT title box and shall consist of: Key Map, Location Map, Estimate of Quantities, Distribution of Quantities sheet, Site Plan, Elevations, Sections, Typical Sections Standard Details, etc. Certain copies of design development drawings may be half-size as designated and/or agreed by NJ TRANSIT. Specifications and supplemental specifications shall conform to Construction Specification Institute (CSI) format or other acceptable format as pre-approved by NJ TRANSIT. Use of graphics shall conform to the NJ TRANSIT Graphics Manual where applicable. Construction plans shall be prepared with a computer-assisted drafting program; disks containing final design drawings shall also be submitted to NJ TRANSIT.

For Amtrak facilities, Amtrak standards shall be met. These standards will be provided by Amtrak to NJ TRANSIT's CM .

The Consultant shall coordinate the plans with other project tasks as necessary to advance the design to the 30%, 60%, 90% and 100% level. Develop a construction plan showing all elements to be constructed. Such plans shall detail requirements as applicable for natural gas supply and connection, electrical power distribution and interconnection, water, sewer, communications, parking, roads, traffic signalization and catenary modifications as applicable. In addition, the electrical plans shall include location of cable and conduit runs and lighting as applicable.

The civil drawings shall graphically depict the proposed layout of facility modifications necessary to implement and operate Distributed Energy Resources as they relate to NJDEP Land Use Program as well as Arm Corps of Engineers (ACOE) regulatory limits of disturbance for the selected Project footprints. Demolition of structures and utilities shall also be identified as applicable. The structural drawings shall depict the type of structures necessary and the size and type of foundations to be proposed. The geotechnical design (if required as determined by NJ TRANSIT), shall include a report and foundation recommendations for required facility modifications. A construction-staging plan shall describe potential methods and sequence of construction to complete the project while maintaining facility operations and/or passenger service where

applicable. The hydraulic design (if required as determined by NJ TRANSIT), shall include the delineation of the drainage patterns for modified facilities and resulting appurtenances. The location of drainage features shall be defined and sized. Drainage requirements in floodplains and wetland areas shall be defined as necessary. A report describing the entire drainage program for the project shall be prepared discussing the impacts and requirements of NJDEP and United States Environmental Protection Agency (USEPA) and taking into account guidance per American Association of State Highway and Transportation Officials (AASHTO) / NJDOT criteria. It is the Consultant's responsibility to ensure that all plans and drawings developed for this Project shall comply with project permit conditions and associated regulatory compliance requirements. Upon the direction by NJ TRANSIT, the Consultant shall be prepared to demonstrate said compliance. Preliminary Design drawings, specifications, schedules and associated documents shall be prepared consistent with the standards set forth in the RFP and shall include at least the following information:

1. Cover Sheet
2. Index of Drawings
3. Site Drawings
4. Facility Plans, Profiles and Cross Sections.
5. Plans, Elevations, Sections and other details pertinent to the feature of Design.
6. Design Analyses, shall completely cover the electrical design requirements for electrical systems necessary for the Project. It shall be used to justify Concept Design and verification. The Basis for Design shall include a concise outline for functional features, including a description of existing systems and other considerations affecting the design. In addition, a full description of any special requirements and justification for any proposed departure from standard criteria are required. The Analysis shall be separately bound and labeled and sufficiently complete to permit review of:
    a. Structural analyses
    b. Mechanical analysis with line diagrams
    c. Electrical analysis with line diagrams and load protection
    d. Special features (e.g. automated systems, corrosion prevention, etc.)
    e. Site security (as applicable)
    f. As applicable, project utilities such as telephone, communications, lighting, etc.
    g. An estimate of total connected loads, power factors, demand factors, diversity factors, load profiles where required, resulting demands and sizes of proposed transformers to serve either the complete project or the

various portions involved shall be provided

h. The basis for selection for primary and secondary distribution voltages and of overhead or underground construction shall be provided

i. Computations shall be provided to indicate that systems and materials are adequate but not over designed and are correctly coordinated

7. Technical Specifications

8. Statement of Estimated Construction Costs and Schedule (staging if appropriate) in sufficient detail (quantity take-offs) so as to permit evaluation. The format of the Cost Estimate reports shall be consistent with NJTRANSIT's Superstorm Sandy Recovery and Resilience Program requirements. Such requirements shall be available subsequent to Contract award.

Plans, Profiles and Section Drawings:

- Develop plans for use in cost estimating and display of plans and profiles for NJ TRANSIT review and approval.
- Prepare plans, profiles, typical sections, and sketches in sufficient number and detail to define and allow for the evaluation of the alternative construction and implementation concepts.

Support NJ TRANSIT complete permit applications as required and directed by NJ TRANSIT, in a format for presentation of plan, profiles and sections, for use in an 11 inch-by 17 inch, or 8.5 inch-by-11 inch report in both hard copy and electronic format. Plan and profile drawings for these purposes shall be presented in the report and as reductions of the full-size drawings. Plans for special facilities for these purposes shall also be presented in the report as reductions of the full-size drawings. The formats shall be submitted to NJ TRANSIT followed by other agencies for prior review and approval.

Deliverables

- Drawing formats for approval.
- Technical Memoranda documenting additional engineering studies as required (fifteen (15) copies);
- Review Set, plan and profile drawings for the, sections at appropriate scales;
- Final Set, plan, profile and section drawings as above (fifteen (15) copies CADD files on CD-Disc);
- Review set, 11 x 17 inches and 8 1/2 x 11 inches drawing reductions as above (fifteen (15) copies originals plus CADD files on Disc).

(Note: For the facilities that shall be owned and maintained by Amtrak, Amtrak may elect to further modify requirements relative to the types and scales of drawings required.)

In addition and in order to facilitate reviews, the drawings shall also be made available on the project website and formatted as Adobe documentation.

Note on use of CADD: Due to the many differing needs of NJ TRANSIT and outside interested parties for review of specific elements of the projects, it shall be necessary to reproduce the design documents. They shall require enlargement, downsizing, and modification, showing without certain elements or emphasis on certain elements. To facilitate these requirements, the use of Computer-Aided Design and Drafting (CADD) is required. The Consultant shall accommodate such requirements in its proposed resource allocations.

The Design documents shall be submitted in fifteen (15) copies [10 half-scale and three full-size set of plans] to NJ TRANSIT for review and comment. Any comments /revisions generated as a result of the review process shall be incorporated during the Final Design Task.

CADD Standards Manual: The documents shall be submitted in both their original software format (e.g. WORD, EXCEL, CAD, Photoshop) and as pdf files. The electronic submittals can also be provided via FTP Site**.**

General Notes: The preparation of all Project plans, details and sections, related but not limited to natural gas supply and connection, electrical power distribution and interconnection, water, sewer, communications, parking, roads, traffic signalization and rail signalization as well as roadway alignment, Facility structural, right-of-way, architectural, building systems including layout plans, shall be guided by the following requirements;

i. All Project documents shall be developed by the Consultant at such scales and of sufficient detail to indicate the full extent of work required;
ii. The engineering and /or construction shall consist of: Key Map, Location Map, Estimate of Quantities, Distribution of Quantities sheet, Site Plan, Elevations, Sections, Typical Sections, Standard Details, etc.
iii. All design work shall be incorporated on plans on a scale of at least 1" = 20'. Architectural plans shall be developed to a similar scale. Certain engineering drawings may be half-size;
iv. More detailed structural drawings shall be prepared at the appropriate scales to depict necessary details;
v. All contract documents must be made with a computer-assisted drafting program so long as the

elements specified herein are included. The latest or applicable version of AutoCAD shall be used in accordance with NJT's CAD standards. [Note – Amtrak owned and maintained facilities shall be drawn using Amtrak CAD standards. MicroStation for Amtrak – the Consultant shall confirm the version in use by NJ TRANSITand Amtrak ,– NJ TRANSIT standard libraries shall be used as applicable]

vi. Design calculations for the work shall be recorded on 8 ½" by 11" calculation paper, shall be indexed by subject and electronic copy provided;

vii. All plans and calculations shall be signed and dated by both the designer and checker, and shall be compiled in separate volumes for future reference;

viii. Specifications and supplemental specifications shall conform to the Construction Specification Institute (CSI) format.

ix. All computer runs shall be reduced to similar size, indexed and compiled with input and output identified; and,

x. Sketches, as may be required, shall accompany design calculations to outline design concepts and results.

xi. Signed and sealed survey drawings of all base maps surveyed for the preparation of the project plans including draft right-of-way metes and bounds descriptions.

Deliverables:

30%, 60%, 90%, 100% Plans & Specs including supporting interim Plans & Specs review packages

Electric Power Loads

The overall performance objective is to enable critical facility operations capability in the event that electricity cannot be supplied from the existing commercial grid as a result of an event consistent with the Project's **Design Basis Threat (DBT)**.

The design shall provide for selection and implementation of appropriate DER systems to supply necessary electrical power to Newark Penn Station. The two operating modes shall be: a grid-tied mode that shall supply continuous power to offset a portion of the

facility's use of commercial grid electric power; an Islanded Mode that shall meet the critical operational power needs for the Incident Transportation Plan, allowing for operation of facility critical elements.

The following information, as applicable, is required for design:

(1) Forecast of annual diversified peak load to be served by the project.
(2) Typical seasonal and daily load curves and load duration curves of the load to be served.
(3) If the facility is to operate interconnected with the local utility company, the Consultant shall develop information such as capacity, rates, metering, and interface switchgear requirements.
(4) If the facility is to operate in ISLANDED MODE, the Consultant shall also develop:
(a) Estimated operating power consumption data for each element required to implement the transportation plan
(b) Recommended distribution voltage, generator voltage, and interconnecting substation voltages (where applicable).

The system shall be designed to minimize the need for significant upgrades to existing utility distribution or transmission systems.

Incident Transportation Plan

The overall service goal is to transport as many people as possible to greater Newark, the New Jersey Hudson River Waterfront in Hudson County, or the Manhattan Central Business District (south of 59th Street) utilizing an array of bus, commuter rail, light rail, rail rapid transit and ferry services. While some services shall operate in a limited manner because of available electrical power, and some shall operate fully, all shall benefit from the implementation of the Distributed Generation Project.

Within New Jersey, a limited portion of NJ TRANSIT commuter rail system in northern New Jersey shall have electrical power provided to it from the NJ TRANSIT-DG to sustain a core system operation. NJ TRANSIT's intrastate bus services shall be operating and interstate bus services shall be redirected to locations where travelers can transfer to available trans-Hudson services. NJ TRANSIT shall be operating the Hudson Bergen Light Rail Line to provide transit service to the New Jersey Hudson River Waterfront in Hudson County, New Jersey. There are four (4) primary locations where trans-Hudson travelers shall be able to board public transit into Manhattan: Hoboken Terminal, Secaucus Junction, Weehawken Ferry Terminal and Newark Penn Station. There are also a few smaller locations where travelers shall be able to access lower-capacity private ferry services. While the focus is on AM peak period demand, it is assumed a PM peak period service shall also be provided where historically demand is more spread out.

Major Public Transit Travel Modes: Eastbound Dominant
Trans-Hudson AM Flows

This is a public transit operating scenario associated with the proposed implementation of a microgrid electrical power generation and distribution system. The system would be located within a limited geographic area of northern New Jersey containing the core of the critical public transit system serving Newark, Hudson County, the New Jersey Hudson River Waterfront and Manhattan, New York. All of these locations are characterized by very high transit dependency, both for work and non-work trips.

Critical Assumptions:

- No electrical power from grid in northern New Jersey and Manhattan
- No power for ventilation of Lincoln and Holland Tunnels
- No power for traffic lights at intersections or at-grade crossing gates
- No power for Port Authority Bus Terminal or George Washington Bridge Bus Station
- No subway service in NYC. Local bus service is operating.
- No service on Newark Light Rail
- No Amtrak service
- The system is managed to balance demand on public transit services more evenly over four hour AM peak period (6-10 am) – transit service shall continue outside of this peak period time but at a lower frequency and capacity
- An PM peak period service plan shall be implemented to match the volumes of AM peak period inbound travelers
- Highways and major roads are usable as are arterials with police assistance at intersections (possibly using barricades to prevent turning movements)
- NJ TRANSIT intrastate bus routes shall operate as close to normal schedule as permitted locally
- National electrical grid feeding northern New Jersey and Manhattan initially shut down completely, and subsequently impaired from normal operation with full power restoration not achieved for two (2) weeks requiring alternate power supply.

<u>THE NJ TRANSIT-DG POWERED FACILITIES AND SERVICES[2]: Base Case Scenario</u>

- Power for switches and signals only for NJ TRANSIT owned lines:
  Bergen County/Pascack Valley to Sports Complex via Secaucus Junction to Hoboken Terminal using diesel powered trains

[2] *Assume these services are operational 24 hours after power outage begins. This allows time to position transit equipment and operating personnel. If the outage is tied to a weather condition, transit equipment may be stored someplace other than in its normal location.*

- Morris & Essex Line trains operate from Maplewood to Hoboken Terminal
    - using diesel powered trains (no use of overhead electrical power)
- Northeast Corridor switches and signals powered, electrical/diesel powered
    - trains operate from North Brunswick to Newark Penn Station. Limited service continuing into Penn Station, New York
- Hudson-Bergen Light Rail fully powered
- Hoboken Terminal fully powered (able to accommodate all modes)
- Weehawken Ferry Terminal fully powered with service to Manhattan
- Newark Penn Station and Frank R Lautenberg Transportation Center at Secaucus Junction operable (able to accommodate all modes) Penn Station, New York, partial power sufficient to accommodate limited NJ TRANSIT service
- Rail system is otherwise physically undamaged and capable of supporting operation of a limited number of trains
- Although the focus of this exercise is on the dominant AM eastbound flows, rail, bus, ferry and light rail services shall also operate in the reverse direction during these time periods
- NJ TRANSIT and private interstate buses shall be diverted to selected intercept locations where passengers can transfer to functioning trans-Hudson modes (PATH, Rail into PSNY & Ferry into Manhattan

<u>Specific NJ TRANSIT Commuter Rail Lines/Services NOT Operating:</u>

- Raritan Valley Line
- North Jersey Coast Line
- Bergen County Line (other than using line to get to Sports Complex)
- Main Line
- Pascack Valley Line (other than trains operating on it for short distance to access Sports Complex)
- Montclair-Boonton Line
- Gladstone Branch
- Morris & Essex west of Maplewood
- Northeast Corridor west of North Brunswick
- Port Jervis Line (although it is operated under contract to Metro North Railroad it must use either the Bergen County Line or Main Line to reach Hoboken Terminal, the terminus of this service)

Two main issues prevent operations on these rail lines:

- No power for at-grade crossing gates, impractical to effectively staff every at grade location; and,
- No ability to distribute power to signals and switches to outlying areas.

Bus Services Not Operating:

- No Lincoln or Holland Tunnel bus service due to lack of power for ventilation fans
- No buses into Port Authority Bus Terminal or George Washington Bridge Bus Station because of electrical power limitations permitting full functioning of these facilities

Light Rail Services Not Operating:

- Newark Light Rail shall not be operating but NJT shall provide parallel bus services and enhance other bus services serving the same general ridership markets.

CYBERSECURITY

The Project's critical nature requires a robust cybersecurity architecture. As a baseline, and where applicable, industry standard best practices for typical power grid industrial control systems (ICSs), including those found in NERC Critical Infrastructure Protection (CIP) and the National Institute of Standards and Technology (NIST) Interagency Report (IR) 7628, shall be incorporated in the design.[2] However, a goal of the project is to make the project more robust than ICSs given that the microgrid shall be used in emergency situations and may be critical to emergency operation continuity. In addition to referenced best practices, additional rigor shall be applied to strengthen the microgrid control system's defense-in-depth. To further enforce defense-in-depth and expand on industry standard best practices, segmentation strategies within the microgrid control system itself are required to reduce the risk of widespread control system damage as a result of malicious activity or unexpected failures.

[2] The Consultant shall review the SANDIA Cybersecurity design evaluation report and associated design recommendations for Project implementation, included as Attachment D.

At a minimum, the Consultant shall address the following recommendations as they relate to hardening of the cybersecurity aspects of NJ TRANSIT-DG controls;

Policy/Procedural

- Developing and maintaining security policies, procedures, training and educational material that applies specifically to the microgrid control system.
- Establishment of a cross functional cyber security team is required and should consist of Information Technology staff, control engineer, control system operator,

network and system security experts, management staff, and physical security department member at minimum.

- Addressing security throughout the lifecycle of the microgrid control system, including architecture design, procurement, installation, maintenance, and decommissioning.
- Evaluate control system security policies and procedures based on the Homeland Security Advisory System Threat Level and deploy increasingly heightened security postures as the Threat Level increases.
- Reviewing user accounts on regular basis and providing a means of quickly changing accounts when access privileges change (e.g., employment termination).
- Authentication/Encryption
- The use of separate authentication mechanisms and credentials for users of the control system network and corporate network.
- Restricting user privileges to only those that are required to perform each person's job (i.e., establishing role-based access control and configuring each role based on the principle of least privilege).
- Applying security techniques such as encryption and/or cryptographic hashes to control system data storage and communications where appropriate.
- Using modern technology, such as smart cards, for additional factors for identity verification.

Segmentation

- Implementing a network topology for the control system that has multiple layers, with the most critical communications occurring in the most secure and reliable layer.
- Providing physical separation between the corporate and control system networks.
- Employing a DMZ network architecture to prevent direct traffic between corporate and control system networks while allowing historian data transfer.

Redundancy/Spares

- Ensuring that critical components are redundant and are on redundant networks.
- Designing critical systems for graceful degradation (fault tolerant) to prevent catastrophic cascading events.

Physical Protection

- Restricting physical access to the control system network and devices.

Monitoring/Audit

- Tracking and monitoring audit trails on critical areas of the control system.

- Establishing use restrictions, monitors, and effectively managing access to the control system.

Change Control

- Expeditiously deploying security patches after testing all patches under field conditions on a test system if possible, before installation on the control system.

Security Controls

- Implementing security controls such as intrusion detection software, antivirus software, and file integrity checking software, where technically feasible, to prevent, deter, detect, and mitigate the introduction, exposure, and propagation of malicious software to, within, and from the control system network.
- Disabling unused ports and services on control system devices and networking equipment.
- Establishing usage restrictions and implementation guidance for allowing remote vendor connections, including authorization of remote access before each connection, automatic session termination, and physical disconnection of remote connection when complete.
- Implementation of strong, non-default passwords and two-factor authentication where feasible.

Distributed Energy Resources Design Attributes

Distributed energy resources (DER) are electric generation units (typically in the range of 3 kW to 50 MW) located within the electric distribution system at or near the end user. They are parallel to the electric utility or stand-alone units. DER have been available for many years, and are known by different names such as generators, back-up generators, or on-site power systems. Within the electric industry the terms that have been used include distributed generation (DG), distributed power (DP), and DER. "DER" refers to the broadest range of technologies that can provide power to the user outside of the grid, and includes demand-side measures such as energy efficiency and demand response.

Distributed Generation—Any technology that produces power outside of the utility grid (e.g, microturbines, natural gas generator's

Subtask 2.1 - Verification of Concept Design Criteria (20% baseline design)

The objective of this subtask is to ensure accuracy and update information and engineering/design data developed during previous NJ TRANSIT efforts in order to

develop the project Design Criteria resulting in 20% Design Documents. This activity is a prerequisite to initiating further engineering on the Project. The Design Criteria shall be prepared for review and approval by NJ TRANSIT. Once approved by NJ TRANSIT, the Design Criteria shall be utilized by the Consultant to progress engineering.

A list of relevant documents previously developed by NJ TRANSIT can be found in the FTA Grant Application for the Project dated March 25, 2014 and which is included as part of this RFP with emphasis on the following:

- Sandia Report Phase I dated February 2014
- INCIDENT TRANSPORTATION PLAN

Pivotal Design Criteria considerations include but are not limited to;

- A thorough analysis of power usage, projected and temporal, with regard to peak and non-peak loading. Similarly, ramping of power demand shall also require characterization. Project/System Power demand characterization from a generation and distribution perspective relative to operation of each facility must also be analyzed.
- In all cases, DG type and configuration accounting for physical footprint and general layout requirements shall also be determined. (Discussed further in Subtask 2.2 – Engineering and Design).

Physical design parameters/specifications (including electrical power loads) and construction requirements for Distribution infrastructure to support facility operations including and as applicable;

  - Other NJ TRANSIT identified Project transformers;
  - Power distribution to control and communication systems.

Another key component of 20% Design verification is the selection and verification of appropriate power generation technology if technically and financially practicable and desired by NJ TRANSIT. The Consultant shall assist NJ TRANSIT in this selection by providing a comprehensive review and summary of available technologies to achieve the requisite power generation capability for this NJ TRANSIT-DG Distributed Generation component critical operation. As part of this evaluation, the Consultant shall characterize a cost-benefit analysis of each technology for power generation accounting for maximum operational efficiencies in the grid connected mode and islanded modes, related emission characteristics, along with the use of heat-recovery steam generators as practicable. Finally, the Consultant shall verify the peak load assumptions and critical operation loads at Newark Penn Station, i.e. the selected DG technology(s) and resultant power generation capacity is optimal to achieve stated emergency operational power demands and advise NJ TRANSIT accordingly. This review shall apply to both the Grid Connected as well as Islanded modes of operation. Facility DG configurations must be designed to

be black-start capable as necessary. A life cycle cost analysis shall be presented in support of the Consultant's conclusions.

The results of this study shall be provided to NJ TRANSIT in report form for review and approval. As noted above, this effort is a pre-requisite before commencing the next level of Design and Engineering.

Deliverable:

30%,60%,90, 100% Design Documents
Design Criteria Manual

Power Generation Technology Analysis Report for NJ TRANSIT-DG, Newark Penn Station

Subtask 2.2 – Engineering and Design

The Consultant shall assist NJ TRANSIT in the selection and implementation of appropriate DER technology for Newark Penn Station as described in Task 2 above. Potential technologies may include one or more, or combinations of the following.

- Combined heat and power, or CHP, is the joint production of both heat (usually steam or hot water) and electricity from a single fuel source. Collecting and making productive use of that waste heat can result in total efficiencies over 70 percent. Combined heat and power is often referred to as cogeneration.
- Energy storage, a device that stores energy to produce useful work at a later time
- Demand side energy management, the modification of consumer demand for energy through various methods such as changes to operations, energy efficiency measures, demand response, etc.

Subtask 2.2.1 – Facility Structural Modifications Supporting DG

Building Modifications

Any modifications to Newark Penn Station arrangements shall depend on the selected equipment or combinations of DG equipment including fuel cells, photovoltaics and CHP with provisions for future expansion and aesthetic and environmental considerations.

1. DG Equipment shall be located in an area that shall not interfere with future Newark Penn Station expansion and isolated from main facilities to control noise;

2. For semi-outdoor or outdoor locations, enclosures for controls shall be enclosed in manufacturer supplied walk-in metal housings or site fabricated closures;
3. Structural design – The Consultant shall advise NJ TRANSIT and upon approval design any modifications necessary to support the addition of DG equipment . Provision must be made in such event for support of piping, trays and conduits.

   Live loads. Modifications to Buildings, structures and all portions thereof shall be designed and constructed to support all live and dead loads without exceeding the allowable stresses of the selected materials in the structural members and connections as applicable.

   Other loads. In addition to the live and dead loads, the following loadings shall be provided for, as applicable:

   (a) Wind loading. Modified structures shall be designed to resist the horizontal wind pressure available for the site on all surfaces exposed to the wind and in accordance with any applicable code or standards requirements;

   (b) Seismic loading. Modified structures shall be designed to resist seismic loading in accordance with the zone in which the building is located and in accordance with any applicable code or standards requirements;

   (c) *Equipment loading.* Equipment loads are furnished by the various manufacturers of each equipment item. In addition to equipment dead loads, impact loads, short circuit forces for generators, and other pertinent special loads prescribed by the equipment function or requirements shall be included.

   (d) *Foundation design.* Foundations shall be designed to safely support all structures, considering type of foundation and allowable bearing pressures.

4. Vibration mounts or “floating floor” foundations where equipment or equipment foundation inertia blocks are separated from the main building floor by springs or precompressed material shall generally not be used. In these circumstances where such inertia blocks are considered necessary for equipment not normally so mounted, written justification shall be included in the project design analysis supporting such a necessity and shall be submitted to NJ TRANSIT for review and approval prior to being used.

Safety

The following general requirements with regard to safety shall be incorporated where applicable;

(1) Equipment shall be arranged with adequate access space for operation and for maintenance.

(2) Safety guards shall be provided on moving parts of all equipment.

(3) All valves, specialties, and devices needing manipulation by operators shall be accessible without ladders, and preferably without using chain wheels. This can be achieved by careful piping design, but some access platforms or remote mechanical operators may be necessary.
(4) Impact type handwheels shall be used for high pressure valves and all large valves.
(5) Valve centers shall be mounted approximately seven feet above floors and platforms so that rising stems and bottom rims of handwheels shall not be a hazard.
(6) Stairs with conventional riser-tread proportions shall be used. Vertical ladders, installed only as a last resort, must have a safety cage if required by the Occupational Safety and Health Act (OSHA).
(7) All floors, gratings and checkered plates shall have non-slip surfaces.
(8) No platform or walkway shall be less than three feet wide.
(9) Toe plates, fitted closely to the edge of all floor openings, platforms and stairways, shall be provided in all cases.
(10) Adequate piping and equipment drains to waste shall be provided.
(11) All floors subject to washdown or leaks shall be sloped to floor drains.
(12) All areas subject to lube oil or chemical spills shall be provided with curbs and drains,
(13) Adequate illumination shall be provided throughout the plant. Illumination shall comply with requirements of the Illuminating Engineers Society (IES) Lighting Handbook
(15) Mechanical supply and exhaust ventilation shall be provided for all of the equipment where applicable and necessary. Battery room (as applicable) shall have separate exhaust fans to remove hydrogen emitted by batteries.
(16) Noise level shall be reduced to at least the recommended maximum levels of OSHA. Control valves shall be designed to limit noise emissions.
(17) Each equipment item shall be clearly labelled in block letters identifying it both by equipment item number and name. A complete, coordinated system of pipe markers shall be used for identification of each separate cycle and power plant service system. All switches, controls, and devices on all control panels shall be labelled using the identical names shown on equipment or remote devices being controlled.

1. Provide 1" = 20' scale layouts of DG Power Equipment, associated building or facility modifications, associated electric power inverters, transformers, cabling and distribution infrastructure, along with grading, utility and drainage requirements, as well as construction cost estimates and half-size drawings. One set of copies shall also be required.
2. The Consultant is advised that supporting documentation accompanying this

RFP is the result of a 20% design phase to assist in ascertaining the optimum physical layout and construction for this project. Particular attention should be focused on NJ TRANSIT Newark Penn Station operations requirements with regard to the introduction of new equipment.

3. The goal of this subtask is to confirm baseline (20%) design criteria compatible with the 20% design package that shall be advanced to final design of the Project. While the data obtained in other sections may provide some of the standards and design criteria, this information shall be augmented through detailed discussions with NJ TRANSIT personnel as necessary, in the engineering, maintenance, and operations departments as well as representative staff of regional power generation, transmission and distribution agencies and regulatory authorities. If not already available in published standards, the criteria and design parameters established through these discussions shall be documented for use on this Project, and a minimum shall include the following:

    - Building and facilities design modifications
    - Supporting Electric Power cabling modifications and additions, control functions Distribution Facilities
    - Permanent and temporary clearance restrictions
    - Typical subgrade cross sections where required
    - Drainage standards where required
    - Slope Protection Standards where required

6. The above list is not all inclusive, but is shown to illustrate the nature of criteria and parameters that must be established for consideration of constructability studies. The design criteria shall be in accordance with applicable standards and/or recommendations set forth by; American National Standards Institute (ANSI), American Society of Mechanical Engineers, Institute of Electrical and Electronic Engineers, National Electrical Manufacturer's Association, National Fire Protection Association, current NJ TRANSIT design standards as applicable as well as American Railway Engineering and Maintenance Association (AREMA) design standards, where applicable. The Consultant shall attempt to improve upon these criteria with regard to increasing and/or improving Newark Penn Station operations, power generation, system resiliency and power distribution if possible.

Deliverable:

Design Plans and Specifications of the new Newark Penn Station DG Facility modifications and additions and associated electric power distribution requirements as detailed above.

Subtask 2.2.2 - Power Management Design

DG Power Generation Control

- All generators at the DG powered Newark Penn Station shall be retrofitted with a networked connected controller.
- Local generator controls must regulate local voltage and frequency during microgrid operation and be retrofitted with control switchgear that enable paralleling and synchronizing to the grid, safely disconnecting from the grid, and synchronizing and paralleling with other generators.
- Local controllers must also provide adequate dynamic response so that transient stability shall be maintained for load steps, generation unit outages, and faults.
- Controllers must be enabled to respond to EMS and Supervisory Control and Data Acquisition (SCADA) commands to support microgrid operations and market based decisions.
- DG controllers at Newark Penn Station shall have network capabilities to support monitoring functions.
- In the event of CHP implementation, continuous monitoring and control should be implemented by recording vital operational parameters (e.g., heat & power outputs, fuel consumption, water consumption, gas pressure and temperature, etc.) and reporting alarm conditions to the control center.
- DG controllers should provide provisions for remote starting and stopping and provide detailed operational data for monitoring and situational awareness purposes.

Load Control

- Monitoring of microgrid loads should be conducted and configured to record real power, reactive power, frequency, and voltage for all buildings and feeders.
- Load data must be recorded at high enough fidelity to conduct load-shedding schemes should they become necessary.
- Inrush current mitigation strategies should be implemented for all problematic loads, including large motor loads and transformers.
- Load control must be implemented in all single-phase systems to maintain proper phase balancing, as outlined in ANSI/NEMA MG 1-2006.
- Automation should be added to medium and /or low voltage switchgear to regulate load connections, depending on the building/equipment location and cost.

- Real-time and historical load data for all building and feeder loads during both islanded and normal operation should be collected and used to identify issues and opportunities for improved performance and operational savings.
- Smart metering should be implemented to collect load data and augment grid telemetry.
- Grounding schemes need to be maintained during microgrid operations.
- During microgrid operation, facility operation mitigation strategies should be implemented to reduce stress on power system if needed.

Distribution and Protection System

- Overcurrent relays, synchronizing relays, breakers, and fuses shall be necessary to protect the distribution system assets during islanded conditions, normal operations, and the brief transition intervals.
- All protection must conform to industry requirements, including the addition of grounding apparatus if necessary for Medium Voltage (MV) systems.
- For faults within the microgrid, the affected area must be isolated from the rest of the microgrid before the entire microgrid is disbanded, requiring facilities or equipment within the affected area to revert to standard building backup.
- For faults within a building, the building should disconnect from the microgrid before other (unfaulted) buildings, facilities or equipment assumes that the fault is in the MV network.
- Faults within equipment shall result in their disconnection before other protection is activated in either the Low Voltage (LV) or MV network.
- Coordination studies should be conducted and implemented for both microgrid and grid connected conditions.
- Protection schemes during grid connected and microgrid mode should be implemented to account for difference in power flow directions, distance calculations, and pilot schemes.
  - The Cis required to develop detailed construction phasing and cutover plans for replacement and/or modifications of existing systems.
  - Provide interfacing, coordination and integration of the new systems with existing systems.
- The Consultant shall obtain approval of Electric Power DG design for Newark Penn Station from NJ TRANSIT as necessary.

Deliverables:

Power Management Design 30%, 60%, 90% and 100% - Final

Prior to the start of any work, the Consultant shall submit a design schedule to NJ TRANSIT for review and acceptance. Once the 20% design package is validated,

resulting in the selection of the “best” design and operations option, NJ TRANSIT shall direct the Consultant to progress the 20% Design to the 30%, 60%,90% and 100% Design Levels. The Consultant shall not proceed with the 30% of this project until directed to do so by NJ TRANSIT.

The 30%, 60%, 90% and 100% Designs shall include:

1. Site Preparation, and Layout – the Consultant shall complete necessary field assessment. The Consultant shall develop plans and specifications at all design progress levels that are complete for the preparation of the site(s) including modifications to existing transmission facilities.

2. Site Plans – the Consultant shall prepare and submit 30%, 60%, 90% and 100% site plans and specifications.

3. Electrical Systems – the Consultant shall prepare and submit 30%, 60%, 90% and 100% plans and specifications and perform all calculations for the Electrical Work, including but not limited to the following:
    a. Location Plan
    b. Wiring Plans (Single Line Diagram, Main Wiring Diagram)
    c. Wire, Cable and Conduit Runs
    d. Relay and Control Schematics
    e. Cable List
    f. Electrical Details
    g. Equipment Layouts
    h. Hardware
    i. Bill of Material

4. Structural – the Consultant shall prepare and submit 30% plans and specifications and perform all calculations for any Structural design necessary. A separate Structure Package shall include the following:
    a. Equipment Mounting Details
    b. Structural Support Modifications
    c. Steel Details
    d. Structure, and Foundation Repairs as Required
    e. Bill of Material

5. Technical Specification – Technical Specifications shall be prepared to the 30%, 60%, 90% and 100% levels in CSI format for construction tasks performed by a contractor and for all special and non -standard Equipment and Material.

6. Construction Cost Estimate and Schedule – the Consultant shall prepare an "order of magnitude" construction cost estimate at the 30%, 60%, 90% and 100% levels of design.

7. Administration – the Consultant shall provide administrative Project Management as outlined in this RFP.

The coordinated design schedule shall assume NJ TRANSIT Facility Managers and Project Management staff shall require twenty-one (21) calendar days from the date of receipt of each design submittal for review and comments.

Geotechnical analyses necessary, as determined by NJ TRANSIT, shall include the collection and review of pre-existing geotechnical test boring and laboratory data as available from facilities designated for energy resiliency improvements. Additional borings and laboratory testing may be approved by NJ TRANSIT as needed.

An analysis shall be performed for structural support options. Settlement and stability characteristics of proposed foundations for DG equipment shall be evaluated, as well as a conceptual-level comparison of construction costs. The analysis shall also consider regulatory compliance implications for presented options. In addition, the Consultant shall assist and support NJ TRANSIT in satisfaction of regulatory compliance permitting and related efforts.

A conceptual geotechnical recommendations report shall be prepared summarizing the existing data available, the results of the foundation(s) analysis, and preliminary recommendations regarding the preferred structural support pad alternative.

Deliverables:
30%, 60%, 90% and 100% Design Packages as outlined above.

Subtask 2.2.3 - Civil, Structural, Geotechnical & Hydraulic

a. Perform the required Civil, Structural, Geotechnical and Hydraulic design calculations necessary for construction. Compare and analyze alternative foundation design and construction methods as applicable.
b. Prepare design plans and typical preliminary details for the required structures as necessary. Show horizontal and vertical control lengths and widths of structures, typical foundation design and construction staging. Specify design criteria to be used.

The civil drawings shall graphically depict the proposed DG equipment installations and all associated generation and distribution equipment in support of Newark Penn Station operations requirements and ACOE and NJDEP Land Use regulatory limits of disturbance for the selected Project site where applicable. Demolition of structures and utilities to be relocated shall also be identified as applicable. The structural drawings shall depict the type of structures necessary, and the size and type of foundations to be proposed. The geotechnical design shall include a report and foundation recommendations as necessary. Foundation design shall be based upon geotechnical data obtained from existing data and by the borings taken for this project under the engineering task. A geotechnical investigation shall be conducted to support the design and contract packaging tasks where required and approved by NJ TRANSIT. A construction-staging plan shall describe the methods and sequence of construction to complete the project along with detailed description of construction windows so as to maintain uninterrupted Newark Penn Station service and adjacent commercial operations as applicable. The hydraulic design shall include the delineation of the drainage patterns for modified facilities and associated appurtenances as well as modifications to related electrical power distribution infrastructure including, but not limited to, inverters, transformers and control apparatus. The location of drainage features shall be defined and sized. Drainage requirements in floodplains and wetland areas shall be defined. A report describing the entire drainage program for the project shall be prepared discussing the impacts and requirements of NJDEP, USACOE and USEPA.

It is the Consultant's responsibility to ensure that all plans and drawings developed for this Project shall comply with project permit conditions and associated regulatory compliance requirements as developed by NJ TRANSIT under separate Contract. Upon the direction by NJ TRANSIT, the Consultant shall be prepared to demonstrate said compliance to all Federal and State regulatory agencies, NJ TRANSIT and/or Amtrak .

Design considerations. The DG system shall meet all applicable regulatory requirements, and the application shall be the most technically and economically feasible method of accomplishment for such regulatory compliance. All alternative solutions addressing compliance shall be considered which shall satisfy the given load and which shall produce the least objectionable wastes. Newark Penn Station design modifications shall be such as to accommodate future additions or modifications at minimum cost.

Deliverables:

Reports as detailed above.
30%, 60%, 90% and 100% Plans & Specs and in conformance with Project General Plan and Specification Requirements as well as General Notes as detailed in Task 2 – Engineering above.

Subtask 2.2.4 - Subsurface Investigations

The Consultant shall ensure that uncertainty relative to Project Subsurface conditions shall be minimized to the extent practicable by the application of a subsurface investigation effort where necessary to support additional structures or modifications to existing facilities. Prepare boring plans including Railroad flagging requirements (where necessary), subject to NJ TRANSIT and Amtrak approvals, for a Soil Engineer's use in order to take borings and provide diagrammatic sketches for foundation explorations and test pits for subsurface, DG related Newark Penn Station modifications and design, associated distribution infrastructure, natural gas supply connections, and service road design data. When required, prepare Site Specific Work Plans (SSWP) for Amtrak and NJ TRANSIT review and approval. The report shall include a proposed schedule that shall allow work to continue without impact to daily rail passenger service as applicable.

The plan shall identify the locations at which additional subsurface information is required in order to ascertain the bedrock profile and quality of subsoils. The Consultant shall conduct the investigation and document the data and findings in a geotechnical report, providing an appropriate level of analysis as required to support final design, temporary support and underpinning design and to determine constructability implications for all facilities and systems associated with the Project.

a. An outline of the Geotechnical Investigation and a Soil Borings Plan shall be submitted to NJ TRANSIT for approval, prior to the initiation of the detailed investigation. The Consultant shall arrange for the services of an Archeological Sub-consultant acceptable to NJ TRANSIT to provide field support during this phase and in concert with the findings of any previously developed Section 1(A) Report of Archeological Resources and Effects. In the event that such a report is not available, the Consultant shall develop necessary Federal and State compliance documentation as required. All test boring samples shall be inspected by the Archeological Sub-consultant, to determine the possible existence of archeologically significant artifacts. The Archeological Sub-consultant shall prepare and submit all necessary documentation in compliance with applicable requirements set forth by the New Jersey State Historic Preservation Office and in compliance with Federal Section 106 guidelines.

b. The Consultant shall designate and stake out all necessary boring locations prior to initiation of field activities as well as notify NJ TRANSIT when said task is complete in order to facilitate NJ TRANSIT review. The Consultant should not rely solely on historic or archived soils data to formulate necessary documentation. This effort shall require accumulation of field data and subsequent reporting as detailed herein.

c. Perform necessary foundation borings and field and laboratory soil tests.
d. Coordinate and inspect any boring operations and test pit excavations where applicable.
e. Analyze all data obtained by borings and laboratory tests and prepare a soils report with recommendations for approval by NJ TRANSIT.
f. Identify temporary or permanent sheet piling and dewatering measures for construction of structures where applicable.

Deliverables:

Geotechnical Investigation Plan and Boring Program
Boring Plan and Profiles
Geotechnical Report, with boring logs and analysis for each geologically discrete project element.
Section 1(A) Report of Archeological Resources and Effects as necessary.

Subtask 2.2.5 – Topographical Survey Reference NJDOT Survey Standards

Where directed and approved by NJ TRANSIT, the Consultant shall conduct a topographic survey of the proposed Project footprint at scales of 1" = 40' horizontal and 1" = 2' vertical. The base sheets shall show the project coordinate grid system, datum references, all existing surface features and the existing utilities as verified by NJ TRANSIT and through field observation. The Facility location (footprint), including related site appurtenances, utility and drainage work, shall be shown on reproductions of the base sheets for the 100% PE design level. The surveys shall include, but not be limited to:

- Horizontal datum (NAD 83) control in the New Jersey and Pennsylvania Plane Coordinate System.
- Contours at 1' intervals and key spot elevations to accuracy of 1/10 of a foot.
- Existing above and below utilities, from NJ TRANSIT, Amtrak and Utility records.
- Site topography including buildings, structures, drainage channels and any other features.
- Conditions of soils and pavement, including evidence of hazardous waste with the support of a qualified Environmental Inspector as provided by NJ TRANSIT under a separate contract. Conditions of soils shall be determined through borings or test pits.
- Property lines, easement lines, railroad and street rights-of-way and any property encumbrances on or adjacent to the site.

Any drawings or data obtained from NJ TRANSIT shall require verification in the field.

General Notes Regarding Topographical Surveys:

- All surveying activities for the Project as prescribed by the Task shall be coordinated with the requirements of; Tasks 4 (Environmental Analysis), 5.0 (Required State and Federal Permits) and Task 6 (NJDEP Site Remediation Compliance), with regards to Data Collection and Mapping.
- Photogrammetry: The Consultant shall secure, review and analyze existing survey data and topographic mapping previously prepared for nearby projects either sponsored by NJ TRANSIT, adjacent property development or Amtrak. The topographic mapping shall be field edited, and necessary changes drafted.
- The Project shall be surveyed under the New Jersey State Plane Coordinate System, NAD83. The Vertical Datum reference shall be to the NGVD29 system. Monumented baselines within the project limit area shall be recovered and missing monuments re-established.
- Location of Borings, Test Pits and Probes: Borings required for the subsurface investigation tasks shall be staked-out in relation to the established baseline monumentation and plotted on prepared boring location plans. Elevations and coordinates shall be established within the project datum for each boring location.
- Location of Utilities and Adjacent Structures: Utility companies having facilities in the project area shall be contacted to provide plans of their facilities that may be affected by the proposed design. Included shall be sewer, water, electric, gas, telephone, data transmission and cable television. Upon receipt of the available plans, a survey field edit shall be performed to verify all subsurface utilities within the right-of-way limits. Inverts of sanitary and storm sewer pipes at manholes, catch basins and outfalls, and top of grate elevations shall be obtained for the affected facilities where accessible by survey equipment. Further details regarding these requirements are provided in Subtask 2.2.6.
- A composite utility plan shall be compiled, incorporating the plans obtained from the utilities and field survey notes. From this, the Consultant shall identify facilities in conflict with the proposed design.
- Field surveys shall be conducted as required to provide the additional information needed to perform the design, such as critical clearance dimensions to adjacent development, property boundaries, environmental control features, etc.
- Field surveys shall utilize the existing horizontal and vertical control established for the original mapping. New monumentation shall be established, as required, to facilitate construction.
- Topography: Fills or cuts due to construction or other activities after the original topographic maps were prepared, shall also be field edited. New contours (@ 1' intervals) and elevations shall be drawn on the topographic maps.

- The photogrammetric mapping shall be prepared in a scale of 1" = 40' with field survey details needed for the existing structures/buildings, existing electric power distribution and transmission facilities, adjacent rail structures including bridges, rail station(s) and signal and communication system components located in or near the Project Area. It shall include:

    i. A survey of all structures to verify location and size of all poles, towers, foundations, elevations from top of rail, top of road or structural details.
    ii. Detailed surveys of existing buildings, bridges, retaining walls and other structures within the project area.
    iii. Drainage structures, utilities, streets, roads, tree masses, etc.

- Existing plans obtained from others may show structures referenced to a different vertical datum than the project vertical datum. Survey work shall be performed to relate all established vertical datum to the project datum. For preliminary design purposes, the azimuth and bearing of each roadway and track within the project limits shall be obtained.
- Preparation of Cross-Sections: Where agreed upon and required by NJ TRANSIT, Cross-sections of the Project area at 50' intervals shall be developed through photogrammetric methods and field survey verification.
- Digitized Data: To convert the field surveys, as well as the topographic mapping in digitized format, the Consultant shall Import all survey data by file transfer directly to electronic drawings. The data shall be translated to a computerized system for convenient use with CADD systems used by NJ TRANSIT or Amtrak.

Deliverables:

Topographical Survey as detailed above.
Topographic Survey (Supplement to NJ TRANSIT's baseline mapping as necessary).

Subtask 2.2.6 – Utility Engineering

1. Utility Engineering is also a vital component of the preliminary engineering and production of 30%, 60%, 90% and 100% construction plans. Using already available Project data as a starting point, the Consultant shall identify all existing and proposed utilities within and immediately adjacent to the site including, but not limited to, the aerial, surface and subsurface PSE&G power lines and commercially owned natural gas transmission pipelines in the Project area. The Consultant shall identify the locations of possible utility impacts or conflicts resulting from the project and determine the required improvement. The Consultant shall locate all types and sizes of utilities, including mains, high pressure lines, aerial transmission lines, fiber optic banks, etc. and prepare both existing utility and utility relocation drawings.

Where agreed upon and required by NJ TRANSIT, the Consultant shall conduct Subsurface Utility Engineering (SUE) for determination of the location of underground utilities. The Consultant shall prepare a SUE Plan, comprising of Test Pit Plans identifying where test pits are needed, a description of what equipment and methods shall be used, method of repair to existing properties, and a plan for coordinating with municipal and state requirements during the investigations. Innovative and non-destructive methods for the preliminary location of utilities shall also be considered.

The utility drawings shall include all facilities such as duct banks, vaults, manholes, telephone poles, utility poles, hydrants, and other relevant structures or facilities that may be potentially impacted by Project Construction. The Consultant shall determine the utility owners' horizontal and vertical controls, and convert the survey the data to comply with the project standards. The Consultant shall catalog data collected, and maintain file copies of source documents, such as deeds, licenses, plots, easements, or other documents used to locate utilities.

Utilities shall also be located on the base mapping.

Upon NJ TRANSIT direction, the Consultant shall support NJ TRANSIT meetings with utility owners and associated regulatory agencies to ascertain the requirements for permanent utility relocations, as well as for temporary supports and work-around as required during construction. The Consultant shall support NJ TRANSIT in developing Utility Agreements based on these discussions.

The Consultant shall also develop utility cost estimates for all temporary and permanent work, including providing support during construction. The format of the Cost Estimate reports shall be consistent with NJ TRANSIT's Superstorm Sandy Recovery and Resilience Program requirements. Such requirements shall be available subsequent to Contract award.

The Consultant shall develop the drawings in compliance with rules of the appropriate regulatory authority.

The Consultant shall evaluate and provide for electrical, water, natural gas supply, sewerage and other utilities needed to support construction operations in all design documentation. The Consultant shall incorporate these services into the utility cost estimates and agreements.

General notes regarding Utilities and Coordination:

- During development of the preliminary design documents for utility work, liaison shall be maintained with agencies and utility companies whose facilities maybe impacted by this Project. Available utility plans, records, reports and surveys

shall be initially reviewed and shall be followed by a site inspection to:

i. confirm the specific existing utilities in the field;
ii. assess the condition of such utilities;
iii. determine the impact of design on such utilities; and
iv. determine the impact of construction on such utilities.

- The location, type, and size of the systems operated by the respective utilities shall be identified. Affected utility owners shall be contacted by NJ TRANSIT to discuss general policies concerning the operation, protection, support, relocation, and reconstruction of the facility.
- The utility facilities can be relocated as necessary, subject to approval by the appropriate utility and NJ TRANSIT. Coordination meetings shall be scheduled to obtain utility input during the early stages of the design, at which time comments shall be considered for use during the development of the preliminary design documents.
- The Consultant shall establish, using the standards and practices of utility owners, the design criteria for utilities that shall be used as a basis for the preparation of construction phase documents. The standards shall be developed using current NJ TRANSIT/Amtrak/utility standards as a base, with modifications to be made where necessary to accommodate the special needs of this Project. Proposed modifications or additions to existing design standards shall be identified and submitted to NJ TRANSIT/Amtrak/Utilities as applicable for their approval prior to use to support design preparation.
- All design documents for utility relocation shall be prepared in accordance with applicable regional, county or municipal, and utility company's applicable rules and regulations. The Consultant shall prepare the necessary sketches, plans, and agreements, along with descriptions of work, to accompany utility permit applications. The Consultant shall also be available to assist NJ TRANSIT and the Utilities in preparing agreements for the correction of utility-related problems with the respective utility owners, if required.
- The Consultant shall provide necessary documents and applications required to permit rearrangement of utilities and/or secure easements. Standard procedures for submission of modifications, changes or relocations shall be noted in the construction contract documents.

Deliverables:

Subsurface Utility Engineering Plan
Existing Utility Drawings

Proposed Utility Relocation Drawings
Utility Cost Estimates
Utility Agreements – drafts and final for reimbursement of engineering cost.
Utility Catalog and Files
Physical Facilities 30%, 60%, 90%, 100% Construction Plans as detailed above

Subtask 2.2.7 - Structures

- This task encompasses the establishment of design criteria and standards for structural elements of the Project in accordance with design standards as set forth above and as applicable, as well as NJ TRANSIT and Amtrak standards and specifications as applicable. These standards, in addition to the normal structural design standards of AREMA, AASHTO, NJDOT, ACI and AISC, where applicable, shall also contain criteria to meet specific requirements of applicable railroad and roadway design standards. Where conflicts occur in the railroad design criteria and standards, NJ TRANSIT and Amtrak shall provide guidance as necessary. These criteria and standards shall be the basis for developing preliminary structural schemes, construction staging procedures and preliminary drawings in sufficient detail so as to identify the structural requirements of the Project.
- The major structural requirements for this Project shall be imposed by the layout and operational schemes of the proposed DG Newark Penn Station facility modifications and new or modified alignments for power distribution. Alternate structural systems, elements, and components shall be evaluated considering various substructure and superstructure systems to achieve low maintenance, aesthetic, practical and cost-effective structures.
- The evaluation of candidate structures shall be an iterative process. Constructability, in light of operational and environmental constraints, shall be considered for all alternatives. Maintenance criteria shall be included in the evaluation.
- The structural effort under this task shall include the design and layout of the new Project Newark Penn Station structures. Additional factors of ROW or NJ TRANSIT property limitations, impact on abutting properties and facilities, constructability, maintenance, and cost shall be considered for structural alternatives.
- Designs and plans for structural elements required for the Project shall be prepared in sufficient detail to evaluate and assess the alternatives to be considered. Plans to be developed under this task shall include, but not be limited to:

  i. Foundation, building and superstructure plans
  ii. Culverts

iii. Retaining walls
iv. Structural modifications to existing facilities

Major requirements of this task shall include preparing cost estimates for the primary designs, alternatives and sub-options to be developed by the Consultant for comparison of cost effectiveness, and determination of funding implications. As noted previously, cost estimates shall be prepared consistent with NJTRANSIT's Superstorm Sandy Recovery and Resilience Program requirements. Such requirements shall be available subsequent to Contract award.

- The results of this work effort along with recommendations for final implementation shall be presented to NJ TRANSIT for approval and selection of the preferred concept. All alternative concept studies and their comparative cost, constructability, performance and maintenance shall be presented. Recommendations shall be fully supported and documented in the Draft Design/Project Definition Report.
- Detailed quantities shall be checked, compiled and indexed for future reference. Technical and procurement specifications, required as a result of the design process, shall be identified for future inclusion into the final contract documents.

Subtask 2.2.8 - Power Management Communications

The Consultant shall establish design criteria for the Communications Systems to be compatible with NJ TRANSIT systems. Proposed systems shall specify the communication infrastructure that is required to maintain normal communication systems necessary for functional interface with operations and interconnection with the area commercial power grid.

The control architecture for the NJ TRANSIT-DG is program essential to the stability and efficiency of its operation. A dedicated communication network shall be required for monitoring and data exchange. Optimal operation shall require controllers on energy resources that shall likely replace or interface with OEM controls.

Microgrid Communication Network

- Network connectivity shall be provided to all microgrid monitored assets, controlled assets, and the primary and secondary control and monitoring centers.
- Network communications must satisfy low latency requirements for control and provide a highly reliable information channel that retains the integrity of data.

- Control system network must, at minimum, meet industry standard best practices for cyber security (reference cyber security section).
- Network architecture and communication protocols must have point-to-point and broadcast capabilities.
- All communications must support interoperability between all distributed devices using published object functions, standard commands, and standard protocols.
- Communications must be adequately extensible to accommodate future additions/modifications.
- Interoperability requirements must also be satisfied for all interconnection control and monitoring systems from NJ TRANSIT and local utilities.
- Network and communication device time synchronization shall be implemented between all transacting parties within a reasonable degree of accuracy.
- Fiber optic communications shall be implemented for the bulk of the microgrid communications.
- Rather than simple logical isolation, all microgrid control system network communication shall be physically isolated from all other networks (as opposed to VLAN separation).
- Provisions for remote access shall be provided for troubleshooting, remote maintenance, and software updates.
- Controlled communication channels shall be established for data transfer between the microgrid network and all rail, bus and ferry operators as well as utility partners, including PSE&G, and PJM.
- Network architecture shall be hardened with redundant communication paths, uninterruptible power supplies, critical spares, and environmental controls.
- Critical network equipment shall be located above the DBT flood level and have adequate physical protection from tampering and unauthorized access.

Energy Management System/SCADA

- An EMS and SCADA system shall be installed for the NJ TRANSIT-DG separate of any existing information systems or rail operation systems currently in place.
- The EMS and SCADA system shall have an Human Machine Interface (HMI) to facilitate monitoring and man-in-the-loop control.
- Full backups of the EMS and SCADA systems shall exist in a geographically diverse location and located above the DBT flood level.
- EMS and SCADA systems shall monitor all critical parameters of the microgrid to manage frequency, voltage, energy/power production, load shedding, microgrid activation, generation asset optimization, and synchronization in accordance with ANSI/NEMA C84.1-2006 and IEEE 1547 standards.

- The EMS shall provide manual and automated start capabilities, including black start.
- Provisions for manual microgrid switchover (for testing or preventative measure purposes) shall be included to disconnect from utility during normal operations.
- Hierarchical controls shall be implemented so that the EMS can manage real and reactive power in a holistic fashion, maintain adequate reserve margins, and properly respond to load fluctuations.
- All parameters and measurements should be archived using data historian functionality.
- Data historians shall be complete with data filters based on time and value rate of change, configurable sampling rates, and shall either save all historical data in provisions for long term storage or have a round robin database with sufficient storage.
- Data acquisition equipment shall contain set, get, forced, and unforced capabilities.
- All EMS/SCADA field equipment shall be protected by environmentally hardened enclosures to protect against the elements, tampering and DBT conditions.
- The SCADA system shall extend to all isolated facilities for monitoring purposes and at minimum shall monitor generator real/reactive power output, building voltage and current draw, fuel levels, and state of renewable energy output (if any).
- Continuous, 24/7 monitoring shall be conducted by qualified operations personnel.
- A paging system shall be put in place to provide monitoring and alert capabilities via a paging system so operations and maintenance personnel can quickly respond to failures or potential problems.
- Remote access to the EMS/SCADA shall permit remote monitoring, diagnosis, troubleshooting, software/firmware updating and limited control during normal and emergency conditions.
- Remote access functionality must satisfy cyber security best practices and recommendations (reference cyber security section).
- Persistent remote access connections shall not be permitted and physically disconnected when not in use.
- Remote connections shall be controlled with connection timeouts and strong encryption and authentication methods.

Design plans, specifications and cost estimates shall be prepared for the necessary modifications to communications facilities affected by this project. Cable routing, communications, bungalow layouts, and typical details shall be shown. The work shall be performed in accordance with applicable Federal and State requirements, PJM and

PSE&G requirements as well as NJ TRANSIT standards as applicable and subject to review and approval by all agencies as applicable. Installation instructions and plans for the communication system configuration shall be provided.

Deliverables:

Performance Specification for Communications Backbone Power Management Infrastructure, Emergency Alarm Stations, Fire Alarm Systems. – draft and final.

Subtask 2.2.9 – Concept of Operations

The objective of this subtask is to assist NJ TRANSIT in developing an outline for baseline operations of the DG components of the microgrid.

Under normal conditions, when the grid is fully available, DG components of the microgrid shall be electrically connected to the grid. Such DG components shall deliver energy for example, to Newark Penn Station.

Under a scenario involving a regional or local blackout condition, DG components of the microgrid would become the primary source of power for affected Newark Penn Station. This would require preplanned switching coordination with the utility after it has been determined that utility power shall not be restored for an extended time period. If the outage affects the NJ TRANSIT system as well, then the tie points to the grid would also be opened. Interlocks and synchronizing relays would be required at each location where switching into an energized secondary source is needed. After a regional outage, it is likely that the microgrid DG components shall be designed to initially trip off line. For this reason, the DG components are required to have black-start capability.

(A more detailed discussion of these requirements is presented in the attached Operational Design Concept/SANDIA Phase I Report - Appendix 1.)

Equipment requirements shall be determined and corresponding capital funding needs identified. The Consultant shall provide an approximate schedule for equipment acquisitions, long lead procurement projections, if any, in terms of months prior to service commencement.

For the outline of the baseline operating plan, the Consultant shall work with NJ TRANSIT staff to determine and define physical aspects of the Newark Penn Station DG Project, hardware and software requirements to effectively support integration and interface of DG components of the microgrid with NJ TRANSIT and Ferry facilities when regional commercial grid operations are suspended.

The Consultant shall also assist NJ TRANSIT in developing and submitting, to the extent required, necessary registrations/certifications with appropriate energy regulatory agencies or bodies, as well as compliance with PJM interconnection requirements as applicable. The Consultant shall provide assistance to NJ TRANSIT in evaluating compliance requirements to Currently Enforceable Standards including but not limited to; FAC-002-1 Coordination of Plans for New generation, Transmission, and End-user Facilities; FAC-008-3 facility Ratings; PER-005-2 Operations Personnel Training; and PRC-005-2 Protection System Maintenance. The Consultant shall assist NJ TRANSIT in compliance activities when resultant findings require such action.

Deliverables:
Outline of Baseline Operations Model, including applicable drawings, specifications, graphs and diagrams as necessary in support of the concept operating plan (10 copies). Registration analyses and applications as necessary and described above.

TASK 3 - COST ESTIMATING

Cost/performance estimates for various design options may be developed to aid in developing final design requirements and to help support approval and funding of the energy infrastructure improvements.

The Consultant shall develop quantity take-offs and cost estimates for each of the major items on all plans.

General Notes on Cost Estimating

The Consultant shall prepare three cost estimates during the PE phase. The first estimate shall *independently* validate the cost estimate established during the 20% baseline design. This estimate shall be completed within two (2) months of NTP and shall include a reconciliation report addressing major differences between the two estimates.

The second and final estimates shall be engineer's estimates based on the completed 60% and (100%) submittals. The final estimate shall be submitted upon completion of the Final submittal, and shall be an accurate and fully quantified estimate for all elements of the project, and shall be suitable for use to evaluate Construction Bids

The estimates shall be developed and formatted to comply with the FTA's Standard Cost Category (SCC) methodology. Up-to-Date unit prices shall be used in every version of the estimate.

As previously noted in this RFP, NJ TRANSIT has developed reporting formats and requirements for cost estimates to be utilized in NJTRANSIT's Superstorm Sandy Recovery and Resilience Program requirements. In order to maintain consistency, such requirements shall be available to the Contractor subsequent to Contract award.

Design Cost Considerations

The Consultant shall implement methods and procedures necessary to identify and incorporate cost savings into the final design.

After each interim design submission and the Final milestone, the Consultant shall be responsible for producing submittals for all design considerations that are consistent with the available budget. In the event that NJ TRANSIT determines that the expected Construction cost for any element exceeds or would potentially exceed the available budget, the Consultant shall provide at no additional cost to NJ TRANSIT:

- Alternatives to reduce the estimated construction cost, including substitution of materials or methods of construction, deletion of features, etc.;
- Other methods to mitigate the cost increases without minimizing safety or performance.

In presenting the cost control alternatives to NJ TRANSIT, the Consultant shall summarize the changes from previous submittals, including changes in quantities and prices.

The requirement that the Consultant's design be cost effective and does not exceed the Project Budget shall be demonstrated using a third party's independent estimate, thereby validating the Consultant's estimate (Third party not part of design team). The third party shall be independently selected by NJ TRANSIT.

Deliverables:
Independent Initial Cost Estimate
60% and 100% Cost Estimates

TASK 4 – RISK MANAGEMENT

The Consultant shall conduct a risk assessment and management process that shall as a minimum contain the following elements:

- **Preliminary Risk Identification** – The Consultant shall develop a preliminary list of all risks (threats or opportunities) that currently exist. The risks shall be entered into the Risk Register. The preliminary Risk Register shall be submitted to NJ TRANSIT for review.

- **Preliminary Workshop** – The Consultant and NJ TRANSIT shall meet and review the preliminary Risk Register. The Risk Register shall be refined to add or remove risks. Preliminary discussions shall include who should own the risk and possible mitigation strategies.
- **Draft Risk Register** – The draft Risk Register developed at the preliminary workshop with NJ TRANSIT shall be sent for review two (2) weeks before the Risk Workshop.
- **Risk Workshop** – A risk workshop shall be scheduled and include a facilitator supplied by the Consultants. Smaller working groups of four (4) to six (6) participants shall be established. Each working groups shall be assigned specific risks to review, evaluate, assign ownership, perform a qualitative analysis and develop mitigation strategies. Each working group shall present their risks and findings to the entire team.
- **Risk Register** – Following the meeting a composite Risk Register shall be developed that lists the risks in priority order, includes ownership and mitigation strategies.
- **Risk Management Plan** – The Consultant shall work with NJ TRANSIT to develop schedule and cost implications associated with each risk. The Risk Register shall be circulated for review and comments periodically or as requested, but updated monthly to address comments. Risk is a dynamic aspect of every project and quarterly meetings shall be held with NJ TRANSIT to update the Risk Register.

NJ TRANSIT has developed document formats and requirements for Programmatic submittals in conformance with reporting to be utilized in NJTRANSIT's Superstorm Sandy Recovery and Resilience Program. In order to maintain consistency, such requirements related to the Risk Assessment Reports and related submissions shall be available to the Contractor subsequent to Contract award.

Deliverable:
Risk Management Plan, associated meetings and workshop findings reports, updates of the Risk Register following Project Progress Meetings

TASK 5 - SYSTEM SAFETY AND SECURITY MANAGEMENT

This task requires the Consultant to include a Safety and Security Management Plan (SSMP) as an element of the Project Management Plan (PMP) submitted to NJ TRANSIT for review and approval.

The SSMP shall be prepared by the Consultant and included as part of the PMP to describe how the NJ TRANSIT-DG Project, DG components, shall address safety and

security in this major capital project from initial project planning through initiation into Project Operation and Revenue Service.

The information provided herein is provided as a baseline deliverable as well as guidance to the Consultant relative to the level of effort necessary for satisfaction of this task**.** NJ TRANSIT requires the Consultant to assist in the development of Safety and Security Management Plans (SSMPs) as part of the PMP. The SSMP must contain the 11 sections specified below.

- SECTION 1: MANAGEMENT COMMITMENT AND PHILOSOPHY. NJ TRANSIT requires the first section of the SSMP to include the following:
    - Safety and Security Policy Statement. The Consultant shall assist NJ TRANSIT in the development and execution of a signed statement, issued by NJ TRANSIT executive management, endorsing the SSMP and confirming the project's commitment to safety and security.
    - Purpose of SSMP. The Consultant shall assist NJ TRANSIT in the development of a description stating the SSMP is the document that shall guide the recipient's integration of safety and security into each phase of the project development process.
    - Applicability and Scope. The Consultant shall assist NJ TRANSIT in the development of a section categorizing the SSMP as the document for all safety and security activities that NJ TRANSIT performs during the project development process. Rail transit agencies, as defined in 49 CFR 659.5 and commuter rail agencies, must clarify that the applicability of the SSMP extends to ensuring their compliance with State oversight agency and the Federal Railroad Administration (FRA) regulations and requirements, as applicable. NJ TRANSIT must ensure that the applicability of their SSMP extends to the resolution of any restrictions to full safety and security certification, even after the Project has commenced revenue service and operations.
    - SSMP Goal. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that clarifies NJ TRANSIT's use of the SSMP to ensure that the final project commenced into revenue service and operation is safe and secure for passengers, employees, public safety personnel, and the general public.
- SECTION 2: INTEGRATION OF SAFETY AND SECURITY INTO PROJECT DEVELOPMENT PROCESS. NJ TRANSIT requires the second section of the SSMP to include the following:

- Safety and Security Activities. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the safety and security tasks that NJ TRANSIT must perform for the project through all phases. This shall include both a text description of the activities and a matrix listing these activities and their corresponding project phases.

- Procedures and Resources. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the procedures and resources that shall support performance of safety and security activities throughout the project phases, including a project budget and schedule for safety and security activities, procedures for managing safety and security contractors, procedures for coordinating safety and security activities with other recipient staff and contractors, and procedures for managing sensitive security information (SSI).

- Interface with Management. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the process and lines of communication through which NJ TRANSIT/Project staff shall communicate safety and security issues to project leadership. This shall include an organization chart. In the organization chart or supporting text, the following information shall be included: 1) identify who among the project team leadership has ultimate decision-making responsibilities for safety and security issues, 2) identify these individuals by names, titles and departments or affiliations, 3) explain how these individuals interface with other project team functions regarding safety and security issues, and 4) identify the relationships from project leadership to construction contractors and subcontractors regarding safety and security issues.

- SECTION 3: ASSIGNMENT OF SAFETY AND SECURITY RESPONSIBILITIES. NJ TRANSIT requires the third section of the SSMP to include the following items:

  - Responsibility and Authority. The Consultant shall assist NJ TRANSIT in the development of organizational requirements to perform the safety and security tasks identified in Section 2 of the SSMP. In documenting this organization, the name, title, and department/affiliation, all staff and contractors assigned to this organization shall be identified. In addition, for committees established to support this organization, each committee member shall be identified by name, with membership provided by title and affiliation. An organization chart shall also be developed and provided.

  - Committee Structure. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the organization and

responsibilities of the different committees that shall be used for the project, including the Safety and Security Review Committee; the Fire/Life Safety Committee; the Safety and Security Change Review Board; and the Safety and Security Operations Review Committee, or other comparable committees.

- Safety and Security Responsibilities Matrix. The Consultant shall assist NJ TRANSIT in the development of a description of the SSMP that identifies the responsibilities and reporting relationships established for recipient staff, committees and contractors performing the safety and security tasks in Section 2 of the SSMP. For all contractors, NJ TRANSIT will identify a NJ TRANSIT staff member or committee responsible for overseeing the contractor.

- SECTION 4: SAFETY AND SECURITY ANALYSIS. NJ TRANSIT requires the fourth section of the SSMP to include the following:

  - Approach to Safety and Security Analysis. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the Project's approach to the analysis of safety hazards and security vulnerabilities. This program shall: (1) identify known hazards and vulnerabilities, (2) categorize them as to their potential severity and probability of occurrence, (3) analyze them for potential impact, and (4) resolve them by design, engineered features, warning devices, procedures and training, or other methods. The Consultant shall assist NJ TRANSIT in the development of a description of the SSMP that identifies the level of hazards and vulnerabilities NJ TRANSIT project management finds acceptable.

  - Requirements for Safety and Security Analysis. The Consultant shall assist NJ TRANSIT in the development of a description of the SSMP that specifies the distinct types of safety and security analyses that shall be performed during the project. Examples of analyses that may be identified include Preliminary Hazard Analysis (PHA), Threat and Vulnerability Analysis (TVA), Subsystem Hazard Analysis (SSHA), System Hazard Analysis (SHA), Failure Modes and Effects Analysis (FMEA), Failure Modes, Effects and Criticality Analysis (FMECA), Fault Tree Analysis (FTA), Terrorism Risk Assessment (TRA), Software Safety and Security Analysis (SSSA), Operations and Support Hazard Analysis (O&SHA), Health Hazard Assessment (HHA) and others. The Consultant shall assist NJ TRANSIT in the development of a description of the SSMP that identifies the types of analysis to be performed for the project, who shall be performing these analyses (i.e., contractor, committee, in-house personnel, other), and when

they shall be performed during the project. The Consultant shall also assist NJ TRANSIT in developing a description of how project personnel shall communicate the results of these analyses to other members of the project team, and the process that shall be used to assure resolution of identified hazards and vulnerabilities resulting from these analyses.

- SECTION 5: DEVELOPMENT OF SAFETY AND SECURITY DESIGN CRITERIA. NJ TRANSIT requires the fifth section of the SSMP to include the following:

    - Approach to Development of Safety and Security Requirements and Design Criteria. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the project's approach to establishing safety and security requirements and design criteria. This description shall include the resources, including standards prepared by such organizations as the American Public Transportation Association (APTA), the National Fire Protection Association (NFPA), Underwriters Laboratories (UL), etc., that it shall use to develop Project safety and security requirements. This description shall also include how project personnel and contractors shall use the safety and security requirements to develop safety and security design criteria and to identify safety and security certifiable elements and items. In addition, this effort shall explain the Project approach for ensuring that safety and security requirements and design criteria are included in the process to develop final specifications and contract documents for the project. Finally, this section shall also describe how the project documents, including drawings, specifications and reports, shall be maintained in a secure manner while they are in the possession or control of the contractor(s).

    - Design Reviews. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies how the recipient shall address safety and security during design reviews to ensure that its project team incorporates the safety and security requirements into the final project design.

    - Deviations and Changes. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies procedures for ensuring that changes to safety and security design criteria are appropriately reviewed and approved by recipient personnel prior to adoption.

- SECTION 6: PROCESS FOR ENSURING QUALIFIED OPERATIONS AND MAINTENANCE PERSONNEL. NJ TRANSIT requires the sixth section of the SSMP to include the following:

- Operations and Maintenance Personnel Requirements. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the number of personnel and their specific job classifications required to operate and maintain the project in revenue service. The relevant section shall also specify the qualifications and core competencies, required by job classification, for these personnel to ensure their abilities to provide safe and secure service and to respond to emergencies. Special emphasis on the requirements for front-line personnel (i.e., operators, supervisors, station attendants, and maintenance personnel) is required.

- Plans, Rules and Procedures. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies, by name, the specific safety, security and emergency plans, rules, procedures, and manuals that the recipient shall develop or revise. This section shall also include an implementation schedule.

- Training Program. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that lists the elements of training the Project shall provide to employees, by job classification, to ensure their capabilities to provide safe and secure service and to respond effectively to emergencies. In addition, the section shall include a schedule for the development and offering of this training and for the completion of any qualifications or certifications required for Project staff. The Consultant shall also assist NJ TRANSIT in the development of a section of the SSMP that details record keeping requirements and associated implementation relative to personnel training and qualifications/certifications.

- Emergency Preparedness. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies any exercises, drills, tabletops, or other activities that shall be performed to ensure the readiness of the project. This shall include an explanation of how the Project shall assess and document the results (i.e., after action report or equivalent document).

- Public Awareness. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies programs that support NJ TRANSIT's commitment to ongoing, comprehensive public awareness, for both security awareness (such as the Transit Watch Program) and emergency preparedness (such as emergency evacuation instructions to riders).

- SECTION 7: SAFETY AND SECURITY VERIFICATION PROCESS (INCLUDING FINAL SAFETY AND SECURITY CERTIFICATION). NJ TRANSIT requires the seventh section of the SSMP to include the following:

    - Design Criteria Verification Process. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the process that shall be used to verify that the technical specifications, drawings, and contract documents for the project conform to the Project's safety and security requirements and design criteria. This shall include an explanation of the Project approach to ensure that all required inspections and tests are incorporated into project test plans.

    - Construction Specification Conformance Process. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the process that shall be used to verify that elements of the project provided under construction, procurement, and installation contracts conform to the safety and security components of the Project's technical specifications, drawings, and contract documents.

    - Testing/Inspection Verification. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the process that shall be used to verify that the as-built (or delivered) configuration contains the safety and security related requirements identified in the Project technical specifications, drawings, and contract documents. This section shall also describe related programs for contractual testing, systems integration testing, and pre-revenue operations testing.

    - Hazard and Vulnerability Resolution Verification. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the process used to verify that project personnel and contractors have appropriately identified, categorized, and resolved hazards and vulnerabilities to a level acceptable by Project management.

    - Operational Readiness Verification. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the process that shall be used to verify that project personnel and contractors developed plans, rules, procedures, manuals, and training and qualification programs, in conformance with the Project safety and security requirements. Further, this description shall also detail associated processes for ensuring the qualification and readiness of operations and maintenance personnel.

    - Safety and Security Certification Requirements. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes

the process that shall be used to deliver final certification that the project is safe and secure for passengers, employees, public safety personnel, and the general public, including the individual certificates the Project shall issue for each of the specific elements to be verified.

- SECTION 8: CONSTRUCTION SAFETY AND SECURITY. NJ TRANSIT requires the eighth section of the SSMP to include the following:

    - Construction Safety and Security Program Elements. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the Project's program for construction safety and security. This shall include requirements for contractors, including the plans and reports the contractor must submit to the NJ TRANSIT. The description shall also detail the activities the Project shall perform to track and manage contractor construction safety and security programs and plans.

    - Construction Phase Hazard and Vulnerability Analysis. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes the Project's requirements for safety and security analysis at construction sites. This shall include a description of the Project approach for identifying and mitigating hazards or threats unique to the construction phase.

    - Safety and Security Incentives. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that describes (as applicable) any incentives the Project may provide for the construction safety and security program.

- SECTION 9: REQUIREMENTS FOR 49 CFR PART 659, RAIL FIXED GUIDEWAY SYSTEMS; STATE SAFETY OVERSIGHT. NJ TRANSIT requires the ninth section of the SSMP to describe activities the recipient shall perform to coordinate with its State safety oversight agency throughout the project development process. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the specific State safety oversight agency requirements applicable to the Project and the activities necessary to address these requirements and coordinate with the NJ State safety oversight agencie(s). This shall include (as applicable) a schedule for the activities necessary to ensure compliance with State safety oversight agency requirements.

- SECTION 10: FRA COORDINATION. NJ TRANSIT requires the tenth section of the SSMP only for those recipients that propose to share track with one or more FRA-regulated railroads or that shall operate on the general railroad system. The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies activities necessary to comply with FRA regulations and provide a

schedule for the performance of these activities as applicable. This shall also include a description of the process for updating existing System Safety Program Plan(s) and submitting same to FRA for review and approval. The System Safety Program Plan shall conform to the American Public Transportation Association (APTA) "Guidelines for the Development of Commuter Rail System Safety Program Plans." In addition, the Consultant shall assist NJ TRANSIT in the compilation and submission of plans for the completion of a collision/derailment hazard analysis that conform to the hazard management process in the approved SSPP or the "Draft FRA Guide to Collision/ Derailment Hazard Analysis" for FRA review and approval as necessary.

- SECTION 11: DHS COORDINATION. NJ TRANSIT requires the eleventh section of the SSMP to address how the project shall meet Department of Homeland Security (DHS) requirements, including the applicable security directives issued by the Transportation Security Administration (TSA) and other programs managed by the Office of Grants and Training (OGT). The Consultant shall assist NJ TRANSIT in the development of a section of the SSMP that identifies the related compliance activities the Project shall perform and provide an implementation schedule. Any concerns regarding the potential for conflict between DHS/TSA/OGT and FTA/PMOCs, should be documented in this section.

Deliverable: SAFETY AND SECURITY MANAGEMENT PLAN as detailed above

TASK 6 – PUBLIC INVOLVEMENT AND AGENCY COORDINATION

Objective:

Assist NJ TRANSIT in targeted outreach efforts to seek input from relevant stakeholders, including the North Jersey Transportation Planning Authority, other regional planning and transportation organizations, municipalities and local government units, electric distribution companies, and other entities as necessary and appropriate.

The objective of this task is to support NJ TRANSIT's efforts regarding public information, stakeholder outreach and agency coordination. The Consultant shall provide assistance and technical support necessary for activities that shall focus upon dissemination of engineering detail status to interested parties including, but not limited to, preparation of graphics such as maps, schematics, physical design and layout sketches, written handouts, Power Point presentations, brochures, videos, and draft progress engineering/design packages and subsets thereof, etc. A second objective is to assist NJ TRANSIT's efforts to fulfill State and Federal regulatory requirements for public and/or agency participation where necessary and applicable. NJ TRANSIT shall lead targeted outreach efforts to seek input from relevant stakeholders, including the Federal and State Regulatory agencies, North Jersey Transportation Planning Authority, other regional planning and transportation organizations, municipalities and local government units, electric

distribution companies, and other entities as necessary and appropriate. As noted elsewhere in this RFP, the Consultant shall not communicate directly with any potential Agency or stakeholder unless otherwise directed by NJ TRANSIT. All such communications shall be solely through NJ TRANSIT.

Subtask 6.1 - Open Houses and Meetings

If needed, open houses shall be designed to encourage one-on-one discussions between the project staff and members of the public, rather than a large group discussion. Upon the direction of NJ TRANSIT, open houses may be held during milestone points in the engineering/design process. The Consultant shall determine the need for translators or special accommodations at open houses. Facilities selected to host open houses must be accessible to persons with disabilities.

When required by NJ TRANSIT, the Consultant shall assist in presentations to Federal, municipal, county and State representatives and other interested parties. All public outreach activities, including meetings or hearings with local, county and citizen groups shall be initiated and coordinated through NJ TRANSIT. The Consultant shall prepare graphics such as maps, schematics, physical design and layout sketches, written handouts, etc. for assistance and technical support when necessary for these activities as directed by NJ TRANSIT. The Consultant shall attend meetings and events, assisting NJ TRANSIT in accordance with a community information program as directed by NJ TRANSIT. The Consultant should anticipate a minimum of 10 meetings. Meetings with municipalities or private persons shall occur as needed as the work progresses.

TASK 7 - INTEGRATION AND INTERFACE

The Consultant shall be responsible for implementing an interface and integration process within its overall design process. This shall ensure that individual design elements of the Project interface properly among themselves, existing NJ TRANSIT facilities and infrastructure as applicable, and the NJ TRANSIT Corporate-wide SANDY Recovery and Resiliency Plan. As such, the Consultant shall also coordinate its activities as required with other consultants as well as governmental agencies, individuals and other entities that may be impacted by the Project through NJ TRANSIT.

The Consultant shall prepare and submit to NJ TRANSIT for its approval an Integration Management Plan (IMP). The IMP shall establish and maintain a comprehensive, systematic, documented, verifiable and continuous integration process throughout the duration of the Project in order to achieve NJ TRANSIT's objective as stated herein. At a minimum, the Consultant's interface and integration effort shall:

- Follow the Work Breakdown Structure (WBS) adopted for the Project, and allow capability for future WBS level expansion.
- Provide an integration design document that systematically identifies and formally documents all interfaces and establishes a process for addressing each interface.
- Define methods to confirm interface compatibility and demonstrate said compatibility through tests or other accepted verification methods.
- Coordinate all civil infrastructure, utility, electrical and mechanical interfaces to ensure that they are compatible with other applicable Project Area design elements.
- Allow NJ TRANSIT to independently assess the effectiveness of, and audit, the Consultant's integration process.

The Consultant shall develop and maintain an Interface Database that lists all physical elements and other interfaces it shall encounter on the Project. Data fields/tables to be included in the database shall include such items as:

- Type of interface with relevant characteristics
- Purpose of the interface
- Status
- Relevant safety standard, if any
- Primary responsibility for defining the interface
- Open issues /conflicts

The Interface Database shall be an integrated part of the Records Management System.

Approval of the Integration Management Plan by NJ TRANSIT shall not imply in any way that the Plan and Report shall be sufficient to enable the Consultant to meet its obligations under the Contract or that they meet requirements of the Contract.

Upon approval of the IMP, the Consultant shall prepare and submit an Interface Control Report that addresses all identified interfaces during design. At any time during the performance of the Contract, NJ TRANSIT may require the Consultant to modify or revise the Plan as NJ TRANSIT deems necessary.

It is the Consultant's responsibility to successfully achieve the interface and integration of the individual design elements of the Project as well with the design elements of other connected or impacted projects. Successful interface and integration shall have been achieved when the Consultant demonstrates that its design shall allow for progress beyond the preliminary engineering phase without the need for re-engineering or re-design of the individual design elements due to failure to identify or properly address required design interfaces.

Lastly, for all elements of PE design, the Consultant shall always take into consideration the operations and maintenance requirements developed by the consultant and approved by NJ TRANSIT for the Project, and ensure that design criteria does not conflict with O&M requirements for all facets of the completed Project.

Deliverables:
Integration Management Plan – draft and final
Interface Control Document (ICD)
Interface Database
Integration Report for Amtrak Sub-41

TASK 8 - CONSTRUCTABILITY REVIEWS

The Consultant shall participate in formal constructability reviews at the 60% and prior to 100% stages of Design, evaluating issues that affect the construction, adjacent properties and the public. The Consultant shall follow Construction Industry Institute (CII) guidelines, which defines constructability as "the optimum use of construction knowledge and experience in planning, design, procurement and field operations to achieve the overall project objectives." The Consultant shall provide experienced construction personnel to be involved with the project from the earliest stages to ensure that the construction focus and their experience are properly communicated to the project's planners and engineers. Constructability shall be used as a design consideration, by factoring in cost and schedule effectiveness.

Examples of project issues to be considered include:

- Ground Water Control and Containment – evaluation of containment systems, impact on adjacent structures, recharging the water table, construction of groundwater cut-off systems, dewatering needs which shall include provisions for construction monitoring and requirements for drawdown.
- Utilities – evaluate relocations and restorations as needed; minimize large magnitude relocations.
- Maintenance and Protection of Vehicular and Pedestrian Traffic
- Environmental Issues – sensitive areas, hazardous materials, high impact mitigations, compliance with conditions of permits and approvals, etc.
- Materials Handling and Disposal / Spoils Disposal
- Construction Equipment Clearance
- Underpinning of existing facilities/building as applicable.
- Temporary Support Structures - lateral support for excavations, design of proposed support systems, limits of such systems, easement takings, etc.
- Staging of work elements.

- Improvement of a Contractor's productivities.
- Temporary / construction power and other utility requirements.
- Signal, communication and electric traction modifications.

NJ TRANSIT may direct the Consultant or third parties to lead this exercise.

Deliverable:
Document findings of constructability reviews in a report to NJ TRANSIT.

TASK 9 - CONTRACT PACKAGING

The Consultant shall assess the various components, potential sub-projects, early action activities, constraints, and construction approaches and develop recommendations for contract packaging and procurement strategies that would produce the best overall value to NJ TRANSIT. The Consultant shall determine factors such as the size and types of contracts, project delivery approaches, and mitigation of constraints brought on by long-lead items. The Consultant shall advise NJ TRANSIT as to the efficacy of procurement methods such as "EPC", etc. and how they might be applied to the DG component phase of the NJ TRANSIT-DG Project. The Consultant shall consider and report on the benefits and drawbacks of each recommended approach, such as increased cost, level of risk, integration issues, and funding stream.

Deliverables:
Contract Packaging and Procurement Strategies' Plan

TASK 10 - PREPARATION AND SUBSEQUENT SUPPORT OF CONTRACT BID DOCUMENTS AND BIDDING PROCESS

The Consultant shall prepare documentation necessary for the procurement of the construction, commissioning, operation, and/or maintenance services to support operation of the Newark Penn Station component of the Distributed Generation services, in accordance with Federal, New Jersey State and NJ TRANSIT regulations, standards and requirements as applicable. In addition, the Consultant shall provide administrative and technical support to NJ TRANSIT in the solicitation, review and award of a successful bid.

The Consultant shall assist NJ TRANSIT in the preparation of bid documents, including the necessary bidding information, bidding forms and Special Provisions of the contract.

The Consultant shall assist in answering RFI's, producing Addenda, and preparation of Conformed Bid documents.

It is likely that any bid process shall involve at least a two-step process and the consultant shall assist NJ TRANSIT in the evaluation of bidders technical and cost proposals

TASK 11 – AS DIRECTED BY NJ TRANSIT

Whenever the Contract Item "As Directed Cost by NJ TRANSIT" appears in the Proposal, NJ TRANSIT has provided an allowance for additional or Supplemental Design and Engineering Consultant Services not specifically designated and defined in this RFP. Such an allowance is provided for NJ TRANSIT to augment design and engineering efforts as necessary. This allowance is provided for the sole convenience of NJ TRANSIT and can only be used for work authorized by NJ TRANSIT's Contracting Officer.

All additional or supplemental tasks authorized under this provision shall be issued by Directive Letter and periodically incorporated into the Contract by Change Order pursuant to Article 5-Modification of Agreement. The Change Order shall describe the additional or supplemental task(s) with any associated cost changes and shall reduce the as directed Cost allowance in the amount specified in the Change Order.

NJ TRANSIT anticipates an As Directed Contract Value equivalent to the cost associated with Resource Loading as detailed in the table below, "Estimated Effort Hours By Task and Job Classification".

		Estimated Effort Hours By Task and Job Classification										
Task	**Task Description**	Principal/ Director	Project Manager	Senior Engineer	Staff Engineer Rail	Staff Engineer Power	Engineer	GIS/CADD Technician	Database Manager	Clerical	**Non-DBE Subconsultants**	**DBE Subconsultants**
Task 15	– As Directed by NJ TRANSIT	0	40	50	0	0	25	50	50	50	0	0

ATTACHMENT D
SANDIA Cyber Security Report

New Jersey Transit Grid Distributed Generation Program

Cybersecurity Design Assurance Assessment

Benjamin Anderson, William Atkins, Jay Johnson, Timothy Ortiz, Steve Scott, Russell Shiplet
Sandia National Laboratories

Working Group Review Draft

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Issued by Sandia National Laboratories, operated for the United States Department of Energy by National Technology & Engineering Solutions of Sandia, LLC.

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ABSTRACT

Superstorm Sandy caused a major disruption to passenger-rail and other commuter systems throughout New York and New Jersey. To address this issue, New Jersey Transit (NJT) established the NJ TRANSITGRID project, an effort designed to power bus, ferry, and limited passenger-rail service during natural or man-made disasters. Given the importance of these transportation systems, NJT partnered with Sandia National Laboratories (Sandia) to assess the cyber-resilience of the information systems that monitor and control the electrical systems within the microgrid. The Sandia "tabletop" assessment is based on the most recent 20% design packages. From this assessment, the Sandia team identified several security areas that were undefined or did not implement industry best practices. Finally, the Sandia team presented possible follow-on assessment activities and recommended investigating multiple hardening technologies. Addressing these findings and adding state-of-the-art detection and mitigation technologies will help ensure the NJ TRANSITGRID is built with more comprehensive cyber-resilience features.

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EXECUTIVE SUMMARY

Sandia National Laboratories assessed cyber-resilience microgrid technologies within the $570M NJ TRANSITGRID project, designed to power bus, ferry, and limited passenger-rail service within and adjacent to Northeast corridor rail operations between New York City and NJ during natural or man-made disasters, e.g., a future Superstorm Sandy. The NJ TRANSITGRID project consists of seven discrete Distributed Generation Facilities (DGF) in addition to the Microgrid Central Facility (MCF) that will support New Jersey Transit (NJT) and Amtrak train operations, the associated Newark Penn, Secaucus Junction, Newark Broad facilities, three bus garages, and the Port Imperial Ferry Terminal—which are used by more than 100,000 commuters daily. The MCF – the largest project component – consists of a 600 kW PV site, energy storage flywheels, and five gensets that will operate NJT and Amtrak rail lines on a limited basis. Consistent with Governor Murphy's Energy Master Plan and Clean Energy Goals, NJ TRANSIT has re-imagined this project to increase the project's renewables and zero-emissions profile. This is part of NJ TRANSIT's effort to challenge the global design community to increase planned investment in solar, storage, and other green technologies to power our system with reliable and sustainable power. As of early 2021, NJT has a 20% design of the electrical system but the security plan is not fully detailed.

This report summarizes the Sandia cybersecurity design assurance assessment performed on the 20% design packages for the NJ TRANSITGRID systems that were submitted to NJT by Jacobs Engineering and AECOM. This assessment was focused on the cybersecurity of the components (generator sets, switch gear, monitoring systems, etc.), systems (HMIs, workstations, etc.), and the various types of networks connecting these devices (SCADA, TCP/IP, etc.). However, the team also examined other aspects of the system that could directly impact cybersecurity – such as the physical security systems protecting the various components.

The design documentation provided by NJT related to the NJ TRANSITGRID project incorporated several security features and best practices that will help ensure the security and resiliency of the microgrid. However, since the system is early in the design phase, the Sandia team identified several potential vulnerabilities and areas that have not yet been defined and will need to be developed in accordance with industry best practices.

While the team recommends that all the findings listed in this report be reviewed and, if possible, mitigated, the team recommends that a review of the network architecture be prioritized. This includes examining the design for inconsistencies in security features such as having an air gap and utilizing data diodes, but then relying on external providers or services such as cellular connections. In addition to this review, the team recommends establishing a formal review process for any modifications in the network architecture that may impact assumptions or introduce inconsistencies.

The Sandia team would like to thank the personnel from NJT, Jacobs Engineering, and AECOM for their assistance with this assessment. Their cooperation and knowledge of the NJ TRANSITGRID project contributed greatly to the success of this effort.

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ACRONYMS AND DEFINITIONS

Abbreviation	Definition
ATS	NJ TRANSITGRID Distributed Generation Program Final Design, Construction and Commission Technical Specification
CASA	Cooperative Adversarial Security Assessment
CRADA	Cooperative Research and Development Agreement
DCM	Design Criteria Manual
HMI	Human Machine Interface
IAFC	Section 255000 – Integrated Automation Facility Controls
IDART	Information Design Assurance Red Team
IPSEC	Internet Protocol Security
ISSS	Integrated Site Security System
JEDP	Jacobs Engineering 20% Design Package
LAN	Local Area Network
MCF	Microgrid Central Facility
NJT	New Jersey Transit
PCS	Process Control System
PJM	PJM Interconnection LLC
PV	Photovoltaic (Solar Power)
SCADA	Supervisor Control and Data Acquisition
SDN	Software Defined Networking
SNL	Sandia National Laboratories
VLAN	Virtual Local Area Network
WAN	Wide Area Network

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1. INTRODUCTION

This section provides the background and the scope for the assessment, and the layout for the rest of the report.

1.1. Background

Superstorm Sandy caused a major disruption to critical infrastructure – including passenger-rail and other commuter systems - throughout New York and New Jersey. To address this issue, New Jersey Transit (NJT) established the NJ TRANSITGRID project, a $570 million effort designed to power bus, ferry, and limited passenger-rail service within and adjacent to Northeast corridor rail operations between New York City and Newark during natural or man-made disasters, e.g., a future Superstorm Sandy. Given the critical importance of these transportation systems to the region's people and economy, NJT partnered with Sandia National Laboratories (Sandia) to assess the cyber-resilience of the microgrid technologies integrated into this project.

1.2. Scope

This assessment was focused on the security of the information systems – both analog and digital – that monitor and control the electrical systems described in the provided Jacobs Engineering and AECOM design documentation. However, the reliability, performance or capability of the proposed electrical systems – and the ability of the systems to meet the estimated power demand – was not considered. The systems were also not evaluated against other project objectives such as ensuring the site is raised to the FEMA 500-year flood elevation.

Physical security of the system was examined, but only as it related to preventing physical access to the electrical systems (generators, switch gear, etc.) and the monitoring and control systems (workstations, laptops, network equipment, cabling, etc.). The specific characteristics of these physical security components were not evaluated, but that physical security access controls that NJT considers sufficient were included in the design. For example, the team did not consider the resiliency of a specific type of door or lock to physical attacks, but would consider the presence of a locked door sufficient to secure an area to NJT standards.

Since the system is still in the early stages of design, policies and procedures related to the operation, maintenance, and physical security systems were not evaluated. However, the team identified several areas – such as defining which personnel (engineers, custodial staff, facility workers, etc.) would have authorized access to those areas – and included those in Section 0 as recommendations for future development.

1.3. Report Organization

The rest of this report is organized as follows: Section 2 provides an overview of the NJ TRANSITGRID project. Sections 3 and 4 describe the assessment methodology used by the Cooperative Adversarial Security Assessment (CASA) team and the team's assessment activities. The assessment results and the team's recommended mitigations are found in Section 5. Section 6 contains the conclusions of the Sandia team and recommended follow-on activities. Technologies that could be incorporated into the NJ TRANSITGRID to enhance its cybersecurity and resilience are included in Section 7.

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2. SYSTEM OVERVIEW

The NJ TRANSITGRID project is designed to allow NJT to continue operations in the event of a major power outage such as that caused by Superstorm Sandy. To allow continuity of operations in the event of another outage of this scale, the NJ TRANSITGRID project was developed to allow uninterrupted train service to the New Jersey and New York area.

The NJ TRANSITGRID project encompasses a variety of equipment and capabilities to be installed at a number of facilities with two main logical components – the Microgrid Central Facility (MCF) and the seven interconnected NJ TRANSITGRID Facilities. While all of these components are interconnected and together form a microgrid that can operate independently if grid power is lost, these two logical components have fundamentally different roles.

2.1. Microgrid Central Facility

The Microgrid Central Facility (MCF) will be located in Kearny, NJ and is being designed to provide up to 140 MW of power through a combination of generation technologies. All selected employed technologies must provide resilient power generation that would not be impacted by another event such as Superstorm Sandy. The MCF will provide power for rail operations while the Distributed Generation components will power the seven facilities discussed in Section 2.2.

In the event that grid power is lost, the MCF and participating facilities will disconnect from the grid (island) where they will use a combination of power generation at their location and power from the MCF to maintain operations. This will include establishing the necessary command and control systems to operate the microgrid when it is in island mode.

A central control room which will allow for monitoring, alarm response, and control of the microgrid will be established, and is expected to be located at the MCF. This will be manned 24/7 and will be equipped with the various workstations and displays to monitor and control the MCF, the distribution system, facilities, and other components that will make up the microgrid.

Various equipment – generators, switch gear, etc. – will have a local human-machine interface (HMI) available to engineering and maintenance personnel, as well as a remote user interface that can be accessed from the control room. The communication network for this will be a dedicated and redundant Ethernet ring loop using copper or fiber cabling. The design documentation also lays out a defense-in-depth strategy using industry best practices to protect the network, network devices, and other systems from a cyber attack.

There is some contradictory information in the design documentation related to the external connectivity of this network. In some areas, it called for an air-gapped network with dedicated fiber optic cables and data diodes. However, there are other areas that discuss cellular connections, connections to the internet, or the requirement for software to use online activation. (This has been called out as an area to be addressed in Section 0.)

The MCF will include an Integrated Site Security System (ISSS) which shall be a "stand-alone industrial grade system, separate from the CPP Plant Control System."[1] The ISSS will incorporate cybersecurity best practices similar to those of the NJ TRANSITGRID network. The ISSS design includes

[1] *NJ TRANSIT TRANSITGRID Phase II NJ TRANSIT Design Criteria Manual;* 09/10/2018

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descriptions of fencing, gates, and other physical protection systems including video surveillance systems. The ISSS design also calls for card readers to access the MCF and other areas – but the kind of card readers to be used has not yet been determined.

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2.2. NJ TRANSITGRID Facilities

There are seven facilities that will be part of the NJ TRANSITGRID project. These facilities are:

- Newark Penn Station
- Broad Street Station
- Secaucus Station
- Wayne Bus Garage
- Meadowlands Bus Garage
- Greenville Bus Garage
- Port Imperial Ferry Terminal

These facilities will have their own power generation and storage systems – with auxiliary power generation, including PV systems where practical. Storage (where contemplated) will be primarily chemical battery systems, but a flywheel energy storage system capable of operating as an uninterruptible power supply will be included at the Wayne Bus Garage.

2.2.1. Facility Descriptions

Newark Penn Station

Located in Newark, NJ this is a four-story building with more than 217,000 square feet of space for waiting rooms, offices, platforms, etc. This facility hosts a number of rail and bus operators. This facility operates on a 24/7/365 schedule. By the number of passengers using a facility, this is the busiest of the facilities in the NJ TRANSITGRID project.

Broad Street Station

Also located in Newark, NJ this is a two-story building with 65,000 square feet of space for offices, retail spaces, and island platforms for passenger waiting and entry. This facility hosts both commuter rail and light rail. The commuter rail operates on a 24/7/365 schedule, while the light rail runs from 5:00 a.m. to midnight daily.

Secaucus Station

Located in Secaucus, NJ this is a three-story building with approximately 321,000 square feet of space for waiting rooms, retail spaces, offices, and utility rooms. This facility hosts both passenger rail and bus operations. The facility operates on a 24/7/365 schedule.

Wayne Bus Garage

Located in Wayne, NJ this is a single-story building with approximately 197,000 square feet of space for offices, maintenance/refueling/storage spaces, and utility rooms. This facility operates on a 24/7/365 schedule. Approximately 100 full-time staff and 300 drivers are employed at this facility.

Meadowlands Bus Garage

Located in Secaucus, NJ this is a single-story building with more than 266,000 square feet of space for offices, maintenance/refueling/storage spaces, and utility rooms. This facility operates on a 24/7/365 schedule. Approximately 100 full-time staff and 300 drivers are employed at this facility.

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Greenville Bus Garage

Located in Jersey City, NJ this is a two-story building with approximately 85,000 square feet of space for offices, maintenance/refueling/storage spaces, and locker rooms. This facility also includes a separate parking lot (across the street) large enough to park 25-30 buses. This facility operates on a 24/7/365 schedule.

Port Imperial Ferry Terminal

Located in Weehawken, NJ this is a multi-modal station supporting ferry, light rail, and bus services. This facility operates 16 hours per day; with the passenger parking area open 24/7.

2.2.2. Facility System Characteristics

The requirements for the various facilities include that the generator controls shall be microprocessor based, and "provide automatic starting, monitoring, protection, and control functions for the unit."[2] The design also calls for appropriate displays so monitoring and control can be readily done by appropriate personnel. The design also calls for physical protections of this equipment (padlocking).

There will be two methods for conducting the monitoring and control operations: An HMI touchscreen interface and a remote workstation. The HMI will be co-located with the equipment to allow for local operation. However, the system will also include the necessary network infrastructure to allow a remote workstation to monitor and control the critical components of the system such as controlling breakers, switch gear, and operating the generators themselves. Security will include monitoring settings for any changes and requiring an appropriate password to make those changes. Support for two password-protected security levels is required.

To support remote operations, the system will have a supervisory control and data acquisition (SCADA) network, and interface with a standard IT network. Specifically, the design documentation calls for the Ethernet Modbus TCP/IP protocol for all critical plant control data. In addition, the documentation calls for "redundant, distributed systems to maximize system reliability and fault tolerance."[3] The design documentation calls for a dedicated network, however it also calls for integration with the building management system. (This contradiction has been called out as an area to be addressed in Section 0.)

The system design also calls for automatically maintaining the engine generators at 50-60% loaded by starting or stopping generators as necessary. However, this feature will be controllable by appropriate personnel.

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[2] *NJ TRANSITGRID Distributed Generation Program Final Design, Construction and Commision Technical Specification, IFB No. 19-033X* (ATS)
[3] Ibid

3. METHODOLOGY

The base methodology used by the Sandia team for this assessment was the Information Design Assurance Red Team (IDART™) Methodology developed and maintained by Sandia National Laboratories. Since the system is currently at the 20% design stage, this methodology was selected for its flexibility and its primary focus of design assurance. This methodology is described below.

3.1. The IDART Methodology

The IDART Methodology was developed and refined by Sandia National Laboratories (Sandia) over a period of 15 years as Sandia assessors performed a variety of adversary-based security assessments. This methodology is intentionally designed to be adaptable, agile, and repeatable so as to apply broadly to any target system (i.e., system under assessment). The IDART Methodology has five primary phases: Planning, Data Collection, Characterization, Analysis, and Reporting. These phases are described in Sections 3.1.1 through 3.1.6 and are shown visually in Figure 1. Note that the Data Collection, Characterization, and Analysis phases are performed iteratively as long as the schedule and budget for the assessment support those phases.

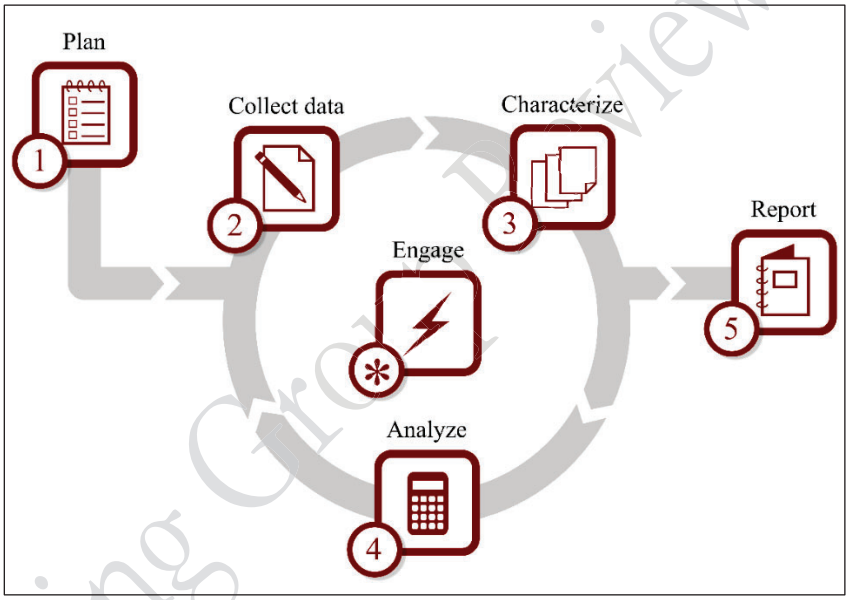


Figure 1: The IDART Methodology

3.1.1. Planning

The Planning phase of the IDART Methodology begins when a potential customer initially contacts the red team with a request for services. In this phase, the potential customer and the red team contact(s) discuss details of the work to be performed, determine an appropriate funding amount, develop a statement of work and execution plan, satisfy legal requirements, assemble a team of assessors and other resources for the project, and finalize project logistics (travel, deadlines, milestones, equipment purchases, classification/sensitivity, rules of engagement, non-disclosure agreements, etc.).

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3.1.2. Data Collection

Once the project logistics are solidified in the Planning phase, the red team begins executing the Data Collection phase. During this phase, the red team engages with the customer and performs open-source (and closed-source, if the project allows) collections to amass as many details as possible about the target system, its operating environment, and its mission. As with all of the other phases of the IDART Methodology, the duration of the Data Collection phase is dependent upon the project schedule and funding level. As the assessors execute this phase, they form a solid grasp of the mission and the target system to provide for the customer. From this, the assessors can use their adversary emulation skills to derive possible attacker motivations and establish which sets of attackers would have an interest in the target system, what skills and capabilities such attackers would likely bring to bear against the target system, and what ultimate goals such attackers would hope to achieve when attempting to defeat the security protections of the target system.

3.1.3. Characterization

As the sizable quantity of data gathered in the Data Collection phase presents a steep learning curve and often contains unnecessary details to the red team, the Characterization phase aims to condense this data repository into a set of manageable, abbreviated artifacts that highlight critical aspects of the target system. These artifacts may take on many different forms based on the target system mission, possible attacker motivations/goals, and constraints on the project itself. Most often, however, the Characterization phase results in a set of "views" – concept graphics that highlight critical design, implementation, and/or operational aspects of the target system – that clearly depict how the target system actually functions (as opposed to how it is advertised or believed to function). Using these views, red team assessors can derive possible attacker opportunities. These views are also useful to arrive at "ground truth," as they are easily presentable to the customer and third parties to resolve conflicts in data gathered during the Data Collection phase.

3.1.4. Analysis

In the Analysis phase of the IDART Methodology, the red team project members use their collective expertise to discover viable attack paths that hypothetical attackers could take to achieve their goals in disrupting the mission of the target system. Furthermore, based on the mission of the target system, the red team can reach out across the entirety of their organization's technical staff to supplement their expertise with that of other experts that may deeply understand aspects of the target system that are unique or uncommon. At the conclusion of this phase for a typical red team project, an attack graph–a graph that guides its reader through the necessary steps an attacker would need to successfully execute to achieve a specific goal based on a specific starting state–and other analysis products are developed and, to some degree, vetted. These outputs are of tremendous use when developing mitigations, as the analysis identifies which attacks are easiest (and hence executable by a large number of potential attackers) and present the "lowest hanging fruit" to adversaries' intent on exploiting or attacking the target system.

3.1.5. Engagements

Whenever the red team must interact with the people, processes, or technologies that comprise the target system, this constitutes an engagement. Engagements can occur at any time during the Data Collection, Characterization, or Analysis phases of the project. For example, if a member of the red team were to contact a system administrator (either overtly or under the guise of cover) to ask a question about the security properties of the target system, an engagement supporting data collection

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would have occurred. Similarly, if an experiment or test were conducted against the target system, the results of such an engagement may support either data collection or analysis, depending on the type of test/experiment.

3.1.6. Reporting

The final phase of the IDART Methodology, Reporting, results in a project report and other deliverables that are tailored for and delivered to the customer. Often, the final project report includes or references all of the documents obtained or generated during the previous phases. Because it is common for a very large set of data to result from executing the Data Collection phase, supplements to the final report are often also delivered to the customer in electronic form to facilitate future security assessments. At the conclusion of the Reporting phase, the project is closed out, with the red team lead and their customer counterparts working intimately to ensure that all tasks in the statement of work were executed and all deliverables were received by the customer.

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4. ASSESSMENT ACTIVITIES

The following high-level activities were performed by the assessment team. The observations and findings made during these activities are discussed in Section 0.

4.1. Jacobs Engineering Documentation Review

The CASA team reviewed the Jacobs Engineering 20% Design Package (JEDP) provided by NJT, which included their *Design Criteria Manual* (DCM), and *Section 255000 – Integrated Automation Facility Controls* (IAFC). In particular, the IAFC contained a specific section on Cyber Security that provided a description of their security strategy. These design documents were focused on the Microgrid Central Facility (MCF) and its interconnections with PJM and the NJ TRANSITGRID substations, transmission lines, and distribution infrastructure.

Review of these documents (and others in the JEDP) led to a number of follow-on questions that were provided to Jacobs Engineering. These questions were discussed on a number of teleconferences held with Sandia, NJT, Jacobs Engineering, and AECOM personnel. From these discussions, areas of concern were identified – along with multiple areas that meet or exceed industry best practice. These results are found in Section 0. In addition, many areas that were beyond the 20% design stage were identified, and the assessment team was able to provide input to Jacobs Engineering to ensure those areas were included, and followed best practices, when developed later in the lifecycle.

4.2. AECOM Documentation Review

The CASA team also reviewed the 20% Design Package from AECOM provided by NJT, which included the NJ TRANSITGRID Distributed Generation Program Final Design, Construction and Commission Technical Specification, IFB No. 19-033X (ATS). This document focused on the infrastructure for the various facilities that will be supported by the NJ TRANSITGRID project. While a number of information systems related to command and control were discussed in the documentation, further discussions with AECOM indicated that the specifics of their cybersecurity approach would be developed later in the system lifecycle.

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5. ASSESSMENT RESULTS AND RECOMMENDATIONS

Results obtained from the activities described in Section 0 are provided in this section. These findings include strengths, weaknesses, and observations made by the team.

The team uses the following definitions for strengths, weaknesses, and observations:

- Strengths are the processes, procedures, or other aspects of the system that increase the difficulty of a successful attack, or limit/remove various attack vectors. These are included to ensure that these practices are continued as the systems evolves over time and are not disabled or discontinued as part of mitigation plans.
- Weaknesses are the procedures, controls, implementation details, or vulnerabilities that could provide an attack vector, contribute to successful attacks using other vectors, or prevent the timely detection of an attack. These enumerate the potential risks and vulnerabilities of the target system to enable corrective actions by the system owner.
- Observations include all other items of note observed by the assessment team that are not classified as strengths or weaknesses. These can include items outside the scope of the assessment, where not enough information was available to make that determination or are "non-actionable" items. Non-actionable items may be weaknesses that cannot be changed or modified due to external requirements such as laws or regulations.

In addition, weaknesses include a severity rating of HIGH, MODERATE, and LOW to represent the team's evaluation of the overall severity of that specific weakness. To perform this evaluation, the team begins by weighing the answers to the following questions:

- What level of damage could be expected from a successful attack?
- How widespread is the damage from the attack? (Single user/system, single facility, Domain-wide, etc.)
- How easy is it to reproduce the attack and result?
- What skill level is required to perform the attack?
- How difficult is it to detect the attack given current implemented protections?

However, the assessment team goes beyond these basic questions to apply a variety of additional rating systems that are based on any adversaries of concern; consequences of concern; adversary motivations and capabilities; potential for alternative attack targets that could achieve the same goal; and other reality filters that are informed by their experience and threat intelligence.

The outputs of these various rating systems are combined by the team members and relevant subject matter experts in a qualitative process to obtain the overall rating. The assessment team recommends that NJT primarily focus on mitigating issues in the order of severity. However, since implementing mitigations may require different levels of resources, these ratings should be used as a guide and not dictate mitigating actions.

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5.1. Weaknesses

(High) Network architecture documentation is inconsistent regarding air gaps, possible use of data diodes, and use of external connections and services.

Justification: In Section 15.1 of the NJ TRANSITGRID Phase II: Design Criteria Manual, the document states: *This network shall not be connected to the Internet and no Cloud services are allowed – an air gap shall be maintained; communications to remote facilities shall be via dedicated fiber optic cables with data diode (one way communications) and/or firewalls for cyber security protection.*

However, in Section 1.3, Item B of the IAFC, it states: "The Plant Control System's Electrical Distribution can be controlled and monitored by a separate Supervisory Control and Data Acquisition (SCADA) System" and lists multiple facilities that will require bidirectional communication, preventing the use of data diodes. In addition, Item J in the same Section indicates that control room workstations will be able to *download software programs*. Section 2.2, Item D of the same document states: "The system shall integrate with components of each sub-system, sub-system to sub-system, control network to data network (LAN/WAN and intranet/internet), and third-party interfaces in a manner transparent to the operator." This seems to indicate that there will be external connectivity to the internet.

In addition, Section 2.5, Item I, bullet #10 states: "System must be able to function through periods of no internet access, no land line telephones service, and no cellular reception" which also indicates external connections into the network.

Finally, Item D, bullet #10 requires the firewall/security gateway to: "Configure VPN to restrict unauthorized access from the Internet", which implies that VPN access from the Internet will be possible.

These seemingly inconsistent requirements or statements may result in the assumption that some parts of the network are protected by an air gap or other architectural features when an external connection or configuration in another system or facility has compromised this protection.

Mitigations: To avoid potential vulnerabilities or unknown side effects from network configurations, it is recommended that a network diagram specifically illustrating the required directionality of the traffic (i.e., can a data diode be used), and color coded to indicate if a connection is using external resources such as a VPN, leased line, or cellular connection; or if it is going over dedicated network connections such as copper or fiber cabling. This diagram should then be reviewed by network architects to determine if vulnerabilities have been introduced.

In addition, the team recommends having a change process for the network architecture that specifically reviews proposed changes for the potential to change network connectivity or security assumptions. For example, changing copper cabling to fiber would not impact these assumptions; however, changing from dedicated fiber to a leased T1 line would introduce an external connection via the leased line provider.

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(Moderate) The password protection for NJ TRANSITGRID Facility HMIs only requires support for numeric passwords instead of a full character set.

Justification: Item 10 in Section 2.15 HMI SCREEN LISTING, in the ATS document states: "Password entry screen that shall contain a numeric keypad for password entry" However, in *Section 5.1.1.1 Memorized Secret Authenticators in NIST Publication 800-63B, it states:*

> *Memorized secrets SHALL be at least 8 characters in length if chosen by the subscriber. Memorized secrets chosen randomly by the CSP or verifier SHALL be at least 6 characters in length and MAY be entirely numeric. If the CSP or verifier disallows a chosen memorized secret based on its appearance on a blacklist of compromised values, the subscriber SHALL be required to choose a different memorized secret. No other complexity requirements for memorized secrets SHOULD be imposed.*

While a numeric only password can meet NIST guidance if it is randomly generated, policies related to password creation and use have not yet been developed.

Mitigations: Ensure that the policies for the HMI interface passwords meet the NIST guidance for numeric-only passwords (i.e., they must be at least 6 characters in length and randomly generated).

(Moderate) Operating systems listed as minimum requirements are past end-of-life.

Justification: In Section 2.2 *Network Architecture* of the IFC, Item J states the OS shall be: "The Latest Windows Operating System compatible with the PCS hardware and software for process control and monitoring." This requirement is modified slightly in other areas of the document with Item M stating that the PCS workstations will use "Microsoft Windows 7 Professional 64 bit"; Item P has the same requirement for the wall-mount PCS view node. Item R states that the PCS servers have a requirement to use "Microsoft Windows Server 2012 R2."

These items do come with a caveat that the system shall "meet or exceed the requirements."

Windows 7 support ended on January 14, 2020 and, while Windows Server 2012 R2 is still in support, that ends January 10, 2023 – which may be prior to the deployment of these systems, or shortly after, preventing security updates from being received.

Mitigations: While process control and monitoring software may not work properly on the latest version of the Windows operating system available at deployment time, the team recommends that the requirement be to strictly use the latest OS version that is compatible with the software. In addition, the team recommends compatibility with an operating system that has several years of support remaining be considered during the procurement process.

(Moderate) The system administrator will be able to lockout any or all workstations from the NJ TRANSITGRID system.

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Justification: If an attacker compromises the administrator account, or gains administrator privileges on a single system, they would be able to lockout all of the workstations providing monitoring and control of the microgrid. This would prevent authorized personnel from responding to or correcting any malicious activities taken by the attacker. Depending on the configuration of this feature, this may also include locking out the workstation that was compromised by the attacker. This would mean that, while authorized personnel could log into the workstations, they would no longer be able to exert control over the microgrid.

Mitigations: Configure the system such that the administrator or other account is always able to access the system regardless of the workstation they are logging in from. In addition, the administrator or other designated account should always have the ability to remove the lockouts.

(Low) Accounts are locked out after 3 failed logon attempts which could result in a denial-of-service attack (bullets 5 and 8)

Justification: In Section 2.5 of the IAFC, Item I, bullets 5 and 8 state that accounts are locked out after 3 attempts until reset by the System Administrator. This means that an attacker with a list of usernames could cycle through all of the users with incorrect passwords and lock out all of the valid users.

Mitigations: Instead of a hard retry limit, an increasing time delay progression (e.g., 2 seconds, 5 seconds, 10 seconds, and then 30 seconds) could be used to prevent brute force attacks. Alternatively, the account lockout could be temporary (e.g. 5 minutes) to ensure that authorized users will be able to access their accounts in a timely manner without the need for system administrator assistance.

(Low) The requirement for password deactivation is "as soon as possible" instead of a specific time requirement

Justification: In Section 2.5 of the IAFC, Item I, bullet 7 indicates that password deactivation should be done as soon as possible. However, this could result in passwords remaining active for some time after they are scheduled for deactivation. For example, if the system administrator has gone home for the weekend (or is on vacation) this could mean the password stays active for several days. This would provide a large window of time where an unauthorized individual could gain access to the system.

Mitigations: Change the verbiage to indicate a precise timeframe such as "same business day" or "next business day." Industry best practice is to disable these accounts at the same time the person is conducting their off-boarding process, but that may not be practical for the process control systems.

(Low) Backing up of log files is not listed as a requirement.

Justification: Log files are not listed as artifacts that need to be included in system backups. However, this could mean that valuable information related to malicious behavior or

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component failure is not preserved, preventing a root-cause analysis for a system failure or anomalous behavior, and would allow an attacker to delete evidence of their activity.

Mitigations: Use a centralized logging system such as syslog to ensure that any log entries related to a system failure or attacker actions are preserved. Ensure that the syslog server is also included in regular backup processes.

5.2. Observations

Exposed areas require using a galvanized steel conduit, but how areas are designated as exposed is unclear.

Description: An unprotected communication cable could be used as an attack vector into the network. However, an area that is not exposed, but is still generally unobserved, could provide an insider or an attacker who has gained physical access the opportunity to tap into the cable. The installation of a device with Wi-Fi, cellular, or other wireless communication would allow them to maintain access even after leaving the area.

Mitigations: For designating areas as exposed (or not exposed), establish a process that takes into account the ability of an attacker to remain unobserved long enough to tap into the cable and install a malicious device.

Policies related to physical access to the HMI systems should consider the insider threat.

Description: If custodians, facilities staff, maintenance contractors, or other personnel are given unrestricted, unescorted, or unobserved access to the HMI systems, then a malicious (or even curious) insider could interfere with or damage the system.

Mitigations: Ensure that policies reflect the necessary level of background checks or screening necessary for all personnel that have physical access to the HMI systems. If third parties are used for custodial activities, facilities work, or other activities, their screening processes should also be reviewed to ensure they provide the necessary assurance for their personnel. In the event the screening process for these other personnel does not meet security requirements, policies related to escorting workers should be developed. In addition, deterrent controls – such as signage indicating only authorized personnel should access the system – could be installed around the HMI systems.

Policies related to the existence, creation, maintenance, and use of manufacturer or third-party administrator accounts should be established.

Description: To ensure access in the event of a device error or software failure, some devices are configured to have an account that can always be accessed by maintenance personnel. This is sometimes done by having "secret" patterns to touch on a touchscreen, or hardcoded username/password combinations. In addition, third-party contractors may configure the

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devices to have their own accounts for maintenance purposes. The existence of these accounts can provide access to the device by individuals who are aware of these accounts and, if these accounts are shared by multiple individuals, prevent auditing and accountability.

Mitigations: If practical, devices should be selected that do not have backdoor accounts, or other universal username and password combinations. However, if a device does have these accounts, configuration policies should require the default passwords be changed once the device is deployed. In addition, if there are maintenance accounts that maintenance personnel will use for device access, these devices should use the same password policy as other systems in the network. For example, these policies should include defining the required password complexity, time period to change the password, and require the password to be changed if there is a change in personnel, suspected password compromise, or other event related to the security of the login credentials.

Policies related to the creation, maintenance, and use of shared accounts should be established.

Description: Standard best practice is for every user of a system to have their own account to allow for proper auditing and accountability. However, some devices do not support this ability. For example:

- A device may simply have a lock screen instead of supporting multiple users
- Authentication for a single user account across the entire system may not be available, resulting in prohibitive administration overhead
- The need for emergency actions may require users have a guaranteed method to gain access to the system to perform operations

Mitigations: Develop policies that govern the creation and maintenance of these accounts. At a minimum, these policies should define a process for approving these accounts, detail how these accounts will be maintained and updated, and how widespread these accounts will be. For example, will the account be used for all devices of the same type, or will they be limited to a specific NJ TRANSITGRID facility, or created and used based on job responsibilities? These policies should also identify the personnel, and from which organization, these accounts can be created and used by.

Policies governing how updates and patches will be transferred to the NJ TRANSITGRID network should be developed. This should include signature updates for intrusion detection/prevention systems.

Description: This item is dependent on the results of the network architecture review related to the use of air gaps, data diodes, etc. For example, if external connections are allowed, then a central proxy used by all systems in the microgrid to obtain updates could be configured. If there are no external connections, then any updates will have to be brought across on removable media.

Mitigations: Mitigations or policies will be dependent on the results of the overall network architecture. However, any point of interconnection should be considered a potential attack vector into the microgrid and protected and monitored appropriately.

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Use of centralized services such as NTP and syslog should be considered.

Justification: Utilizing syslog is discussed in Section 0, however, in addition to preserving the logs, if the systems do not have synchronized clocks it is far more difficult to troubleshoot network issues or system failures. Lack of synchronization can also hinder incident response activities and investigations.

Mitigations: Establish an NTP server (and other centralized services) on the microgrid network and configure systems to utilize these services. To maintain network isolation, an NTP hardware appliance that gets its time from GPS could be used.

Best practices related to network equipment should be applied.

Justification: To ensure that a compromise of one system does not allow an attacker unrestricted access to the entire network, and to ensure that any intrusion detection devices are positioned to detect malicious activity, industry best practices related to network security should be applied.

Mitigations: After the final network architecture discussed in Section 0 is completed, VLANs, network segmentation, and other best practices should be applied to the network equipment configurations.

Given the expected use of third- party contractors, supply chain risk management processes should be used.

Justification: The design documentation explicitly calls out the use of sub-contractors (or third parties). These sub-contractors may use unknown or unexpected suppliers or vendors in their normal work processes, allowing malicious or inappropriate components to be integrated into construction.

Mitigations: The National Risk Management Center (NRMC), housed within the Cybersecurity and Infrastructure Security Agency (CISA), is one of the key components of CISA's risk advisory role. The NRMC has worked with government and industry partners to provide supply chain risk management guidelines, resources, and training for industry.[4] The CASA team recommends using this information to ensure that critical components of the NJ TRANSITGRID project are not stolen, replaced with inappropriate or counterfeit components, altered, or compromised prior to their use in the project.

5.3. Strengths

Network Architecture:

- The network design specifically calls for a physically separate network, using dedicated switches.
- The network is required to have redundancy to ensure there is no single point of failure. The supervisory networks are required to use a non-proprietary topology and use open source protocols.
- The supervisory network is required to be EMI and RFI noise tolerant.

[4] https://www.cisa.gov/supply-chain

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Network Equipment and Capabilities:

- Network equipment is required to be capable of Virtual LAN segmentation.
- The firewall/security gateway is required to support IPsec, SSH, and TLS.
- The firewall/security gateway will perform stateful inspection.

Microgrid Systems and Configuration:

- The Emergency Power System Automation and Controls are required to be the same manufacturer as the switchgear and generator sets to avoid any compatibility issues.
- The system design calls for the hardware configuration to have 20% spare I/O points/modules, and 20% spare cabinet space.
- The system design specifically requires that manufacturer's default password must be changed prior to installation in the system.

Operations:

- Two-factor authentication is called out in the design documentation.
- The system design calls for off-site backups of critical data and configurations.
- The system design recommends using a double interlock preaction fire system for the main electrical room. (This allows manual cancellation in the event a fire is contained.)

Security Management:

- The design documentation requires the development of a network security plan.
- The design documentation requires the development of a change management program.
- The design documentation specifically calls out the requirement to immediately report any questions about the power system design (or other aspect) "At any time during engineering, design or construction".

Testing:

- Cybersecurity testing once the system is deployed is required to verify the defense-in-depth measures are effective.
- Redundancy testing is required to verify the system remains available, and can recover, in the event of a component failure.

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6. CONCLUSIONS AND FOLLOW-ON ACTIVITIES

The design documentation provided by NJT related to the NJ TRANSITGRID project incorporated several security features and best practices that will help ensure the security and resiliency of the microgrid. However, since the system is early in the design phase, the Sandia team identified several potential vulnerabilities and areas that have not yet been defined and will need to be developed in accordance with industry best practices.

While the team recommends all the findings listed in this report be reviewed and, if possible, mitigated, the team recommends that a review of the network architecture be prioritized. This includes examining the design for inconsistencies in security features such as having an air gap, utilizing data diodes, and relying on external providers or services such as cellular connections. In addition to this review, the team recommends the establishment of a formal review process for any modifications in the network architecture that may impact assumptions or introduce inconsistencies.

The Sandia team would like to thank the personnel from NJT, Jacobs Engineering, and AECOM for their assistance with this assessment. Their cooperation and knowledge of the NJ TRANSITGRID project contributed greatly to the success effort.

For follow-on activities, the Sandia team recommends additional assessments as the system design matures and is implemented. At a minimum, the team recommends two additional assessments:

1) A design assurance assessment when the system reaches the 100% design point to ensure that design updates do not introduce additional vulnerabilities.
2) A vulnerability assessment once the system is operational and, ideally, prior to production operation so the difference between the as-designed and the as-built can be evaluated.

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7. POTENTIAL HARDENING FEATURES

The Sandia team proposes working with NJT and NJ TRANSITGRID contractors participating in the architecture and design process to integrate state-of-the-art hardening elements into the NJ TRANSITGRID system.

These hardening features could include:

1. **Network Design**. The team could help support cyber-physical architecture planning using consequence-driven assessments to optimize cyber barriers (data diodes, proxies, firewalls, virtual local area networks (VLANs), air gaps, etc.) for the NJT internal OT network and external connections to other IT and OT systems.
2. **Network-based Intrusion Detection System (NIDS)**. The team would work with the NJT team to select the appropriate network monitoring points for network taps (e.g., SPAN ports), and then select the appropriate software package. Additionally, the team could investigate behavior-based anomaly detection (AD) technologies, refine machine learning-based AD technologies to secure the system, generation sources, and critical loads. These tools could be signature-based or behavior-based:
    a. **Signature-based** NIDS tools detect malware using deep packet inspection. Both open source and commercially available solutions are available for consumers in a variety of sectors, including Information Technology (IT), energy, financial, or government. Depending on the sector that the IDS is being applied, the signatures will be tailored to detect threats specific to those systems.
    b. **Behavior-based** techniques employ one or more algorithms to detect known and unknown patterns through inference. Various types of statistical learning and classification techniques have been used to solve this problem including supervised learning, unsupervised learning, semi-supervised learning, and reinforcement learning methods.
3. **Host-based Intrusion Detection System (HIDS)**. A host-based IDS inspects the integrity of the host itself by examining several host-based features such as system files, system calls, processes, and network communications. The IDS typically shares system resources with the host and can either be placed in-line or in parallel to the flow of traffic to and from the host. Host-based IDS technologies typically require elevated privileges on the host to track the state of system-level files and execute responsive actions. For this reason, it important that the IDS itself be secured and protected against attacks as compromises could lead to unauthorized administrator level access. Host-based IDS can monitor processes, executables, registry entries, RAM, processor utilization, memory utilization, or a variety of other host-based features to alert an operator to indicators of attacks. Host-based IDSs are useful when adversaries affect the features that are being monitored when an end device is compromised.
4. **Security Information and Event Management (SIEM)**. When an alert is detected by an IDS, typically an alert will be generated and communicated to a Security Information and Event Management (SIEM) system for operators to monitor. Several operators will monitor such alerts in a Security Operation Center (SOC) room dedicated to security personnel. Depending on the events detected, the role of an operator within a SOC would be to respond to mitigate any potential threats alerted by the IDS.
5. **Security Orchestration, Automation and Response (SOAR)**. SOAR technologies are software suites that augment SIEM tools to prioritize security events, automate responses to

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low-level threats, and support incident response. There are commercial SOAR solutions from multiple vendors including LogRhythm, Rapid7, CyberSponse, DeMisto/XSOAR, Cyberbit, IBM, and others.

6. **Deception techniques**. The team proposes deploying honeypots within the NJ TRANSITGRID system using Sandia's High-Fidelity Adaptive Deception & Emulation System (HADES) technology. HADES platform is a deception environment that utilizes Software Defined Networks (SDN), cloud computing, dynamic deception, and agentless Virtual Machine Introspection (VMI). These elements fuse to not only create complex, high-fidelity deception networks, but also provide mechanisms to directly interact with the adversary—something current deception products do not facilitate. At the onset of an attack, adversaries are migrated into an emulated deception environment, where they can carry out their attacks on canary systems without any indication that they have been detected or are being observed. HADES then allows the defender to react to adversarial attacks in a methodical and proactive manner by modifying the environment, host attributes, files, and the network itself in real-time. Through a rich set of data and analytics, cybersecurity practitioners gain valuable information about the tools and techniques used by their adversaries, which can then be fed back to the network defender as threat intelligence.
7. **Moving Target Defense (MTD)**. Proactive defense technologies are just beginning to emerge. A R&D100-winning CEDS-funded project called Artificial Diversity and Defense Security (ADDSec) led by Sandia demonstrated moving target defense (MTD) using software defined networks was effective in military microgrid deployments. Similar technologies could be evaluated for the NJ TRANSITGRID project.

The NJ TRANSITGRID leadership are encouraged to consider these R&D areas and others for deployment on the microgrid networks to create a best-in-class cybersecurity defense system.

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APPENDIX A. JACOBS' RESPONSES TO SANDIA REVIEW QUESTIONS

The tables in this section contain questions generated by the CASA team from the provided documentation, the response from Jacobs Engineering, documentation and other references pertaining to the questions and responses, and possible action items for Jacobs Engineering.

The Excel spreadsheet providing the source material for these tables were generated by Jacobs Engineering.

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A.1. Physical Security

QUESTION	JACOBS RESPONSE	TEAM COMMENTS
What is considered tamper-proof cables?	This is listed in the Design Criteria Manual 15.3.4.6 & 21.5.1. Tamper proof cables achieved by having cable in conduit (vs open tray) and terminal boxes/panels with tamper alarm switches; pull boxes can use special security keyed screws/bolts. Design Criteria manual sections 21.6.6.5.d, 21.6.6.7.a, and 22.2.1.3 call out the use of tamper proof hardware and alarm switches. Also, Specification 283310, 3.4.O calls out: O. "Provide tamper resistant features and fasteners on all exposed junction boxes or enclosures."	Resolved
It is mentioned that cables will be placed in a galvanized steel conduit in exposed areas. What is considered an exposed area, and are any of these areas accessible to the public?	Spec 283318, 3.H calls out: H. "Security cable and signal wire shall be installed in separate conduit system or utilize armored cable."	

QUESTION	JACOBS RESPONSE	TEAM COMMENTS
Is the Weehawken tunnel considered an exposed area?	The Webster Definition of 'Exposed' is: open to view; not shielded or protected. The area is open to view, however, that area is posted and fenced for minimal protection.	Are there any security cameras on the tunnel? Any regular police patrols? Current NJT physical security specs, camera requirements? Minimize ease of access. DCM update for requirement to document survey of potential exposed areas and mitigating actions to preclude intrusion. Eventual Red Team evaluate for vulnerabilities. Probably during installation phase. Red Team during pre-installation/final design phase.
For exterior areas, what kind of fencing or barriers will be used?	Exact fencing to be installed will be determined in the final design. The Design Criteria Manual noted perimeter fence to be 8ft high with barbed wire at the top. Specification 283310 calls out the design requirements for a perimeter intrusion detection system on the CPP fence.	Resolved
Are physical keys/locks expected to be used to secure communication enclosures?	Physical keylocks will be used in the facilities and specific details of key lockers and use will be covered in the detailed design. Specification 283310, 1.3.I.15.b.3 notes that keys are a backup use, 1.5.C.27 refers to UL-437 for key locks; communication enclosures should have tamper proof designs and/or tamper switch alarms.	Resolved

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QUESTION	JACOBS RESPONSE	TEAM COMMENTS
The Control Room floor plan shows three entrances/exits with two being protected by a card badging system. How will the third door be protected?	There are 3 doors in the Control Room: to the hallway, to the operating floor and to the Server room (the Server Room has another door to the hallway as shown on drawings PP-A-003. Dwg PP-SS-002 incudes a door schedule that shows the Control Room door to the hallway and the plant operating floor have card readers; the same schedule lists both server room doors as having card readers.	Server room details not yet designed.
If IP cameras are used, how will the network traffic for these be protected?	The Integrated Site Security System is shown on dwg SS-PP-051. the CPP site shall have video camera coverage. Specification 283310 addresses security network (which would include the camera system): 1.3.F.2 - incorporation of firewalls, segmentation and DMZs 1.4.A.1 - requires submittal for network configuration from going from 20% to final design. 3.7.R - requires cyber security testing of network intrusion 1.5.C.11 - invokes IEC-62443 requirements	Resolved

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A.2. Control Room

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
How will physical access to the HMI be controlled? Is it expected that individuals who are not authorized to access the HMI will have unrestricted access to the secure space containing the HMI? (For example, custodial or facilities staff.)	The Owner/Operator entity will develop personnel HR policies and plant operating policies and procedures. Specification 255000, 2.5.E thru I call out system access details; 2.5.K calls for an Intrusion Detection System that would notify defined persons of intrusion detections.	Owner/Operator Policy & Procedures Required	Ongoing training for personnel in malicious threats, etc.
Will there be a single "maintenance account" or "maintenance functionality" for those trained by Jacobs Engineering to access the system if there are system problems?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	Single sign-on account for maintenance staff (IC techs) to perform work on HMI/control room, each has own user account/password. Use CMMS to track (e.g. Maximo). Rights would need to be defined to track individual access.
Will there be a "maintenance account" or "maintenance functionality" specifically for technicians with Jacobs Engineering?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.F8	Owner/Operator Policy & Procedures Required	addressed above.
How will HMI updates be handled? Will they require signed updates – and will this be done by a vendor, on-site personnel, or will the system download them from the vendor website?	Specification 255000 calls out: "Anti-virus and Malware detection software updates shall be controlled by Engineering in conjunction with IT; no automatic updates." 1.6.B.4 requires a Patch management program submittal from the SBOM for review. 3.5 requires verification that the latest software version and patches are installed prior to the FAT		Resolved

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QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
	and SAT. The Design Criteria Manual section 15.1 also calls for a Patch management program.		

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A.3. Backups and Data Storage

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
Will there be a possibility of cloud backups of historical data, reports, or system configurations?	it is possible but would have to be submitted upon for review during the design evolution from 20% to 100%. Specification 255000, 2.5.K requires the Intrusion Detection System to be on premises - not hosted in the cloud. Design Criterial Manual section 15.1: Network communications shall use a redundant Ethernet ring loop and gateways as needed to interface to multiple vendor equipment. This network shall not be connected to the Internet and no Cloud services are allowed – an air gap shall be maintained; communications to remote facilities shall be via dedicated fiber optic cables with data diode (one-way communications) and/or firewalls for cyber security protection."		Only one-way comms from remote station? Basically, set up currently as one-way data comms supplemented by vox for coordination. Plant monitored by ROC and plant. Need to id/define ROC-Plant data exchange. EMS located at MCF. How push data to EMS? Operational Plan to be developed. Specify performance characteristics/data requirements as part of RFP process. Ramp rate limitations a concern; batteries good solution.
If so, what protections will be considered?	See above.		
Will a version control system be used to allow access to previous configurations, documents, and files?	Question is not understood.	Sandia to clarify question	Version history to track/document issues/vulnerabilities. Assist with integrating new devices. Applicable to hardware and software. Share

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
			updates with Sandia as RFP developed.
Who will be allowed to initiate an off-site backup?	This will be defined as part of the 20 to 100% design evolution. Specification 255000, section 2.6 has backup criteria .		Resolved
Will designated ports be left open to plug in physical media to back up data?	Port controls are noted in specification 255000, sections: 1.2.M, 2.5.D ("Unused services in the operating system and device ports shall be disabled".), and 3.5.D.10.f.2, 7, & 8 address unused ports.		Resolved
What policies and procedures will be in place for records retention and deletion of archived data?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	Resolved

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A.4. Field Instruments & Control Valves

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
What protections will be put in place to protect the digital valves and positioners from being modified through Modbus TCP or HART	Owner/Operator will develop policies & procedures and train plant personnel in same for security as well as maintenance activities. This should include a Work Order management system that would be auditable and a supervisory check of all work activities by technicians or any manufacturer on site.	Owner/Operator Policy & Procedures Required	Beef up Inst spec.
How will updates to the HART Communicators be handled since licensing is done via the Web?	Discussions with local Emerson rep (TX) indicated that they could do updates via hard files (disc, thumb drive) in lieu of web. Remains to be verified.	Revise 253000 to follow 255000 more closely	How are malware scans handled - do onsite, kiosks recommended? Recommend burning to a disc versus thumb drives.
How will these updates be verified?	No ; will follow 255000, 2.5 that notes "no automatic updates".		
Will these updates be automatic?			
If possible, will the manufacturer's equipment default usernames be changed?	Yes, will need to update spec similar to specification 255000, 2.5.B: "Evaluate and incorporate equipment manufacturer security recommendations as applicable. Change manufacturer's equipment default passwords prior to installation in the system."		
Will the ICS Cert check be performed periodically? How long between checks?	The 255000 spec calls for ICS CERT checks and inventory list submittal in 1.4.A.2.f.6, performed per 2.5.C in design development/equipment selection. Frequency of checks will be an Owner/Operator developed policy & procedure.		

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A.5. System Login Requirements

QUESTION	JACOBS RESPONSE	TEAM COMMENTS
What user encryption software will be used to store credentials?	That is beyond a 20% design and will be determined during design evolution to 100%.	
Who will have access to configurable password account?	See 255000 section 2.5	
Will user chosen passwords be compared to a blacklist of previously used/cracked passwords?	See 255000 section 2.5	Refine spec to address. Wiki article on most common passwords. NJT weighing guidance on password expiration timeframe.
What second means of user login authentication will be required?	See 255000 section 2.5.h.10; exact products will be determined, submitted, reviewed and approved during the 20 to 100% design evolution.	
Will password requirements be applied on all applicable machines across the plant?	Certain equipment, such as the combustion turbine generators have their own local control panels and were specified to meet cyber security requirements for passwords and access.	Contained in CTG spec.
Is there any guidance for password complexity or how often passwords need to be changed?	See 255000 section 2.5	Addressed.

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A.6. Remote Monitoring & Control

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
Will the remote locations be rooms on-site, or will there also be a location off-site that can be accessed from?	See 255000 section 2.5.H.10 & 11; also 2.7.D.17 requires a Network Security Plan as part of the 20 to 100% design evolution		TBD
Who can connect remotely and where are these connections allowed from? Operator home offices? Jacobs Engineering offices?	See Dwg PP-IC-051, PP-CM-051. See Design Criteria Manual section 15.1. Specification 255000, 1.3.P, 2.7.E calls out use of data diodes for remote sites		TBD
What type of hybrid firewalls will be implemented?	See specification 255000, 2.7.D for firewall details; firewalls to be tested per 3.5.C.10		
Will a combination of blacklisting and whitelisting be used?	Spec 255000, 2.7.D.5 calls for whitelist anti-virus and malware protection		
Site Communication Block Diagram shows a singular router and communications switch serving what appears to be both the IT and OT portions of the plant. This router is also shown to be connected to the internet via a dedicated fiber through a firewall. Is this correct? If correct, is there a reason for having the IT/OT sides managed by the same switch?	Dwg PP-CM-01 is for Emergency point to point/conference calls between associated rail entities dependent upon the MCF. System requirements are called out in Specification 273010.		intended for voice comms
Will the proposed intrusion detection system/intrusion prevention system be able to detect changes in values passed to PLCs, remote I/O, etc.?	The IDS requirements are called out in 255000, 2.5.K and notes monitoring the network for unauthorized or abnormal traffic.	Add wording to clearly include network traffic from PLCs and remote I/O	

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
Is it possible to get a physical diagram that shows where remote monitoring, and control workstations/sites are physically located in relation to each other? In particular, will leased lines or ISPs be required to connect the various sites to the remote monitoring and control locations?	The full design drawing package has this physical information. The OWS are shown in the control room of the CPP on PP-IC-051.		
How are the remote monitoring and control workstations secured?	CPP OWS are with the control room which is card key access or by plant management authorization. OWS access is by user login and passwords. Local OWS, such as the combustion turbine is at the local panel that also requires login and passwords.		Beef up engineering laptop security access
Will this system have an internet connection for external communication and/or information access? (Ex. Access other New Jersey Government websites or email accounts.)	There is to be a separate Corporate IT computer structure for plant personnel that would have access via ISP to internet; but this network is isolated from the plant controls, security, and emergency comms.		Clarify computer access operational control vs personal

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A.7. Maintenance & Troubleshooting

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
How will maintenance and troubleshooting of the various systems be performed?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	
Will the technicians use the Engineer laptop to plug into the systems or will there be use of outside laptops?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements. The Engineering laptop should be kept in a secured location with a sign out access log.	Owner/Operator Policy & Procedures Required	see 38 above, vendor equipment laptops too
Are the systems expected to have an external connection and/or "phone home" to report diagnostic information? If so, how is this connection monitored and secured?	No, specification 255000, 2.7.D.17 requires a Network Security Plan as part of the 20 to 100% design evolution.		
Will version control be used to facilitate rolling back any system changes?	System back up and patch management are discussed in Specification 255000.		check details for system backups/frequency?
Is the time to perform maintenance or repair operations in-line with the maximum outage/failure time that can be tolerated?	The plant is an N+1 design. The plant operator will be in control of maintenance & repair activities & schedules. This is beyond a 20% design package	Owner/Operator Policy & Procedures Required	Post event spare parts
What is the estimated time between receiving a software update for anti-virus and/or malware detection software and installation since automatic updates are disabled?	This is beyond an engineering design package. It is dependent on what systems and equipment are actually selected and installed as well as the respective manufacturers. The Operator will manage this activity.		
How will the signature list for the signature-based IDS/IPS be kept up to date? Will this be automatic or manual as in the case of the anti-virus/malware updates?	The design basis does not allow automatic updates; this is to allow another step in the process to control/monitor such activities. Specification 255000, 2.5.K.5 calls for: Provide a list of signatures and define the means as to how		

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QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
	this list shall be kept current; update means shall be coordinated with Owner.		

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A.8. IT/OT Networking

QUESTION	JACOBS RESPONSE
If there are additional external connections from the remote monitoring and control workstations can a network diagram of those systems, connections, protocols, and encryption also be provided?	The known connections at this time are shown on the dwg set
Is it possible to get a physical layout diagram showing where the physical control and network cables will be located? If any of these locations are outside of a secured area?	This is a 20% design package; additional drawings will be developed in the evolution between 20 to 100% design by the DBOM
If communication or network cables (serial, Ethernet, fiber) are disconnected is this detected, and is an alarm raised?	This should generate a loss of communication alarm. Specifiation255000, 2.4.O.6.a.1 calls for loss of communications alarms.
Is there any information regarding cybersecurity services being integrated into the IT/OT network such as centralized logging (ex. syslog), authentication, time synchronization (NTP), and use of VLANs or other network separation techniques?	The OT network is separate from the IT network for the CPP. Power glitch, lightning

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A.9. Other

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
What type of cyber security training will be required to be taken by the Operator in order for them to be able to develop cyber security policies and procedures for plant personnel and training of staff?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	We developed policies plans and procedures for many clients. However, I think it will require funding. (Adi) Check network security plan details.
Will a 3rd party cyber security expert be considered to aide in development of said procedures and policies?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	We developed policies plans and procedures for many clients. However, I think it will require funding. (Adi)
What physical hardening tactics will be used to prevent unauthorized access to device ports?	Exact means to physically disable a port will be determined in the design evolution from 20% to 100% final configuration. Specification 255000, 2.5.D requires unused ports and services be disabled; and this is to be tested during FAT and SAT per 3.5.C and D.		We probably need to add element of network monitoring. (Adi) Address trigger VLAN
How will a virus scan of portable media be verified?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Revise 255000 to add requirement for freestanding portable media kiosk to meet NERC CIP 003-7 and NIST-800-53 requirements.	
How will privacy, integrity and authenticity be guaranteed to remote login sessions to the system?	This will be developed by the Owner/Operator during detailed design completion and contractual requirements.	Owner/Operator Policy & Procedures Required	We need details to understand why and the design for remote connectivity - it could affect some cyber aspects (Adi)
Will a data diode be used anywhere in this network?	Data diodes are listed in specification 255000 and may be used as the design progresses rm		We deployed data diodes several times - but it will be design dependent. (Adi)

QUESTION	JACOBS RESPONSE	ACTION REQUIRED	TEAM COMMENTS
	20% to 100% final configuration.		
What cyber security checks will be conducted during self-diagnostics of the system?	Not sure what the expectation is in the question? Specification 255000 calls out diagnostics with respect to the actual process control system operations. The IDS is in place as noted below and plant operators monitor the system alarms.	Sandia to clarify question	If we design proper OT management and monitoring, there will be 100& monitoring, check and vulnerability analysis 100% of the time. (ADI)
For systems that use external media for updates or to control settings, other than physical access, are there any protections to prevent the removal or modification of this media?	The design does not allow external media to control the system; updates are to be vetted and controlled such as noted above for patch management.		There are a variety of options to accomplish this; need to understand intent. (Adi)
Will any of the systems, HMIs, or remote workstations use secure boot techniques, or require digitally signed firmware or software updates?	Not sure what the expectation is in the question?	Sandia to clarify question	This is vague. Needs to be clarified (Adi) Don't currently reference "secure boot" techniques. Avoid installation of bugs without digital sig.
What is the process to ensure configuration values are correct, and are not modified in a manner that could impact operations or damage the system? (Ex. Would the system prevent a cooldown period of a generator to be set to 60,000 minutes?)	The Intrusion Detection System shall use both signature list and anomaly means to detect unauthorized traffic. The control system also has built in alarms and setpoint limitations that are monitored by the plant operators 24/7.		Call out hart communicator lockup

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Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

EXHIBITS

EXHIBIT 1

AGREEMENT (CONTRACT) NO. 21-059

BETWEEN

NEW JERSEY TRANSIT CORPORATION

AND

[INSERT NAME]

FOR PROFESSIONAL SERVICES

This Agreement (Contract) made as of _____ 20___, between New Jersey Transit Corporation (hereinafter "NJ TRANSIT"), a public instrumentality of the State of New Jersey and _____ having its principal place of business at _____ (hereinafter the "Consultant").

WITNESSETH:

WHEREAS, the Board of Directors of NJ TRANSIT, at its meeting of _____, authorized the NJ TRANSIT President and CEO (Executive Director) or his designee, to enter into this Agreement (Contract) with the Consultant for_____; and

WHEREAS, the said Consultant, for and in consideration of the payments hereinafter specified and agreed to be made by NJ TRANSIT, hereby covenants and agrees to commence and complete the work as follows:

NOW, THEREFORE, in consideration of the mutual covenants and conditions herein contained, the parties hereto covenant and agree with each other as follows:

1. **CONSULTANT SERVICES:** The Consultant, at the direction of NJ TRANSIT, shall provide to NJ TRANSIT services in conformance with the description of services, deliverables, standards of performance, and acceptance criteria under this Agreement set forth in **Exhibit A** (Scope of Services), annexed hereto and made a part hereof.

2. **COMPENSATION:** This Agreement is a cost plus fixed fee contract. NJ TRANSIT will, subject to the availability of funds and audits, pay the Consultant for work identified in **Exhibit A** (Scope

of Services). The Consultant's total costs and fees have been identified as an amount not to exceed $_____ as set forth in **Exhibit B** (Cost Information), annexed hereto and made part hereof. The costs have been identified as $_____ for direct labor, $_____ for indirect costs, and $_____ for direct expenses. The fixed fee has been identified as $_____. Payment shall only be made for work that is actually performed and accepted by NJ TRANSIT. The Consultant shall render monthly invoices for direct and indirect charges incurred pursuant to this Agreement no later than two (2) weeks after the end of the month. The invoices shall be detailed in accordance with procedures and formats prescribed by NJ TRANSIT.

Prompt Payment: The Consultant agrees to pay each Subconsultant and Supplier under this Contract for satisfactory performance of completed work under its subcontract no later than ten (10) Calendar Days from the receipt of each payment the Consultant receives from NJ TRANSIT. The Consultant shall ensure that all lower-tier Subconsultants and Suppliers are paid all invoiced amounts that meet all applicable requirements within fifteen (15) Calendar Days from the time the Subconsultant receives payment from the Consultant.

All costs incurred under this Agreement by the Consultant and approved Subconsultants, including those costs resulting from changes to, modifications of and termination of the Agreement, at a minimum, must be considered allowable and allocable in accordance with the cost principles of Part 31 of the Federal Acquisition Regulations (48 C.F.R. Part 31). The Contracting Officer's determination on the allowability, allocability, and reasonableness of incurred costs shall be final and conclusive. The Contracting Officer for NJ TRANSIT shall be the Chief of Procurement & Support Services or his/her designees within NJ TRANSIT's Procurement Department.

Direct labor rates shall be the wages or salaries actually paid to employees, principals or partners directly charging time to the project for work performed as set forth in **Exhibit A** (Scope of Services). Escalation of direct labor rates is subject to a 3% yearly maximum to be applied on the contract anniversary date.

Maximum provisional indirect cost rates (e.g. fringes, overhead, General & Administrative (G&A), etc.) have been computed by the Consultant for it and its Subconsultants and are considered acceptable by NJ TRANSIT. The following provisional rates shall be in effect for the duration of the Agreement unless revised as mutually agreed or adjusted as provided below:

Consultant and each Subconsultant	***Contract Year XX***	***Contract Year XX***	***Contract Year XX***

Should the Consultant's or any of its Subconsultant's actual indirect cost rates for their fiscal year be determined to be less than the established maximum provisional indirect cost rates, and should the amount invoiced by and paid to the Consultant exceed those rates for that fiscal year, then the amounts invoiced shall be adjusted downward as compared to the actual indirect cost rate and overpayment amounts including the corresponding fixed fee shall be remitted to NJ TRANSIT.

Direct expenses shall be only those costs which are necessary to accomplish the Scope of Services and not excludable as direct costs by the Federal Acquisition Regulations or not otherwise compensated under the Consultant's direct labor and indirect cost rates. All direct expense purchases of goods, materials, and services made by the Consultant on behalf of NJ TRANSIT shall be competitively procured wherever practicable.

Direct expense compensation for travel, subsistence and lodging costs shall comply with the NJ TRANSIT Travel and Business Reimbursement Guidelines as set forth in (**Exhibit C**).

Direct labor rates, hours and costs, indirect labor rates and costs and direct expenses invoiced by the Consultant and paid by NJ TRANSIT are subject to audit and downward adjustment by NJ TRANSIT, in its sole discretion. Any determination of an overpayment by NJ TRANSIT as a result of an

audit shall be final and conclusive of the amounts to be refunded. All overpayments shall be reimbursed to NJ TRANSIT within thirty (30) Calendar Days of notification. Alternatively, NJ TRANSIT may deduct the overpayment amount from payments owed to the Consultant under this or any other agreement with NJ TRANSIT. No upward adjustments shall be allowed.

Within one hundred and eighty (180) Calendar Days after the end of the Consultant's and Subconsultant's fiscal year or for accounting periods of no less than three (3) months should the Contract terminate, the Consultant and Subconsultants shall furnish NJ TRANSIT with a Statement of Indirect Labor Costs (Statement of Overhead) attesting that the statement has been prepared in conformity with accounting principles generally accepted in the United States and reflect all adjustments required by Part 31 of the Federal Acquisition Regulations. Such fiscal year or stub period statements must be certified by an independent public accountant. Failure to provide the requisite Statement of Indirect Labor Costs (Statement of Overhead) in a format acceptable to NJ TRANSIT may result in NJ TRANSIT withholding payment of fee and all or a portion of Indirect Labor Costs in an amount determined by NJ TRANSIT.

Interest payable by the Consultant on excess direct labor cost, indirect labor costs (overhead) or any other excess amounts paid to the Consultant by NJ TRANSIT, and not previously remitted to NJ TRANSIT within thirty (30) Calendar Days of notification by NJ TRANSIT, shall accrue at the prime rate as established by the United States Federal Reserve and published in The Wall Street Journal. Interest shall be applied to balances owed to NJ TRANSIT in excess of $5,000. Application of interest to excess payments made in the preceding fiscal year shall begin six (6) months after the close of the Consultant's fiscal year. Interest shall continue to accrue monthly at the prime rate until all amounts have been remitted to NJ TRANSIT, unless amounts owed NJ TRANSIT including accrued interest, have been deducted by NJ TRANSIT from any payments owed the Consultant on this or any other agreement.

Costs incurred above the contract amounts as set forth in Exhibit B (Cost Information) are not reimbursable, except as authorized by the Contracting Officer in writing in accordance with Article 5, MODIFICATION OF AGREEMENT.

3. LIMITATION OF FUNDS:

A.) The Consultant estimates that performance of this Agreement will not cost NJ TRANSIT more than the estimated amount as set forth in **Exhibit B** (Cost Information). The Consultant agrees to make every effort to perform the work as set forth in **Exhibit A** (Scope of Services) and all obligations under this Agreement within the estimated amount as set forth in **Exhibit B** (Cost Information).

B.) The Purchase Order specifies the amount presently available for payment by NJ TRANSIT and allotted to the Scope of Services and the tasks the allotted amount will cover. The parties contemplate that NJ TRANSIT will allot additional funds incrementally to the Purchase Order up to the full estimated cost as set forth in **Exhibit B** (Cost Information) inclusive of all fees. The Consultant agrees to perform, or have performed, work on the Agreement up to the point at which the total amount paid and payable by NJ TRANSIT under the Agreement approximates but does not exceed the total amount actually allotted by NJ TRANSIT for each of the tasks identified in the Agreement. The Purchase Order is for invoicing purposes only and its attached Terms and Conditions are not part of this Agreement.

C.) The Consultant shall notify the Contracting Officer in writing whenever it has reason to believe that within the next sixty (60) Calendar Days the costs it expects to incur under this Agreement to complete the Scope of Services, when added to all costs previously incurred, will exceed seventy-five percent (75%) of the total amount so far allotted by NJ TRANSIT. The notice shall state the estimated amount, if any, of additional funds required to continue and complete performance of the Scope of Services, as set forth in **Exhibit A** (Scope of Services), beyond the total allotted amount as set forth in **Exhibit B** (Cost Information).

D.) If, after notification by the Consultant pursuant to paragraph C above, additional funds are not allotted for the Scope of Services, the Contracting Officer may terminate this Agreement, in whole or in part, in accordance with the provisions of Article 15, TERMINATION OF THE AGREEMENT FOR CONVENIENCE.

E.) Except as required by other provisions of this Agreement:

1.) NJ TRANSIT is not obligated to reimburse the Consultant for costs incurred in excess of the amount allotted in total by NJ TRANSIT for this Agreement; and

2.) The Consultant is not obligated to continue performance under this Agreement (excluding actions under Article 15, TERMINATION OF THE AGREEMENT FOR CONVENIENCE) or otherwise incur costs in excess of the amount then allotted to the Agreement by NJ TRANSIT until the Contracting Officer notifies the Consultant in writing that the amount allotted by NJ TRANSIT has been increased and specifies an increased amount, which shall then constitute the total amount allotted by task and in total by NJ TRANSIT for this Agreement.

F.) No notice, communication, or representation in any form other than that specified by the Contracting Officer in writing shall affect the amount allotted by NJ TRANSIT to this Agreement. In the absence of the notice specified in Paragraph C, NJ TRANSIT is not obligated to reimburse the Consultant for any costs in excess of the total costs and fees as set forth in **Exhibit B** (Cost Information) to this Agreement, whether incurred during the course of the Agreement or as a result of termination.

G.) Change Orders shall not be considered an authorization to exceed the amount allotted by NJ TRANSIT as set forth in **Exhibit B** (Cost Information) unless they contain a statement increasing the amount allotted.

H.) Nothing in this clause shall affect the right of NJ TRANSIT to terminate this Agreement.

I.) If NJ TRANSIT does not allot sufficient funds to allow completion of the work, the Consultant will be entitled to the actual costs incurred plus a percentage of the fixed fee as set forth in **Exhibit B** (Cost Information) not to exceed the percentage of completion of the work contemplated by this Agreement.

4. <u>EFFECTIVE DATE AND TERM OF AGREEMENT</u>: This Agreement shall become binding upon the parties hereto when executed on behalf of NJ TRANSIT by the Contracting Officer or his/her designee. The Consultant shall commence work upon the Scope of Services within five (5) Calendar

Days upon receipt of a written Notice to Proceed to that effect which shall be issued on behalf of NJ TRANSIT by its Contracting Officer or his/her designee upon the execution of the Agreement by NJ TRANSIT. The Consultant shall complete the Scope of Services by _____.

5. MODIFICATION OF AGREEMENT:

A.) The Scope of Services set forth in **Exhibit A** may be reduced, modified or expanded within the scope of this Agreement by written contract modifications executed by NJ TRANSIT's Contracting Officer or his/her designee and the Consultant.

Except as provided in Paragraph B, below, in the event that NJ TRANSIT requires a reduction, expansion, or modification of the Scope of Services of this Agreement, the Contracting Officer will issue to the Consultant a written notification which specifies such reduction, expansion, or modification. Within fifteen (15) Calendar Days after receipt of the written notification, the Consultant shall provide the Contracting Officer with a detailed cost and schedule proposal for the work to be performed or to be reduced. This proposal may be accepted by NJ TRANSIT's Contracting Officer or his/her designee or modified by negotiations between the Consultant and NJ TRANSIT's Contracting Officer or his/her designee. A contract modification (Change Order) shall be effective only if executed in writing by both parties.

B. Notwithstanding Paragraph A. above, the Contracting Officer may at any time, by written order, make changes within the Scope of Services of this Agreement to the work to be performed by the Consultant. If any such change causes an increase or decrease in the estimated cost of, or the time required for, the performance of any part of the work under this Agreement, whether or not changed by the order, the Contracting Officer may make such adjustments as are appropriate and equitable and shall modify the Agreement in writing accordingly. Any claim by the Consultant for adjustment under this clause must be asserted within thirty (30) Calendar Days from the date of receipt by the Consultant of the notification of change; provided however, that the Contracting Officer, if he or she decides that the facts

justify such action, may receive and act upon such claim asserted at any time prior to final payment under this Agreement. Failure to agree to any adjustment shall be a dispute within the meaning of Article 38, DISPUTES. However, nothing in this clause shall excuse the Consultant from proceeding with the Agreement as changed.

C. No services for which an additional cost or fee will be charged by the Consultant shall be furnished without the prior express written authorization of the Contracting Officer.

D. Unless specified in a written contract modification, no change, reduction, modification or expansion of the Scope of Services within or beyond the scope of this Agreement shall serve to modify the terms and conditions of this Agreement.

E. Whenever an "AS DIRECTED TASK" appears as set forth in **Exhibit A** (Scope of Services) and **Exhibit B** (Cost Information), NJ TRANSIT has provided an allowance for additional or supplemental work that has not yet been defined. This allowance is provided for the sole convenience of NJ TRANSIT and may only be used for work authorized by NJ TRANSIT's Contracting Officer or his/her designee.

All additional or supplemental work authorized under this provision will be incorporated into the Agreement by Change Order pursuant to Article 5, MODIFICATION OF AGREEMENT. The Change Order will describe the additional or supplemental work with any associated cost changes and will reduce the "AS DIRECTED TASK" allowance in the amount specified in the Change Order. Residual amounts remaining in the "AS DIRECTED TASK" allowance may be deleted from the Agreement by NJ TRANSIT at any time at NJ TRANSIT's sole discretion or at the completion of all work.

6. STATUS REPORTS: The Consultant shall submit to NJ TRANSIT monthly or more frequently, at the discretion of NJ TRANSIT, a written status report outlining the status of the Project to date. Each status report shall be a concise narrative description of activities to date and planned activities for the coming month or other period and include, at a minimum: the period's accomplishments by deliverable and/or task; status of deliverables; work-in-progress; next steps; listings and status of

documents/data requested; potential impacts to the scope of work, cost or schedule; items or issues identified; total weekly and cumulative hours by task, deliverable, and person; projected hours to complete each task/deliverable; and any other information NJ TRANSIT may require. A final report, one (1) original, and seven (7) copies, and one (1) copy in an electronic format acceptable to NJ TRANSIT shall be submitted by the Consultant upon completion of the project.

7. REVIEWS: Until the completion of the Scope of Services by the Consultant and the final payment made by NJ TRANSIT, the Consultant shall allow representatives of NJ TRANSIT to visit the offices and other places of work of the Consultant periodically without prior notice to monitor the Consultant's work completed or in progress pursuant to this Agreement. NJ TRANSIT will, within a reasonable time, review and act upon all documents submitted by the Consultant. Both parties agree that if either party deems it advisable to hold either a conference or any inspection of work in progress, all parties shall be notified and may participate.

8. ACCEPTANCE OF THE CONSULTANT'S WORK: All services and deliverables that the Consultant must provide and deliver to NJ TRANSIT, as set forth in **Exhibit A** (Scope of Services), shall be provided and delivered to the designated NJ TRANSIT Project Manager. The Project Manager will examine and inspect the deliverables and shall have the right in his/her reasonable judgment to refuse to accept any services or deliverables if they do not meet the requirements of the Scope of Services. Such inspection does not relieve the Consultant of its liability regarding any deficiencies in the performance of the Scope of Services or deliverables, whether obvious or not. If any deliverables are not accepted, NJ TRANSIT may terminate this Agreement, in whole or in part, in accordance with Article 16, TERMINATION OF THE AGREEMENT FOR CAUSE.

9. OVERPAYMENTS: If at any point NJ TRANSIT determines that the Consultant has been overpaid, NJ TRANSIT shall notify the Consultant in writing of the overpayment. The Consultant shall repay the amount of overpayment to NJ TRANSIT within thirty (30) Calendar Days of said notification including interest as applicable. In the event of failure by the Consultant to remit the overpayment amount

within the time period set forth above, NJ TRANSIT reserves its right to pursue recovery of said amount pursuant to the terms of this agreement and any means available at law.

10. ASSIGNMENT, SUBCONTRACT AND DISPOSITION APPROVAL: The Consultant shall not sell, transfer or otherwise dispose of this Agreement or its interest therein to any other parties without the prior written consent of NJ TRANSIT's Contracting Officer or his/her designee. The Consultant shall not, without the prior written approval of NJ TRANSIT's Contracting Officer or his/her designee, assign or subcontract any of the Scope of Services under this Agreement. Neither shall any assignee or Subconsultant, without the prior written approval of NJ TRANSIT, further assign or subcontract any of the work to be performed pursuant to this Agreement.

The terms of this Agreement shall be incorporated into and made part of any assignment or subcontract pursuant to this Agreement. As a condition of obtaining NJ TRANSIT's approval of any proposed assignee or Subconsultant, the Consultant shall provide NJ TRANSIT with sufficient documentation regarding the proposed Subconsultant or assignee for NJ TRANSIT's review and approval and shall provide to NJ TRANSIT a copy of the agreement established between the Consultant and its Subconsultant or assignee. Any assignment or subcontract of work to be performed under this Agreement entered into without prior written approval by NJ TRANSIT's Contracting Officer or his/her designee, shall be void and unenforceable unless NJ TRANSIT's Contracting Officer or his/her designee subsequently gives written approval or consent.

If the Consultant's assignee or Subconsultant fails to perform in accordance with the terms of its assignment or subcontract, the Consultant shall complete or pay to have completed the work which the assignee or Subconsultant failed to complete at no additional cost to NJ TRANSIT.

11. INDEMNIFICATION: The Consultant shall defend, indemnify, protect and save harmless the State of New Jersey, NJ TRANSIT, the U.S. Department of Transportation (USDOT), the Federal Transit Administration (FTA) (if the Agreement is in whole or part Federally funded), and their directors, officers, employees, servants and agents ("Indemnified Parties") from and against all suits,

actions, claims demands or damages of whatsoever kind or nature arising out of or related to the performance of this Agreement including, but not limited to, expenditures for and costs of investigations, hiring of expert witnesses, court costs, counsel fees, settlements, judgments or otherwise, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of said Consultant or its Subconsultant in the performance of the work, specified in this Agreement or because of any act, omission, neglect, or misconduct of said Consultant or its Subconsultant in the performance of the work specified in this Agreement; or from any claims or amounts arising or recovered under the Worker's Compensation Act, or any other law, ordinance, order, or decree. So much of the money due the said Consultant under and by virtue of this Agreement as may be considered necessary by NJ TRANSIT for such purpose may be retained for the use of NJ TRANSIT; except that money due to the Consultant will not be withheld when the Consultant produces satisfactory evidence that it is adequately protected by the insurance coverages required in Article 12, INSURANCE. NJ TRANSIT will, as soon as practicable after a claim has been made against it, give written notice thereof to the Consultant along with full and complete particulars of the claim. If the suit is brought against NJ TRANSIT, NJ TRANSIT will immediately forward to the Consultant every claim, demand, complaint, notice, summons, pleading or other process received by NJ TRANSIT. NJ TRANSIT shall have the right, but not the obligation, to participate, to the extent, it deems appropriate, in the defense of the matter and must concur in the terms of any settlement or other voluntary disposition of the matter. In the defense of any such claims, demands, suits, actions and proceedings, the Consultant shall not raise or introduce, without the express written permission in advance of the Office of the Attorney General of the State of New Jersey, any defense involving in any way the immunity of NJ TRANSIT or the State of New Jersey, the jurisdiction of the tribunal over NJ TRANSIT or the State of New Jersey, or the provisions of any statutes respecting suits against NJ TRANSIT or the State of New Jersey.

The Consultant is an independent professional firm contracting with NJ TRANSIT to provide specialized services. The Consultant, its officers, partners, employees, agents, and servants are

not to be deemed employees, agents, extensions of staff or servants of NJ TRANSIT. The Consultant assumes full responsibility for liability arising out of its conduct and the conduct of its Subconsultants whether by action or inaction. NJ TRANSIT assumes no liability or responsibility for the acts of the Consultant, its officers, partners, employees, agents, or servants, by virtue of entering into this Agreement.

12. INSURANCE: The Consultant, and any of its contracting parties, shall carry and maintain, in its name as Insured, the following minimum insurance coverages:

a. Professional Liability/Medical Malpractice Insurance of the type necessary to protect the Consultant and its Affiliates from professional liability arising out of the negligent acts, errors or omissions of the Consultant or its Affiliates, in connection with the performance of the Consultant's services pursuant to this Agreement. Said insurance shall be in an amount not less than $10,000,000 for any one claim and annual aggregate with a deductible not to exceed $50,000 for any one claim, unless approved otherwise by NJ TRANSIT. The Consultant agrees to maintain this coverage for six (6) years after completion of this Agreement including any amendments thereto. There shall be no exclusions in coverage for the insured's interest in a Joint Venture or Limited Liability Company or Limited Liability Partnership. There shall be no exclusions in coverage for pollution, mold or asbestos. The policy shall include contractual liability coverage.

b. Commercial General liability Insurance using ISO Occurrence Form CG0001 10/93 or equivalent. The policy shall provide a minimum amount of $10,000,000 each occurrence, $10,000,000 personal and advertising injury, $10,000,000 per project general aggregate, and $10,000,000 products completed operations aggregate. Coverage provided under this liability policy shall be on an occurrence basis and shall include, but not be limited to, bodily injury and property damage coverage including products liability/completed operations coverage, premises operations liability, blanket contractual liability, personal injury liability, advertising injury coverage, independent contractors liability, mobile equipment, damage from explosion, collapse and underground hazards, and cross liability and severability of interests clause. Additional insured endorsement CG2026 11/85, together with ISO Form CG 20 10 10 01, and CG 20 37

10 01 (but only if modified to include both ongoing and completed operations and written on a broad form) naming NJ TRANSIT and the State of New Jersey and the Indemnified Parties and coverage must apply on a primary and non-contributory basis. The policies shall contain a waiver of subrogation in the benefit of the Indemnified Parties. There shall be no coverage exceptions for property containing or adjacent to railroad facilities or other transportation facilities, and to provide the policy endorsement evidencing the contractual exclusion related to construction activities, or any access whatsoever, within fifty (50) feet of the railroad has been deleted. Coverage shall be required and maintained in force for a minimum of six (6) years following acceptance of the overall Contract, regardless of any beneficial occupancy by NJ TRANSIT during the Contract term.

c. Commercial Automobile Liability Insurance applicable to all owned, non-owned, hired or leased vehicle with a minimum of $5,000,000 combined single limit for bodily injury and property damage. With respect to said insurance, NJ TRANSIT and the Indemnified Parties shall be named as an additional insured at no additional cost to NJ TRANSIT.

d. Workers' Compensation Insurance in compliance with the laws of the state where the work is to be performed and Employer Liability Insurance as follows: Employer's Liability: $1,000,000 each accident / $1,000,000 each employee disease / $1,000,000 policy limit – disease. In the event the Consultant, its Members, or its Contracting parties, if any, are considered a railroad, Employers Liability coverage shall be extended to cover the Federal Employers Liability Act with a limit of not less than $10,000,000 each accident, illness or occurrence.

e. Security and Privacy Liability (Cyber) insurance with a limit of not less than $5,000,000 per any one claim covering actual or alleged acts, errors, or omissions committed by Consultant, its agents, employees or any other person or entity. The policy shall also extend to include the intentional, fraudulent, or criminal acts of Consultant, its agents, or employees and all other persons or entities. The policy shall expressly provide, but not be limited to, coverage for the following perils: (i) unauthorized use of and/or access to Company Systems, Consultant's computer system or any other system in which Consultant has

stored Company Data; (ii) defense of any regulatory action involving a Security Incident; (iii) failure to protect Confidential Information from disclosure; and (iv) Notification Related Costs, whether or not required by statute. If the policy is subject to an aggregate limit, the aggregate limit shall be per project or per location where Work is performed. The policy required to be maintained by Consultant shall include, without limitation, coverage for legal fees; notifications; investigation/forensic and restoration costs; crisis management/public relations; credit monitoring/identity protection services; call center expenses; network interruption and extra expense/business interruption; and cyber threat extortion costs. The Policies shall include the Indemnified Parties as additional insureds. The insurers shall waive the right to subrogate against the Indemnified Parties.

f. The Consultant agrees to carry, and shall require its assignees and Subconsultants, if any, to carry, Contractor's pollution liability insurance covering the liability arising out of any sudden and/or non-sudden pollution or impairment of the environment, including clean-up and disposal costs and defense that arise from the operation of Consultant or its Subconsultants. Coverage under this policy shall have limits of liability with a minimum of $5,000,000 per occurrence.

g. In the event the Consultant, its assignees or its Subconsultants, if any, is considered a railroad, Employers Liability coverage shall be extended to cover the Federal Employers Liability Act with a limit of not less than $10,000,000 each accident, illness or occurrence.

h. The Consultant agrees to carry, and shall require its assignees and Subconsultants, if any, to carry, Contractor's pollution liability insurance covering the liability arising out of any sudden and/or non-sudden pollution or impairment of the environment, including clean-up costs and defense that arise from the operation of Consultant or its Subconsultants. Coverage under this policy shall have limits of liability with a minimum of $5,000,000 per occurrence. This policy shall name NJ TRANSIT and the indemnified parties as additional insured at no cost to NJ TRANSIT.

i. The Consultant, its assignees or its Subconsultants, if any, (or whoever is performing environmental removal or remediation work) must procure and maintain through the term of the Agreement

Environmental Impairment Liability Insurance, including lead abatement if required, and removal operations in an amount of $5,000,000 per occurrence and $5,000,000 aggregate.

j. In the event the Consultant, its assignees or its Subconsultants, if any, will be transporting and/or disposing of any hazardous material or waste off the jobsite under this Agreement shall be required to carry Hazardous Waste Haulers Insurance (MCS90) in an amount of $5,000,000 per occurrence or statutory minimum, whichever is greater. This policy shall name NJ TRANSIT and the Indemnified Parties as additional insured at no cost to NJ TRANSIT.

Should it be required, NJ TRANSIT will provide Railroad Protective Liability Insurance coverage for this Agreement.

All insurance policies shall be written on an occurrence form basis, and shall not include any exclusions for "actions over claims" (insured vs. insured). All policies must be written by insurance companies authorized to do business in New Jersey with an A.M. Best and Company rating of "A-" or better (or equivalent rating). All policies shall contain an endorsement that if the policy is canceled, non-renewed or is subject to any material reduction in limits, the Insurer will provide written notice to NJ TRANSIT at least thirty (30) Calendar Days prior to the occurrence of such event in accordance with Article 35, NOTIFICATION with a copy to NJ TRANSIT's Senior Director of Risk Management as follows:

NJ TRANSIT
One Penn Plaza East
Newark, New Jersey 07105-2246
Attn: Senior Director, Risk Management

The foregoing insurance coverage is not intended to nor does it limit the liability of the Consultant to hold the Indemnified Parties harmless. All the insurance policies required to be maintained hereunder shall be primary and non-contributory and any insurance or self-insurance maintain by NJ TRANSIT or any of the Indemnified Parties shall not contribute to any loss. Further, any self-insurance retention shall be evidenced and approved by NJ TRANSIT. If approved, such self-insured retention

and/or deductible maintained by Consultant, or its contracting parties, shall cover any liability imposed upon the Consultant and its Affiliates with respect to the operations and obligations assumed by the Consultant. The Consultant represent that such deductible or retentions provide NJ TRANSIT and the Indemnified Parties with all rights and protections that would be provided by traditional independent insurance, including but not limited, defense obligations that insurers are required to undertake under liability policies pursuant to the terms of this Agreement. If the Consultant carries higher limits than those required hereunder, or other coverages, those shall be made available to pay claims and provide defense.

The Consultant shall provide NJ TRANSIT with evidence of the Consultant's insurance. Said insurance shall be maintained in full force and effect by the Consultant, Subconsultant and assignee, if any, from the effective date of this Agreement until completion of and final payment for the Scope of Services. If the Consultant (Subconsultant or assignee) shall fail or refuse to renew its insurance, as necessary, NJ TRANSIT may cancel or refuse to make payment of any further monies due under this Agreement. In lieu of requiring its assignees or Subconsultants to carry this coverage, the Consultant may elect to cover them under its policies of insurance.

If the Consultant, its assignees or any Subconsultant is required to perform work on property or facilities owned by a third party, the Consultant, its assignees or any Subconsultant will be required to satisfy the insurance requirements set forth by the third-party property owner. NJ TRANSIT reserves the right to increase the limits of insurances or require additional coverages.

13. AUDIT AND INSPECTION OF RECORDS: The Consultant shall retain all records and permit the authorized representatives of NJ TRANSIT, the State of New Jersey, the US Department of Transportation (USDOT), the Federal Transit Administration (FTA) and the Comptroller of the United States and their duly authorized representatives, such as Project Management Oversight (PMO), Integrity Oversight Monitors (IOM) etc., to inspect and audit all financial data, operational data and other records of the Consultant including but not limited to disclosure forms, payment requests, change orders, invoices, certified payrolls, manifests, etc. related to products, transactions or services provided under this

Agreement including the performance of its Subconsultants from the Advertisement of Request for Proposal and for five (5) years after final payment under this Agreement has been made.

NJ TRANSIT, the State of New Jersey, the USDOT, the FTA and the Comptroller General of the United States and their duly authorized representatives also shall have the right to inspect all services hereunder and specifically reserves the right to conduct on-site visits and perform financial audits and operational reviews. Any inspection, audit or review or lack thereof shall not relieve the Consultant of responsibility for satisfactory performance of the Scope of Services. Consultant shall maintain a true and correct set of Records for all financial and operational data in sufficient detail to permit reasonable verification or correction of charges and performance in accordance with this Agreement from the date of Advertisement of this RFP and for five (5) years after final payment under this Agreement has been made.

Any such audit shall be conducted at Consultant's principal place of business during Consultant's normal business hours and at NJ TRANSIT's expense, provided all costs incurred by NJ TRANSIT in conducting any such audit shall be reimbursed by Consultant in the event such audit reveals an aggregate discrepancy in any invoice or cumulative invoice not previously audited by NJ TRANSIT of more than two percent (2%) of the final total costs and fees for the period under audit as determined by NJ TRANSIT.

The Consultant further agrees to include in all its subcontracts hereunder a provision requiring the Subconsultant to keep all Contract records and that NJ TRANSIT, the State of New Jersey, the USDOT, the FTA and the Comptroller General of the United States or any of their duly authorized representatives, such as PMO, IOM, etc. shall, until the expiration of five (5) years after final payment under the subcontract, have access to and the right to examine pertinent books, documents, papers and records of such subcontract, involving transactions related to the Subconsultant. The term "Subconsultant" as used in this clause excludes (1) purchase orders not exceeding $10,000 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

Documents of every nature prepared pursuant to this Agreement shall be available to and become the property of NJ TRANSIT, and basic notes and other pertinent data shall be made available to NJ TRANSIT upon request without restriction as to their future use. Such documents shall be provided or made available within thirty (30) Calendar Days of NJ TRANSIT's request.

Pursuant to N.J.S.A. 52:15C-14(d) and N.J.A.C. 17:44-2.2, the Consultant shall retain all documentation related to products, transactions or services under this Contract for a period of five (5) years from the date of final payment. Such records shall be made available to the New Jersey Office of the State Comptroller upon request.

The periods of access and examination described above, for Records which relate to: (1) appeals under Article 38, DISPUTES; (2) litigation or the settlement of claims arising out of the performance of this Agreement; or (3) costs and expenses of this Agreement as to which exception has been taken by NJ TRANSIT, State of New Jersey, the Office of the State Comptroller, USDOT, FTA or any of their authorized representatives, shall continue until such appeals, litigation, claims, or exceptions have been disposed of.

14. SUSPENSION OF WORK: NJ TRANSIT may, for any reason, issue a stop order directing the Consultant to suspend work under the Contract for a specific time. The Consultant shall be paid for goods ordered, goods delivered, or services requested and performed until the effective date of the stop order. The Consultant shall resume work upon the date specified in the stop order, or upon such other date as the Contracting Officer or his or her designee, may thereafter direct in writing. The period of suspension shall be deemed added to the Consultant's approved schedule of performance. The Contracting Officer or his or her designee shall make an equitable adjustment, if any is required, to the Contract price. The Consultant shall provide whatever information that the Contracting Officer or his or her designee may require related to the equitable adjustment.

15. TERMINATION OF THE AGREEMENT FOR CONVENIENCE: NJ TRANSIT may terminate the Consultant's services in whole or in part for any reason at any time before completion. In that

event, the Consultant will be given written notice by the Contracting Officer of such termination specifying the effective date thereof. Compensation will be paid to the Consultant pursuant to the terms of Article 2, COMPENSATION for the work actually performed prior to such date. All documents begun or completed by the Consultant pursuant to this Agreement shall become the property of NJ TRANSIT. After receipt of such written notice, the Consultant shall not incur any new obligations without the prior written approval of the Contracting Officer and shall cancel as many outstanding obligations so related as possible. NJ TRANSIT will evaluate each obligation deemed non-cancellable by the Consultant in order to determine its eligibility for inclusion in compensable costs. No damages of any nature shall be claimed against NJ TRANSIT in the event it exercises this right of termination.

16. TERMINATION OF THE AGREEMENT FOR CAUSE: NJ TRANSIT may terminate this Agreement in whole or in part at any time if the Consultant has materially failed to comply with terms of the Agreement. In the event of such failure, NJ TRANSIT will promptly give written notification to the Consultant of its intent to terminate and the reasons therefor. The Consultant shall have ten (10) Calendar Days, or such additional time as NJ TRANSIT may grant, after receipt of notice to cure its failure. If the failure is not cured to the satisfaction of NJ TRANSIT, NJ TRANSIT may terminate this Agreement (in whole or in part) effective immediately.

After receipt of notice of termination, the Consultant shall not incur any new obligations without the approval of NJ TRANSIT and shall cancel as many outstanding obligations as possible. NJ TRANSIT will evaluate each obligation deemed non-cancelable by the Consultant in order to determine its eligibility for inclusion in compensable costs. Compensation shall be made for Scope of Services as set forth in **Exhibit A** (Scope of Services) pursuant to the terms of this Agreement for work actually performed, completed and approved by NJ TRANSIT prior to the date of termination.

If this Agreement or any part thereof is terminated for cause, NJ TRANSIT may procure services similar to those so terminated. The Consultant shall be liable to NJ TRANSIT for any reasonable excess costs incurred for such similar services.

The Consultant shall not claim any damages of any nature against NJ TRANSIT in the event NJ TRANSIT exercises this right of termination. The rights and remedies available to NJ TRANSIT in this Article shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Agreement.

If, after notice of termination of this Agreement under the provisions of this Article, it is determined for any reason that the Consultant was not in default under the provisions of this Article, or that the default was excusable under the provisions of this Article, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to Article 15, TERMINATION FOR CONVENIENCE.

17. BUSINESS REGISTRATION NOTICE: Pursuant to N.J.S.A. 52:32-44, NJ TRANSIT ("Contracting Agency") is prohibited from entering into a contract with an entity unless the Proposer/Consultant and each Subcontractor/Subconsultant that is required by law to be named in a Proposal has a valid Business Registration Certificate on file with the Division of Revenue and Enterprise Services within the Department of the Treasury. Prior to Contract award or authorization, the Consultant shall provide the Contracting Agency with its proof of Business Registration and that of any named Subcontractor(s)/Subconsultant(s).

Subcontractors/Subconsultants named in a Proposal shall provide proof of Business Registration to the Proposer, who in turn, shall provide it to the Contracting Agency prior to the time a contract, purchase order, or other contracting document is awarded or authorized.

During the course of Contract performance:

(1) The Consultant shall not enter into a contract with a Subcontractor/Subconsultant unless the Subcontractor/Subconsultant first provides the Consultant with a valid proof of Business Registration.

(2) The Consultant shall maintain and submit to the Contracting Agency a list of Subcontractors/Subconsultants and their addresses that may be updated from time to time.

(3) The Consultant and any Subcontractor/Subconsultant providing goods or performing services under the Contract, and each of their affiliates, shall collect and remit to the Director of the Division of Taxation in the Department of the Treasury, the use tax due pursuant to the Sales and Use Tax Act, (N.J.S.A. 54:32B-1 et seq.) on all sales of tangible personal property delivered into the State. Any questions in this regard can be directed to the Division of Taxation at (609)292-6400. Form NJ-REG can be filed online at http://www.state.nj.us/treasury/revenue/busregcert.shtml.

Before final payment is made under the Contract, the Consultant shall submit to the Contracting Agency a complete and accurate list of all Subcontractors/Subconsultants used and their addresses.

Pursuant to N.J.S.A. 54:49-4.1, a business organization that fails to provide a copy of a Business Registration as required, or that provides false Business Registration information, shall be liable for a penalty of $25 for each day of violation, not to exceed $50,000, for each proof of Business Registration not properly provided under a contract with a contracting agency.

18. SOURCE DISCLOSURE:

A.) Under N.J.S.A. 52:34-13.2, all contracts primarily for services awarded by NJ TRANSIT shall be performed within the United States, except when the Contracting Officer certifies in writing a finding that a required service cannot be provided by a Consultant or Subconsultant within the United States and the certification is approved by the President and CEO (Executive Director)of NJ TRANSIT.

All Consultants seeking a contract primarily for services with NJ TRANSIT must disclose the location, by country, where services under the contract, including subcontracted services, will be performed.

If any of the services cannot be performed within the United States, the Consultant shall certify with specificity the reasons why the services cannot be so performed. NJ TRANSIT's Contracting Officer will determine whether sufficient justification has been provided by the Consultant to form the basis of his/her certification that the services cannot be performed in the United States and whether to seek the approval of the President and CEO (Executive Director).

B.) Breach of Contract for Shift of Services outside the United States

If, during the term of the Agreement, the Consultant or Subconsultant, who had on contract award certified that services would be performed in the United States, proceeds to shift the performance of the services outside the United States, the Consultant shall be deemed to be in breach of the Agreement, which shall be subject to termination for cause pursuant to Article 16, TERMINATION OF THE AGREEMENT FOR CAUSE, unless previously approved by NJ TRANSIT.

19. USE OF BRAND NAME PRODUCTS IN DESIGN: Consultants engaged to prepare specifications or to perform design work, or both, for NJ TRANSIT shall prepare such specifications to encourage full and open competition. A situation considered to be restrictive of competition involves specifying only a "brand name" product instead of allowing "an equal" product to be offered and listing the products' salient characteristics. Accordingly, Consultants engaged in preparing specifications or performing design work for NJ TRANSIT are required to include the salient characteristics of a product when it is identified by "brand name" and allow for an equivalent. Consultants may define salient characteristics by using language similar to the following:

A.) Original Equipment Manufacturer (OEM) part #123 or approved equal that complies with the original equipment manufacturer's requirements or specifications and will not compromise any OEM warranties'; or

B.) 'Original Equipment Manufacturer part #123 or approved equal that is appropriate for use with and fits properly in [describe the bus, engine, or other].

20. PATENT RIGHTS AND RIGHTS IN DATA:

A.) Rights in Data

1.) The term "subject data" as used herein means recorded information, whether or not copyrighted, that is delivered or specified to be delivered under this Agreement. The term includes graphic or pictorial delineations in media such as drawings or photographs; text in specifications or related performance or design-type documents; machine forms such as punched cards; magnetic tape,

or computer memory printouts; and information retained in computer memory. Examples include, but are not limited to, computer software, engineering drawings, and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information. The term does not include financial reports, cost analyses, and similar information incidental to contract administration.

2.) All "subject data" first produced in the performance of this Agreement shall be the sole property of NJ TRANSIT. The Consultant agrees not to assert any rights at common law or equity and not to establish any claim to statutory copyright in such data. Except for its own internal use, the Consultant shall not publish or reproduce such data in whole or in part, or in any manner or form, nor authorize others to do so, without the written consent of NJ TRANSIT until such time as NJ TRANSIT may have released such data to the public.

3.) The Consultant agrees to grant and does hereby grant to NJ TRANSIT and to its officers, agents, and employees acting within the scope of their official duties, a royalty-free, nonexclusive, and irrevocable license throughout the world:

a.) To publish, translate, reproduce, deliver, perform, use, and dispose of, in any manner, any and all data not first produced or composed in the performance of this Agreement, but which is incorporated in the work furnished under this Agreement; and

b.) To authorize others so to do.

4.) The Consultant shall indemnify and save and hold harmless NJ TRANSIT, its officers, agents, and employees acting within the scope of their official duties against any liability, including costs and expenses, resulting from any willful or intentional violation by the Consultant of proprietary rights, copyrights, or rights of privacy, arising out of the publication, translation, reproduction, delivery, performance, use, or disposition of any data furnished under this Agreement.

5.) Nothing contained in this Article shall imply a license to NJ TRANSIT under any patent or be construed as affecting the scope of any license or other right otherwise granted to NJ TRANSIT under any patent.

6.) Paragraphs 3 and 4, above, are not applicable to material furnished to the Consultant by NJ TRANSIT and incorporated in the work furnished under the Agreement; provided that such incorporated material is identified by the Consultant at the time of delivery of such work.

7.) In the event that the project, which is the subject of this Agreement, is not completed, for any reason whatsoever, all data generated under this Agreement shall become subject data as defined in this clause and shall be delivered as NJ TRANSIT may direct.

B.) Patent Rights

1.) NJ TRANSIT shall own any patent or copyright to, and the right to patent or copyright, any plan, drawing, design, specification, report, software, study, survey, data, compositions of matter, manufactures, apparatus, appliances, processes of manufacture or types of construction or materials, regardless of medium (hereafter "Material") prepared by or for the Consultant, any Subconsultant, or by their respective consultants, agents, officers or employees in connection with performance of the Scope of Services under this Agreement as set forth in **Exhibit A**. Consultant deems all Material produced pursuant to this Agreement as work-made-for-hire under the Federal Copyright Law, United States Copyright Act, 17 U.S.C. § 101, and, to the extent not so deemed, the copyright thereto is hereby assigned to the NJ TRANSIT. Upon completion of the services or the earlier termination of this Agreement, the Consultant shall deliver to NJ TRANSIT all such Material, including such documentation, certifications, and executed forms, assignments and agreements as may be necessary to enable the NJ TRANSIT to fully own, patent or copyright such Material.

2.) If the Material or portions of the Material may be patented or copyrighted by others or are subject to other protection from use or disclosure, then the Consultant must grant or secure

for NJ TRANSIT, a royalty-free perpetual license to use the Material for any purpose, without additional compensation. NJ TRANSIT shall have the right to use or permit the use of Materials, and also any oral information received by NJ TRANSIT in connection with performance of the Scope of Services as set forth in **Exhibit A** and any ideas or methods represented by such Materials, for any purposes and at any time without additional compensation.

3.) Subject to the provisions set forth in this section, the Consultant shall defend and indemnify NJ TRANSIT against and save them harmless from all loss and expense incurred in the defense, settlement or satisfaction of any claims in the nature of infringement of any tangible or intangible property right including contract, patent, copyright, trademark or trade secret infringement or unfair competition arising out of or in connection with the use, in accordance with preceding paragraphs 1 and 2 of this Section, of such Materials or portions thereof which are patentable or which may be, or are, copyrighted or trademarked, or otherwise protected by law. If requested by the NJ TRANSIT and if notified promptly in writing of any claim as to which the Consultant shall indemnify NJ TRANSIT, the Consultant shall conduct all negotiations with respect to, and defend, such claim without expense to NJ TRANSIT or such affiliate or subsidiary. If NJ TRANSIT be enjoined from using the product of the Services or any portion thereof as to which the Consultant is to indemnify NJ TRANSIT against such claims, NJ TRANSIT may, at its option and without thereby limiting any other right it may have hereunder or at law or in equity, require the Consultant to provide at its own expense, equivalent substitutes for such product or affected portion thereof not subject to such injunction and not infringing any patent, copyright, trademark trade secret or other protection from use or disclosure, and if the Consultant shall fail to do so, the Consultant shall, at its expense, refund the cost of the offending product or portion thereof to NJ TRANSIT or take such steps as may be necessary to ensure compliance by NJ TRANSIT with such injunction, to the satisfaction of NJ TRANSIT.

4.) If any invention, improvement, or discovery of the Consultant is conceived or first actually reduced to practice in the course of or under this Agreement, which invention, improvement or

discovery may be patentable under the laws of the United States of America or any foreign country, the Consultant shall immediately notify NJ TRANSIT and provide a detailed report to FTA.

5.) The rights and responsibilities of NJ TRANSIT, the Consultant and the FTA with respect to such invention, improvement, or discovery will be determined in accordance with applicable Federal laws, regulations, policies and any waiver thereof.

21. PUBLICATION AND PUBLICITY: The Consultant, its Subconsultants, assignees, employees or agents shall not release or publish any information or material generated from this project to others outside of NJ TRANSIT without the express written permission of NJ TRANSIT except as specified in the Scope of Services.

22. EQUAL EMPLOYMENT OPPORTUNITY:

22.1 The Consultant hereby acknowledges that pursuant to N.J.A.C. 17:27-3.1, N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27 et seq. NJ TRANSIT cannot award a contract or pay money to any Consultant or Subconsultant which has not agreed and guaranteed to afford equal employment opportunity in performance of the contract in accordance with an affirmative action program and, except with respect to affectional or sexual orientation, approved under the terms established in N.J.A.C. 17:27. MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE FOR GOODS, GENERAL SERVICES, AND PROFESSIONAL SERVICES CONTRACTS (required by N.J.S.A. 10:5-31 et seq. and N.J.A.C. 17:27)

During the performance of this Contract, the Consultant agrees as follows:

The Consultant or Subconsultant, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the Consultant will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin,

ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity 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 apprentice-ship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The Consultant or Subconsultant, where applicable 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 age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The Consultant or Subconsultant will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union of the Contractor's commitments under this chapter and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The Consultant or Subconsultant, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

The Consultant or Subconsultant agrees to make good faith efforts to meet targeted county employment goals established in accordance with N.J.A.C. 17:27-5.2.

The Consultant or Subconsultant agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, and labor unions, that it does not discriminate on the basis of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The Consultant or Subconsultant agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the Consultant or Subconsultant agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The Consultant shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three (3) documents:

- Letter of Federal Affirmative Action Plan Approval;
- Certificate of Employee Information Report; or
- Employee Information Report Form AA-302 (electronically provided by the Division and distributed to the public agency through the Division's website at: http://www.state.nj.us/treasury/contract_compliance).

The Consultant and its Subconsultant shall furnish such reports or other documents to the Division of Purchase & Property, CCAU, EEO Monitoring Program as may be requested by the office from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Purchase & Property, CCAU, EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27.

22.2 Non-Discrimination: In accordance with the provisions of N.J.S.A. 10:2-1 the Consultant agrees that:

A.) In the hiring of persons for the performance of work under this Agreement or any subcontract hereunder, or for the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under this Agreement, no Consultant, nor any person acting on behalf of such Consultant or Subconsultant, shall, by reason of race, creed, color, national original, ancestry, marital status, gender identity or expression, affectional or sexual orientation, or sex, discriminate against any person who is qualified and available to perform the work to which the employment relates;

B.) No Consultant, Subconsultant, nor any person on his behalf shall, in any manner, discriminate against or intimidate any employee engaged in the performance of work under this Agreement or any subcontract hereunder, or engaged in the procurement, manufacture, assembling or furnishing of any such materials, equipment, supplies or services to be acquired under such Agreement, on account of age, race, creed, color, national origin, ancestry, marital status, gender identity or expression, affectional or sexual orientation, disability, nationality, or sex;

C.) There may be deducted from the amount payable to the Consultant by the contracting public agency, under this Agreement, a penalty of $50.00 for each person for each calendar day during which such person is discriminated against or intimidated in violation of the provisions of the Agreement; and

D.) This Agreement may be canceled or terminated by the contracting public agency and all money due or to become due hereunder may be forfeited, for any violation of this Article of the Agreement occurring after notice to the Consultant from the contracting public agency of any prior violation of this Article of the Consultant.

23. EQUAL OPPORTUNITY FOR INDIVIDUALS WITH DISABILITIES: The Consultant and NJ TRANSIT agree that the provisions of Title II of the Americans With Disabilities Act of 1990 (the "Act") (42 U.S.C. § 12101 et seq.), which prohibit discrimination on the basis of disability by public entities in all services, programs, and activities provided or made available by public entities, and the rules

and regulations promulgated thereto, are made a part of this Agreement. In providing any aid, benefit, or service on behalf of NJ TRANSIT pursuant to this Agreement, the Consultant agrees that the performance shall be in strict compliance with the Act. In the event that the Consultant, its agents, servants, employees, or Subconsultants violate or are alleged to have violated the Act during the performance of this Agreement, the Consultant shall defend NJ TRANSIT and the State of New Jersey in any action or administrative proceeding commenced pursuant to this Act. The Consultant shall indemnify, protect, and save harmless NJ TRANSIT and the State, their agents, servants, and employees from and against any and all suits, claims, losses, demands, or damages of whatever kind or nature arising out of or claimed to arise out of the alleged violation. The Consultant shall, at its own expense, appear, defend, and pay any and all charges for legal services and any and all costs and other expenses arising from such action or administrative proceeding or incurred in connection therewith In any and all complaints brought pursuant to the owner's grievance procedure, the Consultant agrees to abide by any decision of the owner which is rendered pursuant to such said grievance procedure. If any action or administrative proceeding results in an award of damages against NJ TRANSIT or the State or if NJ TRANSIT or the State incur any expense to cure a violation of the Act which has been brought pursuant to its grievance procedure, the Consultant shall satisfy and discharge the same at its own expense.

NJ TRANSIT shall, as soon as practicable after a claim has been made against it, give written notice thereof to the Consultant along with full and complete particulars of the claim. If any action or administrative proceeding is brought against NJ TRANSIT or any of its agents, servants, and employees, NJ TRANSIT will forward or have forwarded to the Consultant every demand, complaint, notice, summons, pleading, or other process received by it or its representatives.

It is expressly agreed and understood that any approval by NJ TRANSIT of the services provided by the Consultant pursuant to this Agreement will not relieve the Consultant of the obligation to comply with the Act and to defend, indemnify, protect, and save harmless NJ TRANSIT pursuant to this paragraph.

The Consultant expressly understands and agrees that the provisions of this indemnification clause shall in no way limit the Contractor's obligations assumed in this Agreement, nor shall they be construed to relieve the Consultant from any liability, nor preclude NJ TRANSIT from taking any other actions available to it under any other provisions of this Agreement or otherwise at law.

24. DISADVANTAGED BUSINESS ENTERPRISES: As an aid in meeting the commitment of its Disadvantaged Business Enterprise Program, NJ TRANSIT has assigned a DBE goal on the gross sum amount of the bid or contract for DBE subcontracting participation. All NJ Unified Certification Program (NJUCP) certified DBE firms, including suppliers, are eligible to participate in this contract. NJ TRANSIT's DBE Program is accorded the same priority as compliance with all other legal obligations required by the USDOT. Contractors shall comply with the DBE Program requirements in the award and administration of NJ TRANSIT contracts. Failure by the Contractor to carry out these requirements shall constitute a breach of the Contract, which may result in the termination of the Contract or other such remedy, as NJ TRANSIT deems appropriate.

The term "disadvantaged business enterprise" means a for-profit small business concern that is owned and controlled by one or more socially and economically disadvantaged persons, as defined by 49 C.F.R. Part 26. Such disadvantage may arise from cultural, racial, chronic economic circumstances or background or other similar cause. Such persons would include, but not be limited to, Black Americans (not of Hispanic origin); Hispanic Americans; Native Americans; Asian-Pacific Americans; Subcontinent Asian Americans; and Women, regardless of race or ethnicity.

NJ TRANSIT's DBE Program is accorded the same priority as compliance with all other legal obligations required by the USDOT. Consultants shall comply with the DBE Program requirements in the award and administration of NJ TRANSIT contracts. Failure by the Consultant to carry out these requirements shall constitute a breach of the Contract, which may result in the termination of the contract or other such remedy, as NJ TRANSIT deems appropriate.

Should the actual Contract amount increase or decrease, through approved change order(s), the Office of Business Development (OBD) must be informed. OBD will determine if this will result in an adjustment to DBE participation to reflect the assigned DBE goal.

The Consultant shall fully comply with the requirements and provisions set forth in the New Jersey Transit Corporation DBE Requirements for Federal Procurement Activities as set forth in **Exhibit D**

25. COMPLIANCE WITH FEDERAL, STATE AND LOCAL LAW:

A.) The Consultant shall comply with applicable laws, ordinances, and codes of the United States, the State of New Jersey and local governments within the State. If NJ TRANSIT determines that the Consultant has violated or failed to comply with applicable Federal, State or local laws with respect to its performance under this Agreement, NJ TRANSIT may withhold payments for such performance and take such other action that it deems appropriate under the circumstances until compliance or remedial action has been accomplished by the Consultant to the satisfaction of NJ TRANSIT.

B.) Incorporation of FTA Terms

This Professional Service Agreement includes, in part, certain standard terms and conditions required by USDOT, whether or not expressly set forth in this Agreement. All contractual provisions required by USDOT, as set forth in FTA Circular 4220.1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The Consultant shall not perform any act, fail to perform any act, or refuse to comply with any NJ TRANSIT requests which would cause NJ TRANSIT to be in violation of the FTA Master Agreement between NJ TRANSIT and the FTA.

C.) Changes to Federal Requirements

The Consultant shall at all times comply with all applicable FTA regulations, policies, procedures, and directives, including without limitation those listed directly or by reference in the Master Agreement between NJ TRANSIT and the FTA, as they may be amended or promulgated from time to time

during the term of this Agreement. Consultant's failure to so comply shall constitute a material breach of this Agreement unless the FTA determines otherwise.

26. CONFLICT OF INTEREST: In the event that the Consultant deems that any work currently being performed by it on other projects or any work to be performed on future projects is in conflict directly or indirectly with this Agreement, the Consultant shall immediately so notify NJ TRANSIT. NJ TRANSIT, in its sole discretion, shall have the right to terminate this Agreement in accordance with Article 15, TERMINATION OF THE AGREEMENT FOR CONVENIENCE hereof. Consultant, its subsidiaries and affiliates, joint ventures involving the Consultant, and its employees, agents or Subcontractors may be precluded from participating in any follow-up work based on the services provided under this Agreement. See FAR Subpart 9.507.

27. CONSULTANT'S EMPLOYEES: All personnel employed on this project and their daily rates shall first be approved in writing by NJ TRANSIT prior to assignment to this project and, in addition, any employee of the Consultant or its Subconsultants declared undesirable by NJ TRANSIT shall be relieved of any work under this Agreement by the Consultant.

The Consultant must receive NJ TRANSIT's prior written approval of any change in the project organization/manpower and Subconsultant project team approved for this project.

28. PROHIBITED INTEREST: No member, officer, or employee of NJ TRANSIT or its subsidiaries shall have any interest, direct or indirect, in this Agreement or the proceeds thereof. No former member, officer or employee of NJ TRANSIT or its subsidiaries who, during his tenure, had a direct, substantial involvement with matters that are closely related to this Agreement, shall have any interest, direct or indirect, in this Agreement or the proceeds thereof.

29. INTERESTS OF MEMBERS OF OR DELEGATES TO CONGRESS: No member of or delegate to the Congress of the United States shall be admitted to any share or part of this Agreement or to any benefit arising therefrom.

30. NJ TRANSIT CODE OF ETHICS FOR CONSULTANTS:

A.) General

1.) NJ TRANSIT considers the maintenance of public trust and confidence critical to its proper functioning. Consultants of NJ TRANSIT must avoid all situations where proprietary or financial interest, or the opportunity for financial gain, could lead to the favored treatment of any organization or individual. Consultants must also avoid circumstances and conduct which may not constitute actual wrongdoing, or conflict of interest, but might nevertheless constitute the appearance of questionable behavior to the general public, thus compromising the integrity of NJ TRANSIT.

2.) This policy is based upon the principles established in the New Jersey Conflicts of Interest Law (N.J.S.A. 52:13D-12 et seq.) and the regulations promulgated by the New Jersey State Ethics Commission thereunder, as well as the Plain Language Guide to Ethical Business Conduct for Companies Transacting Business with the State of New Jersey, promulgated by the New Jersey Department of the Treasury.

3.) This Code of Ethics for Consultants shall be deemed to be a substantial and integral part of every NJ TRANSIT Invitation for Bid (IFB), Request for Proposal (RFP) and contract.

4.) This policy is intended to augment, not to replace, existing law, regulations, administrative orders and the current Uniform Ethics Code.

B.) NJ TRANSIT Code of Ethics for Consultants

1.) Gifts, Gratuities and Favors:

a.) A Consultant shall not, either directly or indirectly, pay, offer to pay, or agree to pay any amount of money, fee, commission, compensation, gift, gratuity or other thing of value of any kind to any NJ TRANSIT Board Member or employee or to any member of their immediate family, or to any partnership, firm or corporation with which any such Board Member or employee is employed or associated, or in which (s)he has an interest within the meaning of N.J.S.A. 52:13D-13(g).

b.) A Consultant shall not give or offer any NJ TRANSIT Board Member, employee or their immediate family any amount of money, gift, loan or other thing of value regardless of

whether it might be reasonably inferred that such amount of money, gift, loan, service or other thing of value was given or offered for the purpose of influencing the Board Member or employee in the discharge of his or her official duties. In addition, Board Members, employees and their immediate family are not permitted to accept breakfasts, lunches, dinners, alcoholic beverages, tickets to entertainment and/or sporting events, wagers or other items or consideration. A Consultant may not "wine and dine" NJ TRANSIT Board Members, employees or their immediate family.

c.) NJ TRANSIT Board Members and employees may not accept any food or beverages from any Consultant with the exception of coffee, tea, soda, Danish, chips, pretzels, donuts or similar snacks, which may be provided to all attendees at a conference, seminar or business meeting. If food other than the above is provided (e.g., sandwich, pizza or a meal), the Board member or employee must pay the cost for the meal.

d.) Any questions as to what is or is not acceptable or what constitutes proper conduct for an NJ TRANSIT Board Member or employee, and any solicitation of gifts, consideration or items of value by or on behalf of a NJ TRANSIT Board Member or employee, should be referred to:

Chief Ethics Officer
NJ TRANSIT
One Penn Plaza East, 8th Floor
Newark, NJ 07105-2246
(973) 491-8820

2.) Solicitation by NJ TRANSIT Board Member or employee:

A Consultant shall immediately report in writing the solicitation of any fee, commission, compensation, gift, gratuity or other thing of value by a NJ TRANSIT Board Member or employee, to NJ TRANSIT's Chief Ethics Officer, the New Jersey Attorney General and the State Ethics Commission.

3.) Business, commercial or entrepreneurial relationship:

Whether or not pursuant to employment, contract or other agreement, expressed or implied, a Consultant shall not, directly or indirectly, undertake any private business, commercial or

entrepreneurial relationship with, or sell any interest in such Consultant to any NJ TRANSIT Board Member or employee having any duties or responsibilities in connection with the purchase, acquisition or sale of any property or services by or to NJ TRANSIT or with any person, firm or entity with which (s)he is employed or associated or in which (s)he has an interest within the meaning of N.J.S.A. 52:13D-13g. Any relationships subject to this provision shall be reported in writing forthwith to NJ TRANSIT's Chief Ethics Officer.

4.) General Standards:

a.) A Consultant shall not influence, or attempt to influence or cause to be influenced, any NJ TRANSIT Board Member or employee in his/her official capacity in any manner which might tend to impair the objectivity or independence of judgment of any Board Member or employee.

b.) A Consultant shall not request, influence, or attempt to request, influence or cause to be requested or influenced, any NJ TRANSIT Board Member or employee to use, or attempt to use, his/her official position in any manner to secure unwarranted privilege or advantage for the Consultant or any other person.

5.) Protected/Confidential Information:

a.) A Consultant may not profit, directly or indirectly, from the use of any secret or confidential NJ TRANSIT information, knowledge or data that has been illicitly disclosed.

b.) Consultants and their employees may not use any secret or confidential NJ TRANSIT information, knowledge or data for any purposes other than complying with their contractual obligations to NJ TRANSIT.

6.) Intellectual Property:

A Consultant may not use NJ TRANSIT branding, logo or any promotional or marketing materials without prior written approval from the NJ TRANSIT Communications Department.

7.) Employment Offers:

a) Current State Employees/Future Employment: If a Consultant offers a job to a NJ TRANSIT employee, with whom they have direct and substantial contact, such offer or solicitation

must be immediately disclosed to management and the Chief Ethics Officer. Please also note that NJ TRANSIT employees must secure prior approval for secondary employment. Depending on the consultant relationship with the employee, the consultant employment offer may be disapproved, and the NJ TRANSIT employee could be screened from taking any official action with respect to the particular consultant contracts, applications, or matters in the future.

b) Former State Employees: After leaving NJ TRANSIT, employees are under a lifetime ban against the use or provision of information not generally available to the public acquired during their employment. Additionally, former employees are prohibited from representing or assisting a Consultant concerning a particular contract or other matter if they were substantially and/or directly involved in that particular contract or other matter while employed by NJ TRANSIT.

8. Failure to Comply:

A Consultant's failure to comply with this policy may result in termination of the contract or debarment pursuant to N.J.A.C. 16:72-5.2. Additionally, violations of certain provisions of the Conflict of Interest Law are subject to a fine not to exceed $1,000, or imprisonment not to exceed six months, or both.

C. CROSS-REFERENCES

New Jersey Uniform Ethics Code, available online at https://www.state.nj.us/ethics/docs/ethics/uniformcode.pdf

New Jersey Conflicts of Interest Law and regulations adopted thereunder (N.J.A.C. 19:61-1.1 et seq.), available online at https://www.state.nj.us/ethics/statutes/conflicts/ and https://www.state.nj.us/ethics/statutes/rules/

Plain Language Guide to Ethical Business Conduct for Companies Transacting Business with the State of New Jersey, available online at https://nj.gov/ethics/docs/ethics/plainlanguage.pdf

31. POLITICAL ACTIVITY PROHIBITED: None of the funds or services contributed by NJ TRANSIT or the Consultant under this Agreement shall be used for any partisan political activity, or to further the election or defeat of any candidate for public office.

32. CERTIFICATION AND POLITICAL CONTRIBUTION DISCLOSURE (P.L. 2005, C.271): The Consultant is advised of its responsibility to file an annual disclosure statement on political contributions with the New Jersey Election Law Enforcement Commission (ELEC), pursuant to N.J.S.A. 19:44A-20.13 (P.L. 2005, c.271, section 3) if the Consultant receives contracts in excess of $50,000 from a public entity in a calendar year. It is the Consultant's responsibility to determine if filing is necessary. Failure to so file can result in the imposition of financial penalties by ELEC. Additional information about this requirement is available from ELEC at 888-313-3532 or at http://www.elec.state.nj.us.

33. NONSOLICITATION: The Consultant warrants that it has not retained any party other than a bona fide employee working for the Consultant to solicit this Agreement, and that it has not paid or agreed to pay any outside party consideration in any form contingent upon securing this Agreement. For breach of this warranty, NJ TRANSIT shall have the right to terminate this Agreement for cause.

34. MERGER AND SEVERABILITY: This Agreement embodies the entire agreement between the parties. If any provision herein is held invalid, it shall be considered deleted herefrom and shall not invalidate the remaining provisions hereof.

35. NOTIFICATION: Any request, demand, authorization, direction, notice, consent, waiver or other document provided or permitted by this Agreement to be made upon, given or furnished to, or filed with one party by another party shall be in writing and shall be delivered by hand or by deposit in the mails of the United States, postage paid, in an envelope addressed as follows:

If to NJ TRANSIT:

Chief of Procurement & Support Services
NJ TRANSIT
One Penn Plaza East
Newark, New Jersey 07105-2246
Attn: _____

With a copy to:

NJ TRANSIT
One Penn Plaza East
Newark, New Jersey 07105-2246
Attn: _____
Project Manager

If to the Consultant:

Attn: _____

Either party to the Agreement may redesignate the recipient or change the address of the recipient of notifications hereunder by notifying the other party to this Agreement, in writing, of such change.

36. EQUAL PAY ACT: Pursuant to N.J.S.A. 34:11-56.14(a), any employer, regardless of the location of the employer, who enters into a contract with a public body to perform qualifying services to the public body shall provide a report to the Commissioner of the New Jersey Department of Labor and Workforce Development, in a form promulgated by the Commissioner, of information regarding the compensation and hours worked by employees categorized by gender, race, ethnicity and job category.

Information regarding the Diane B. Allen Equal Pay Act and its requirements may be obtained from the New Jersey Department of Labor and Workforce Development (LWD) web site at: https://nj.gov/labor/equalpay/equalpay.html

LWD forms may be obtained from the online web site at:

https://nj.gov/labor/forms_pdfs/equalpayact/mw563(6-18)annualequalpay.pdf

37. SOVEREIGN IMMUNITY: NJ TRANSIT in entering into this Contract does not waive its sovereign immunity except as provided in the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1 et seq. The terms and conditions of the Contract are not intended to, and shall not be deemed to, expand the waiver of sovereign immunity as set forth in the Act.

38. DISPUTES: Disputes regarding whether a party has failed to make payments will first be submitted for resolution between the parties. If the parties are unable to reach an agreement, the dispute may be submitted to a process of alternative dispute resolution. Disputes arising in the performance of this Agreement which are not resolved by agreement of the parties will be decided in writing by the authorized representative of the Contracting Officer. This decision of the Contracting Officer's authorized representative shall be final and conclusive unless, within ten (10) Calendar Days from the date of receipt of its copy, the Consultant mails or otherwise furnishes a written appeal to the Contracting Officer. In connection with any such appeal, the Consultant shall be afforded an opportunity to be heard and to offer evidence in support of its position. Pending a final decision of a dispute hereunder by the Contracting Officer after a timely appeal, the Consultant shall proceed diligently with performance of the Contract in accordance with the decision of the authorized representative of the Contracting Officer.

39. LIMITATIONS OF LIABILITY: In no event, whether under the provisions of this Contract, as a result of breach of contract, tort (including negligence) or otherwise, shall NJ TRANSIT, the State, or USDOT, be liable to the Consultant for special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of rental value for Contractor owned equipment, damages to associated equipment, additional risk, cost of capital or interest of any nature (whether characterized as damages for the retention of money, an increase in the cost of performance, a penalty, or otherwise).

40. NO THIRD PARTY BENEFICIARIES: It is specifically agreed between the parties executing this Contract that it is not intended by any of the provisions of any part of the Contract to create

the public or any member thereof a third party beneficiary hereunder, or to authorize anyone not a party to the Contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the Contract.

It is the further intent of NJ TRANSIT and the Consultant in executing this Contract that no individual, firm, corporation or any combination thereof, which supplies materials, labor, services or equipment to the Consultant for the performance of the Scope of Services becomes thereby a third party beneficiary of this Contract. NJ TRANSIT and the Consultant understand that such individual, firm, corporation or combination thereof, has no right to bring an action in the courts of this State against the State or NJ TRANSIT, by virtue of this lack of standing and also by virtue of the provisions of the New Jersey Contractual Liability Act, N.J.S.A. 59:13-1 et seq.

41. PERSONAL LIABILITY OF PUBLIC OFFICIALS: In carrying out the provisions of the Contract, or in exercising power or authority granted to them by or within the scope of the Contract, there shall be no liability upon any NJ TRANSIT employee, either personally or as officials of the State, it being understood that in all such matters they act solely as agents and representatives of the State.

42. OUT OF STATE CORPORATIONS: If the Consultant is a corporation organized under laws of a state other than New Jersey, the Consultant shall have a certificate of authority to do business in New Jersey in accordance with N.J.S.A. 14A:13-3. In addition, pursuant to N.J.S.A. 14A:4-1 et seq., the Consultant shall maintain a registered office in New Jersey, have a registered agent with a business office in New Jersey and shall file with the Secretary of State the name of said agent and address of said office and provide a copy thereof to NJ TRANSIT.

Inquiries should be directed to:

State of New Jersey
Department of State
Division of Commercial Recording
CN-308
Trenton, New Jersey 08625
www.state.nj.us/njbgs

43. SUCCESSORS: This Agreement shall bind the heirs, representatives, successors, and assignees of the Consultant.

44. GOVERNING LAW: The Agreement shall be governed by and interpreted pursuant to the laws of the State of New Jersey.

45. QUALITY ASSURANCE PLAN: The Consultant shall perform all work consistent with the professional skill and care provided by practitioners of the same discipline under similar circumstances and conditions. The Consultant shall establish and maintain a Quality Assurance Plan, subject to NJ TRANSIT's approval, setting forth the Consultant's policy for quality assurance and procedures for implementing that policy. Such plan must apply to all persons engaged in work under this Agreement, include regular and written procedures for performance of all Project activities, and provide sufficient information to senior managers to enable effective supervision of the Project. The procedures shall provide for sufficient documentation to allow review and audit by NJ TRANSIT, and NJ TRANSIT may, in its discretion, review the Consultant's implementation of the procedures.

46. PROJECT SUPERVISION: If engineering, design, architectural or surveying services are provided under this Agreement, the Consultant shall assign an engineer or architect authorized to practice in the State of New Jersey to supervise the Scope of Services. The design and engineering services for this project shall be performed and/or approved by a Professional Engineer or Registered Architect licensed to practice in the State of New Jersey.

The Consultant shall exercise all due care in its preparation of documents for construction to ensure that they conform to all applicable legal and other requirements in effect at the time of issuance of the Contract documents. The approval of plans and specifications which have been submitted to NJ TRANSIT by the Consultant is not to be construed as authority to violate, cancel or set aside any provisions of such requirements or this Agreement. Nothing contained in this Agreement is intended to relieve the Consultant of responsibility for maintaining adequate supervision over the design in order to guard against deficiencies in the design work.

The Consultant shall be liable to NJ TRANSIT for any reasonable costs incurred by NJ TRANSIT to correct, modify or redesign any drawings submitted by the Consultant that are found to be defective or not in accordance with the provisions of this Agreement as a result of any act, error or omission on the part of the Consultant, or its agents, servants or employees. The Consultant shall be given reasonable opportunity to correct any deficiencies at no additional cost to NJ TRANSIT.

The Consultant shall also be liable to NJ TRANSIT for any reasonable costs incurred to correct, modify or reconstruct contractor work which was done based on any drawings submitted by the Consultant that are found to be defective or not in accordance with the provisions of this Agreement as a result of any act, error or omission on the part of the Consultant, or its agents, servants or employees. The Consultant shall be given reasonable opportunity to correct any deficiencies at no additional cost to NJ TRANSIT.

47. HISTORIC PRESERVATION: The Consultant shall submit to NJ TRANSIT, pursuant to this Agreement, a final design which meets the "Standards for Rehabilitation" established and published by the United States Department of the Interior at 36 C.F.R. Part 67, which standards are applied by the Commissioner of Environmental Protection in the statutory review, required by N.J.S.A. 13:1B-15.131, of projects which will encroach upon a site included in the New Jersey Register of Historic Places. In the event that the final design for the Project is submitted for review pursuant to N.J.S.A. 13:1B-15.131 and is not approved or is approved with conditions by the Commissioner of Environmental Protection, for reasons that the final design does not meet said standards, the Consultant shall correct or modify said design immediately upon notification of non-approval, or shall reimburse NJ TRANSIT for any reasonable costs incurred by NJ TRANSIT to correct or modify the design, so that it may be approved by the Commissioner of Environmental Protection.

48. FALSE OR FRAUDULENT STATEMENTS AND CLAIMS:

A.) The Consultant recognizes that the requirements of the Program Fraud Civil Remedies Act of 1986, as amended, 31 U.S.C. § 3801 et seq. and USDOT regulations, "Program Fraud

Civil Remedies," 49 C.F.R. Part 31, apply to its actions pertaining to the project. Accordingly, by signing the Agreement, the Consultant certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, or it may make pertaining to the Agreement. In addition to other penalties that may be applicable, the Consultant also acknowledges that if it makes a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986, as amended, on the Consultant to the extent the Federal Government deems appropriate.

B.) The Consultant also acknowledges that if it makes a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government in connection with an urbanized area formula project financed with Federal assistance authorized by 49 U.S.C. § 5307, the Government reserves the right to impose on the Consultant the penalties of 18 U.S.C. § 1001 and 49 U.S.C. § 5307(n)(1), to the extent the Federal Government deems appropriate.

49. NO FEDERAL GOVERNMENT OBLIGATIONS TO THIRD PARTIES: The Consultant agrees that absent the Federal Government's express written consent, the Federal Government shall not be subject to any obligations or liabilities to any sub-recipient, any third-party contractor, or any other person not a party to the Contract in connection with the performance of the project. Notwithstanding any concurrence provided by the Federal Government in the approval of any solicitation, sub-agreement, or third party contract, the Federal Government continues to have no obligations or liabilities to any party, including the sub-recipient and third party contractor.

50. EXCLUSIONARY OR DISCRIMINATORY SPECIFICATIONS: Apart from inconsistent requirements imposed by Federal statute or regulations, the Consultant agrees that it will comply with the requirements of 49 U.S.C. § 5323(h)(3) by refraining from using any Federal assistance awarded by FTA to support procurements using exclusionary or discriminatory specifications.

51. CLEAN WATER AND CLEAN AIR ACTS:

51.1 The Consultant agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. § 1251 et seq.:

A.) With the notification of violating facilities provisions of Executive Order No. 11738; "Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans", 42 U.S.C. § 7606. The Consultant agrees to report each violation to NJ TRANSIT and understands and agrees that NJ TRANSIT will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

B.) With the provisions of the Safe Drinking Water Act of 1974, as amended, 42 U.S.C. § 300h et seq.

51.2 The Consultant agrees to comply with all applicable, standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq. The Consultant agrees to report each violation to NJ TRANSIT and understands and agrees that NJ TRANSIT will, in turn, report each violation as required to assure notification to FTA and the appropriate EPA Regional Office.

51.3 The Consultant agrees to include both the Clean Water and Clean Air requirements in each subcontract exceeding $100,000. The $100,000 limit includes indefinite quantities where the amount is expected to exceed $100,000 in any year.

52. ENERGY CONSERVATION: The Consultant shall comply with mandatory standards and policies relating to energy efficiency contained in applicable State of New Jersey Energy Conservation Plans issued in compliance with the Energy Policy and Conservation Act (42 U.S.C. § 6321 et seq.).

53. CIVIL RIGHTS: During the performance of this Contract, the Consultant, for itself, its assignees and successors in interest and its Subconsultant at every tier (hereinafter referred to as the "Consultant") agrees as follows:

A.) Compliance with Regulations

The Consultant shall comply with the Regulations relative to nondiscrimination in federally-assisted programs of the United States Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Contract.

B.) Nondiscrimination

In accordance with Title VI of the Civil Rights Act, as amended, 42 U.S.C. § 2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6102, section 202 of the Americans with Disabilities Act of 1990, 42 U.S.C. § 12132, and Federal transit law at 49 U.S.C. § 5332, and N.J.S.A. 10:3-1, the Consultant agrees that it will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, age, or disability. In addition, the Consultant agrees to comply with applicable Federal implementing regulations and other implementing requirements FTA may issue.

C.) Equal Employment Opportunity

The following equal employment opportunity requirements apply to the underlying contract:

1.) Race, Color, Religion, National Origin, Sex

In accordance with Title VII of the Civil Rights Act, as amended, 42 U.S.C. § 2000e, and Federal transit laws at 49 U.S.C. § 5332, the Consultant agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 C.F.R. Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect activities undertaken in the course of the Project. The Consultant agrees to take affirmative action to ensure that applicants are employed and that

employees are treated during employment, without regard to their race, color, religion, national origin, sex, sexual orientation, gender identity, or age. 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. In addition, the Consultant agrees to comply with any implementing requirements FTA may issue.

2.) Age

In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, 29 U.S.C. § 623 and Federal transit law at 49 U.S.C. § 5332 and N.J.S.A. 10:5-12(a), the Consultant agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Consultant agrees to comply with any implementing requirements FTA may issue.

3.) Disabilities

In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 U.S.C. § 12112, the Consultant agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 C.F.R. Part 1630, pertaining to employment of persons with disabilities. In addition, the Consultant agrees to comply with N.J.S.A. 10:5-29.1 and any implementing requirements FTA may issue.

D.) The Consultant also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance provided by FTA, modified only if necessary, to identify the affected parties.

E.) Information and Reports

The Consultant shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or NJ TRANSIT or the FTA to be pertinent to ascertain compliance with such Regulations, orders and instruction. Where any information is

required or a Consultant is in the exclusive possession of another who fails or refuses to furnish this information, the Consultant shall so certify to NJ TRANSIT, or the FTA, as appropriate, and shall set forth what efforts it has made to obtain the information.

F.) Sanctions for Noncompliance

In the event of the Consultant's noncompliance with the nondiscrimination provisions of this Contract, NJ TRANSIT shall impose such contract sanctions as it or the FTA may determine to be appropriate, including but not limited to:

1.) Withholding of payments to the Consultant under the Contract until the Consultant complies; and/or

2.) Cancellation, termination or suspension of the Contract, in whole or in part.

54. CONTRACT WORK HOURS AND SAFETY STANDARDS: During the performance of this Agreement, the Consultant, for itself, its assignees and successors in interest (hereinafter referred to as the "Consultant") agrees as follows:

A.) Overtime Requirements: No Consultant or Subconsultant 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 work-week in which he or she is employed on such work to work in excess of forty (40) hours in such work-week unless such laborer or mechanic receives compensation at rate not less than one and one-half (1 ½) times the basic rate of pay for all hours worked in excess of forty (40) hours in such work-week, whichever is greater.

B.) Violation; Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in subparagraph (b)(1) of 29 C.F.R. Section 5.5, the Consultant and any Subconsultant responsible therefore shall be liable for the unpaid wages. In addition, such Consultant and Subconsultant shall be liable to the United States (in case the 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 (b)(1) of 29 C.F.R. Section 5.5 in the sum of $25 for each calendar day on which such individual was required or permitted to work in excess of eight (8) hours or in excess of the standard work-week of forty (40) hours without payment of the overtime wages required by the clause set forth in subparagraph (b)(1) of 29 C.F.R. Section 5.5.

C.) Withholding for Unpaid Wages and Liquidated Damages: NJ TRANSIT shall upon its own action or upon written request of an authorized representative of the U.S. Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the Consultant or Subconsultant under any such contract or any other Federal contract with the same prime Consultant, or any other Federally-assigned contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime Consultant, such sums as may be determined to be necessary to satisfy any liabilities of such Consultant or Subconsultant for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (B)(2) of 29 C.F.R. Section 5.5.

D.) Nonconstruction Grants: The Consultant or Subconsultant shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of five (5) years from the completion of the Agreement for all laborers and mechanics, including guards and watchmen, working on the Agreement. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. These records shall be made available by the Consultant or Subconsultant for inspection, copying, or transcription by authorized representatives of NJ TRANSIT, the FTA and the Department of Labor, and the Consultant or Subconsultant will permit such representatives to interview employees during working hours on the job.

E.) Subcontracts: The Consultant or Subconsultant shall insert in any subcontracts the clauses set forth in Paragraphs A through E of this Section and also a clause requiring the Subconsultants to include these clauses in any lower-tier subcontracts. The prime Consultant shall be

responsible for compliance by any Subconsultant or lower-tier Subconsultant with the clauses set forth in Paragraphs A through E of this Section.

55. CERTIFICATIONS REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION – LOWER TIER COVERED TRANSACTION: By signing this agreement, the lower tier participant, defined as the Consultant and its Subconsultants, is providing the certification set out below.

The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, NJ TRANSIT may pursue available remedies, including suspension and/or debarment.

The lower tier participant shall provide immediate written notice to NJ TRANSIT if at any time the lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

Certain terms used in this clause have the meanings set out in 2 C.F.R. Part 1200 and 2 C.F.R. Part 180.

The lower-tier participant agrees by signing this agreement that it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction unless authorized in writing by NJ TRANSIT.

The lower-tier participant further agrees by signing this agreement that it will include the clause titled “Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion – Lower-Tier Covered Transaction”, without modification, in all lower tier covered transactions (valued at $25,000 or more) and in all solicitations for lower tier covered transactions.

A participant in a covered transaction may rely upon a certification of a participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the

covered transaction, unless it knows that the certification is erroneous. Each participant shall check the U.S. Government System for Award Management (SAM) database.

Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

Except for transactions authorized under the fifth paragraph above, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to all remedies available to the Federal Government, NJ TRANSIT may pursue available remedies including suspension and/or debarment.

The lower tier participant certifies by signing this agreement that neither it nor its "principals" (as defined 2 C.F.R. § 180.995) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. A participant may decide the method and frequency by which it determines the eligibility of its principals.

When the lower tier participant is unable to certify to the statements in this certification, such participant shall submit a written explanation.

The lower tier participant shall also be currently registered and active with no exclusion on the U.S. Government System for Award Management (SAM) database.

56. LIMITATIONS ON LOBBYING: The Consultant and its Subconsultants shall comply with 31 U.S.C. § 1352, entitled "Limitation on use of appropriated funds to influence certain Federal contracting and financial transactions".

A.) No appropriated funds may be expended by the recipient of a Federal contract, grant, loan or cooperative agreement to pay 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 any of the following covered Federal actions: 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.) Any Consultant and any Subconsultant at any tier who requests or receives a Federally-assisted contract or subcontract in excess of $100,000 from NJ TRANSIT shall file with NJ TRANSIT the certification attached to this Agreement and entitled "Certification for Contracts, Grants, Loans and Cooperative Agreements" which certifies that the Consultant or Subconsultant, as applicable, has not made, and will not make, any payment prohibited by paragraph A.) of this Section.

C.) Any Consultant and any Subconsultant who has made or has agreed to make any payment using non-appropriated funds (to include profits from any covered Federal action) which would be prohibited under paragraph A.) of this Section if paid for with appropriated funds, shall file with NJ TRANSIT a disclosure form entitled "Disclosure of Lobbying Activities", which is available from NJ TRANSIT.

D.) Any certification or disclosure form filed under paragraphs B.) and C.) of this Section shall be forwarded from tier to tier until received by NJ TRANSIT. Any certification or disclosure form shall be treated as a material representation of fact upon which all receiving tiers shall rely. All liability arising from an erroneous representation shall be borne solely by the tier filing that representation and shall not be shared by any tier to which the erroneous representation is forwarded.

E.) The prohibition on the use of appropriated funds does not apply in the case of a payment of reasonable compensation to an officer or employee of the Consultant or Subconsultant if the payment is for agency and legislative liaison activities not directly related to a covered Federal action.

F.) The prohibition on the use of appropriated funds does not apply in the case of any reasonable payment to an officer or employee of a Consultant or Subconsultant or to a person, other than an officer or employee of a Consultant or Subconsultant, if the payment is for professional or technical

services rendered directly in the preparation, submission or negotiation of any bid, proposal or application for a Federal contract, grant, loan or cooperative agreement.

57. BUY AMERICA DESIGN REQUIREMENTS AND BUY AMERICA PREFERENCE:

(a) Buy America Design Requirements

The Consultant shall design the Project to ensure that the plans and specifications produced by the Consultant under this Agreement permit compliance with Section 165 of the Surface Transportation Assistance Act of 1982 (P.L. 97-424). All iron, steel and manufactured products specified by the Consultant shall be of domestic manufacture or origin, except as otherwise approved by NJ TRANSIT. Whenever the Consultant lists a product by make, manufacturer or model number in the specifications, the Consultant shall first ensure that the product is of domestic manufacture or origin. Should the Consultant find it necessary to specify iron, steel, or manufactured products which are not produced in the United States in sufficient and reasonably available quantities, then the Consultant shall submit a written justification to the Contracting Officer describing in detail the product, its estimated cost, the rationale for its use in the project and the basis for the Consultant's belief that the product is of limited domestic availability. NJ TRANSIT, in its sole discretion, will determine whether to seek a waiver of the Buy America requirements from the U.S. Secretary of Transportation. Should NJ TRANSIT determine that there is insufficient basis for seeking a waiver or if a waiver request is denied by USDOT, the Consultant shall redesign the project to conform with Buy America requirements at no additional cost to NJ TRANSIT.

(b) Domestic Preferences for Procurement

In accordance with 2 C.F.R. 200.322, the Contractor is advised of NJ TRANSIT's preference, to the greatest extent practicable, for the purchase, acquisition, or use of goods, products, or materials, produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products).

(1) For purposes of this section:

i. ‘‘Produced in the United States’’ means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.

ii “Manufactured products’’ means items and construction materials composed in whole or in part of nonferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

58. FLY AMERICA REQUIREMENTS: The Consultant agrees to comply with 49 U.S.C. § 40118 (the “Fly America” Act) in accordance with the General Services Administration’s regulations at 41 C.F.R. Part 301-10, which provide that recipients and sub-recipients of Federal funds and their Consultant s are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Consultant shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Consultant agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

59. FEDERAL PROVISIONS RELATED TO CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT:

(a) Definitions.

As used in this clause, the terms backhaul; covered foreign country; covered telecommunications equipment or services; interconnection arrangements; roaming; substantial or essential component; and telecommunications equipment or services have the meaning as defined in FEMA Policy, #405-143-1 Prohibitions on Expending FEMA Award Funds for Covered Telecommunications Equipment or Services.

(b) Prohibitions.

(1) Section 889(b) of the John S. McCain National Defense Authorization Act for Fiscal Year 2019, Pub. L. No. 115-232, and 2 C.F.R. § 200.216 prohibit the head of an executive agency on or after Aug.13, 2020, from obligating or expending grant, cooperative agreement, loan, or loan guarantee funds on certain telecommunications products or from certain entities for national security reasons.

(2) Unless an exception in paragraph (c) of this clause applies, the contractor and its subcontractors may not use grant funds to: (i) Procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system; (ii) Enter into, extend, or renew a contract to procure or obtain any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology of any system; (iii) Enter into, extend, or renew contracts with entities that use covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system; or (iv) Provide, as part of its performance of this contract, subcontract, or other contractual instrument, any equipment, system, or service that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) Exceptions.

(1) This clause does not prohibit contractors from providing— a. A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or b. Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) By necessary implication and regulation, the prohibitions also do not apply to:

a. Covered telecommunications equipment or services that:

i. Are not used as a substantial or essential component of any system; and

ii. Are not used as critical technology of any system.

b. Other telecommunications equipment or services that are not considered covered telecommunications equipment or services.

(d) Reporting requirement.

(1) In the event the contractor identifies covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system, during contract performance, or the contractor is notified of such by a subcontractor at any tier or by any other source, the contractor shall report the information in paragraph (d)(2) of this clause to NJ TRANSIT, unless elsewhere in this contract are established procedures for reporting the information.

(2) The Contractor shall report the following information pursuant to paragraph (d)(1) of this clause:

(i) Within one (1) business day from the date of such identification or notification: The contract number; the order number(s), if applicable; supplier name; supplier unique entity identifier (if known); supplier Commercial and Government Entity (CAGE) code (if known); brand; model number (original equipment manufacturer number, manufacturer part number, or wholesaler number); item description; and any readily available information about mitigation actions undertaken or recommended.

(ii) Within ten (10) business days of submitting the information in paragraph (d)(2)(i) of this clause: Any further available information about mitigation actions undertaken or recommended. In addition, the contractor shall describe the efforts it undertook to prevent use or submission of covered telecommunications equipment or services, and any additional efforts that will be incorporated to prevent future use or submission of covered telecommunications equipment or services.

(e) Subcontracts.

The Contractor shall insert the substance of this clause, including this paragraph (e), in all subcontracts and other contractual instruments.

60. **SEISMIC SAFETY**: The Consultant agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations 49 C.F.R. Part 41 and will certify to compliance to the extent required by the regulation. The Consultant also agrees to ensure that all work performed under this Contract including work performed by a Subconsultant is in compliance with the

standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

61. SETTING OFF TAX ARREARS AGAINST SUMS OWED: Whenever a taxpayer under contract with the State of New Jersey is indebted for any State Tax in accordance with N.J.S.A. 54:49-19, the State of New Jersey shall seek to set off the indebtedness as follows:

Whenever any taxpayer under contract to provide goods or services to the State of New Jersey or its agencies or instrumentalities, and including the legislative and judicial branches of State government, or under contract for construction projects of the State of New Jersey or its agencies or instrumentalities, and including the legislative and judicial branches of State government, is entitled to payment for the goods or services or on that construction project and at the same time the taxpayer is indebted for any State tax, the Director of the Division of Taxation shall seek to set off so much of that payment as may be necessary to satisfy the indebtedness. The Director, in consultation with the Director of the Division of Budget and Accounting in the Department of the Treasury, shall establish procedures and methods to effect a set-off. The Director shall give notice of the set-off to the taxpayer, the provider of goods or services or the Contractor or Subcontractor of construction projects and provide an opportunity for a hearing within thirty (30) Calendar Days of such notice under the procedures for protests established under N.J.S.A 54:49-18, but no request for conference, protest, or subsequent appeal to the Tax Court from any protest under this Article shall stay the collection of the indebtedness. No payment shall be made to the taxpayer, the provider of goods or services or the Contractor or Subcontractor of construction projects pending resolution of the indebtedness. Interest that may be payable by the State pursuant to N.J.S.A. 52:32-32 et seq. to the taxpayer, the provider of goods and services or the Contractor or Subcontractor of construction projects shall be stayed.

62. DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN: Pursuant to N.J.S.A. 52:32-55 et seq., any person or entity that submits a proposal or otherwise proposes to enter into or renew a contract must complete the certification to attest, under penalty of perjury, that neither the person or entity,

nor any of its parents, subsidiaries, or affiliates, is identified on the Department of Treasury's Chapter 25 list as a person or entity engaging in investment activities in Iran. The Chapter 25 list is found on the Division's website at http://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf. Consultants must review this list prior to completing the Disclosure of Investment Activities in Iran Certification. If NJ TRANSIT finds a person or entity to be in violation of law, NJ TRANSIT shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

63. ADA ACCESS: Facilities to be used in public transportation service must comply with the Americans with Disabilities Act, 42 U.S.C. § 12101 et seq.; DOT regulations, "Transportation Services for Individuals with Disabilities (ADA)," 49 C.F.R. Part 37; and Joint Access Board/DOT regulations, "Americans with Disabilities (ADA) Accessibility Specifications for Transportation Vehicles," 36 C.F.R. Part 1192 and 49 C.F.R. Part 38. Notably, DOT incorporated by reference into Appendix A of its regulations at 49 C.F.R. Part 37 the Access Board's "Americans with Disabilities Act Accessibility Guidelines" (ADAAG), revised July 2004, which include accessibility guidelines for buildings and facilities. DOT also added specific provisions to Appendix A of 49 C.F.R. Part 37 modifying the ADAAG with the result that buildings and facilities must comply with both the ADAAG and the DOT amendments.

64. TRANSITION: In the event that a new Contract has not been awarded prior to the expiration date of this Contract, including any extensions exercised, and the Contracting Officer elects to exercise this Contract transition, the Contractor shall continue the Contract under the same terms, conditions, and pricing until a new Contract can be completely operational. At no time shall this transition period extend more than 365 Calendar Days beyond the expiration date of this Contract, including any extensions exercised.

65. EXTENSION: If in the opinion of the Contracting Officer, it is in the best interest of NJ TRANSIT to extend the Contract, the Contractor shall be so notified of the Contracting Officer's intent at least thirty (30) Calendar Days prior to the expiration date of the existing Contract. The

Contractor shall have fifteen (15) Calendar Days to respond to the Contractor Officer's request to extend the term and period of performance of the Contract. If the Contractor agrees to the extension, all terms and conditions including pricing of the original Contract shall apply unless more favorable terms for NJ TRANSIT have been negotiated.

66. **ATTACHMENTS/EXHIBITS:** All of the following Appendices, Attachments, and Exhibits, are annexed hereto and made a part of this agreement:

Exhibit A: Scope of Services

Exhibit B: Cost Information

Exhibit C: NJ TRANSIT Travel and Business Reimbursement Guidelines

Exhibit D: DBE Requirements and Forms

Exhibit E: Consultant Certifications

Exhibit F: Addenda

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed the _____ day of _____ to be effective as of the day and year first above written.

WITNESS: **NEW JERSEY TRANSIT CORPORATION**

By:_____ By:_____
Title Contracting Officer or Duly Authorized Designee

WITNESS: **CONSULTANT**

By:_____ By:_____
Title Title

The aforementioned Agreement has been reviewed and approved as to form only.

ANDREW J. BRUCK
ACTING ATTORNEY GENERAL OF NEW JERSEY

By: _____
Deputy Attorney General

EXHIBIT 2

EXHIBIT 2
ACKNOWLEDGMENT OF RECEIPT OF ADDENDA

Proposers are required to acknowledge receipt of all Addenda issued prior to the Proposal due date. This acknowledgment is made by the Proposer, if an individual; by a partner, if a partnership or limited liability partnership; or by an officer of the corporation, if a corporation or by a member, if a limited liability corporation.

The undersigned acknowledges receipt of the following Addenda.

Addendum Number	Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

By: _____
Signature of Company Official

_____
Official's Title

_____
Company Name

EXHIBIT 3

Philip D. Murphy, Governor
Sheila Y. Oliver, Lieutenant Governor
Diane Gutierrez-Scaccetti, Commissioner
Kevin S. Corbett, Executive Director

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

NJ TRANSIT'S DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM POLICY STATEMENT

TO ALL NJ TRANSIT EMPLOYEES AND THE CONTRACTING COMMUNITY:

The NEW JERSEY TRANSIT CORPORATION (NJ TRANSIT) administers its Disadvantaged Business Enterprise (DBE) program in accordance with the U.S. Department of Transportation (USDOT) regulation 49 CFR Part 26, and hereby reaffirms and formalizes its commitment to the DBE Program and its objective: to create a "level playing field" in NJ TRANSIT's procurement activities.

As a major provider of public transportation with thousands of employees who have extensive daily contact with the public, NJ TRANSIT recognizes its responsibility to the diverse communities that it serves. It is the policy and commitment of NJ TRANSIT not to discriminate based on race, color, national origin, or sex in the award and performance of any NJ TRANSIT contract, or in the administration of its DBE program. It is also the policy of NJ TRANSIT to ensure that DBE's have a fair opportunity to be informed about, compete for, and participate in USDOT-assisted contracts.

In keeping with this commitment and this agency's obligations under 49 CFR Part 26, NJ TRANSIT will make every effort to achieve the following objectives:

- Ensure that only firms that fully meet eligibility standards of 49 CFR Part 26 are permitted to participate as DBE's on NJ TRANSIT contracts.
- Remove barriers that may prevent some DBE's from being able to participate on NJ TRANSIT contracts; and,
- Support the development of DBE firms, so they can compete successfully in the marketplace outside of the DBE Program.

Implementation of the DBE Program is accorded the same priority as compliance with all other legal obligations required by the USDOT. Contractors/Consultants shall comply with the DBE Program requirements in the award and administration of NJ TRANSIT contracts. Failure by the contractor/consultant to carry out these requirements shall constitute a breach of the contract, which could result in the termination of the contract or other such remedy, as NJ TRANSIT deems appropriate.

Leotis Sanders, NJ TRANSIT's Chief Civil Rights & Diversity Officer, is the corporation's DBE Liaison Officer (DBELO) to the Federal Transit Administration (FTA), and is responsible for implementing all aspects of NJ TRANSIT's DBE program while ensuring appropriate DBE participation in NJ TRANSIT's procurement activities.

NJ TRANSIT's Board of Directors is committed to the DBE Program as are all Assistant Executive Directors, General Managers, Chiefs, and their staffs. NJ TRANSIT's employees and all DBE and non-DBE business community members that participate in USDOT-assisted contracts, share in the responsibility for making NJ TRANSIT's DBE program a success. This policy is disseminated to all tiers of our organization, and to the DBE and non-DBE business communities that participate in our USDOT-assisted contracts.

Date: August 7, 2018

Kevin S. Corbett
Executive Director

NJT Contract #: _____

NEW JERSEY TRANSIT CORPORATION

DBE REQUIREMENTS FOR

FEDERAL PROCUREMENT ACTIVITIES

Race Conscious

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NEW JERSEY TRANSIT CORPORATION

Race Conscious

DBE REQUIREMENTS FOR
FEDERAL PROCUREMENT ACTIVITIES

The following pages provide Bidders/Proposers/Primes on federal contracts with New Jersey Transit (NJT), information about NJT's Disadvantaged Business Enterprise (DBE) Program, administered by the Office of Business Development (OBD). Prospective Bidders/Proposers/Primes will have an opportunity to ask questions regarding the directives contained in the DBE specifications at the pre-bid/pre-proposal conference(s). Further clarification of the DBE specifications, along with assistance in completing the forms, can be obtained by calling (973) 491-7593.

A list of certified DBE firms may be found in the NJ Unified Certification Program (NJUCP) Directory at https://njucp.dbesystem.com. **Note: Use of this list does not relieve the Bidder/Proposer/Prime contractor/consultant of responsibility to seek DBE participation from other sources. The list is updated daily and must be checked periodically, as firms are certified and decertified daily.**

These DBE specifications are a part of the Contract and shall be binding upon the successful Bidder/Proposer and Prime in the pre and post-award stages of NJT professional services, construction, and goods and services contracts. These specifications shall be binding upon sub-recipients and imposed on their contractors.

1.1 POLICY

As defined in the U.S. Department of Transportation (USDOT) Regulation 49 CFR Part 26, it is the policy of NJT that Disadvantaged Business Enterprises shall have the opportunity to compete for and participate in the performance of contracts financed in whole or in part with federal funds. Each subcontract a Prime signs with a subcontractor/subconsultant must include the following assurance referenced in **article 1.2.**

1.2 ASSURANCE

1.2.1 The Bidder/Proposer, Prime Contractor/Consultant, or subcontractor/subconsultant shall not discriminate on the basis of race, color, national origin, or sex in the award or performance of this contract. The Prime contractor/consultant shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. The Bidder/Proposer, Prime Contractor/Consultant, or subcontractor/subconsultant shall take all necessary and reasonable steps under 49 CFR Part 26 to ensure nondiscrimination in the award and administration of DOT assisted contracts. Failure by the contractor/consultant to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate

(49 CFR 26.13).

1.2.2 **This language is included to comply with relevant Federal law and to ensure that all persons who enter into any direct or indirect form of contractual agreement with NJT are aware of their responsibilities and the commitment of NJT to see that NJT's DBE Policy is carried out in all instances.**

1.3 DBE GOAL FOR THIS PROJECT

As an aid in meeting the commitment of its DBE Program, NJT is setting a *race conscious* goal of awarding _____ percent of the gross sum bid/proposal to certified NJUCP DBE firms. Should the actual contract amount increase or decrease, through approved change order(s), the assigned goal may remain. The OBD will determine if the change orders and/or contract phases will result in an adjustment to the DBE participation goal.

1.4 GUIDANCE TO BIDDER/PROPOSERS/PRIMES

1.4.1 Failure by a Bidder/Proposer/Prime to comply with any of the requirements contained herein shall result in breach of contract and it shall be subject to the appropriate penalties, remedies, or liquidated damage(s). **Refer to articles 5.6-5.7**

1.4.2 All required forms, including the supplemental section **(see articles 2.3-2.4)** must be submitted in accordance with the requirements. **Firms must be certified under the NJUCP at the time of contract award in order to obtain DBE credit toward the goal**. Firms pending certification will not count toward meeting the contract goal.

1.4.3 Price alone is not an acceptable basis for rejecting a DBE subcontractor/subconsultant's bid.

1.4.4 The Bidder/Proposer/Prime shall, at a minimum, seek DBEs in the same geographic area in which it generally seeks subcontractors/subconsultants. However, the Bidder/Proposer/Prime may be required to expand its search under specific circumstances as determined by OBD. **Refer to article 2.0**

1.4.5 Agreements between a Bidder/Proposer/Prime and a DBE in which the DBE promises not to provide subcontracting quotations to other Bidder/Proposers are prohibited.

1.4.6 The desire of a Bidder/Proposer/Prime to self-perform the work of a contract with its own organization is not an acceptable basis to not meet the goal or demonstrate a good faith effort to do so.

1.4.7 The Bidder/Proposer/Prime is responsible for verifying that the DBE is certified under the appropriate NAICS code for the scope of work identified. DBE credit shall be given only for work performed in the NAICS code(s) under which the DBE is certified.

1.4.8 A DBE firm listed on the First-Tier DBE Utilization Form (Form A) and Second-Tier DBE Utilization (Form AA) shall constitute a binding representation to NJT, by the Bidder/Proposer/Prime, that the DBE firm is qualified, available, and certified under the appropriate and required NAICS code to perform the scope of work identified. **Refer to article 2.5a**

1.5 TRANSIT VEHICLE MANUFACTURERS (TVM)

1.5.1 As a transit vehicle manufacturer, you must establish and submit for FTA's approval an annual overall DBE percentage goal. A TVM must certify that it submitted the annual DBE goal required by 49 CFR 26.49 and FTA has approved it or not disapproved it.

(a) As a condition of being authorized to bid or propose on FTA assisted transit vehicle procurements, the Bidder/Proposer must complete and submit the TVM Certification form with the bid/proposal certifying that it has complied with the requirements of 49 CFR 26.49.

1.5.2 NJT may, with FTA approval, establish project-specific goals for DBE participation in the procurement of transit vehicles in lieu of complying with the procedures of this section.

1.6 RESPONSIBLE BID/PROPOSAL CRITERIA

1.6.1 As a matter of responsibility, the two lowest Bidders or two highest ranked Proposers must submit the required forms, including the supplemental section (if applicable), with the bid/proposal or within five (5) calendar days after the bid opening or proposal/cost due date. Notwithstanding the date of submission of the mandatory DBE forms, **all negotiations between a Bidder and any potential DBE subcontractor, subconsultant, or supplier shall be completed prior to the bid opening or proposal/cost due date**.
Bidders/Proposers shall identify all DBE and non-DBE subcontractors, subconsultants, and suppliers proposed to participate in and those solicited for this Contract, and shall complete and submit the mandatory DBE Forms A, A1, A2, and B. The two lowest Bidders or two highest ranked Proposers shall also print and submit the DBE firm's current DBE Certification Profile from the NJUCP DBE Business Directory at njucp.dbesystem.com. Additionally, the two lowest Bidders or two highest ranked Proposers shall submit all applicable supplemental forms (AA, AA1, AA2, BB, DBE Certification Profile and D). All required DBE forms and Certification Profiles shall be submitted with the Bid or within five (5) calendar days of the bid opening or final cost due date. However, Bidders are strongly encouraged to submit all mandatory documents with the Bid to prevent delay of the Contract award.

1.6.2 Bidders are requested to review carefully and complete the forms entirely, with no blank fields. Failure to satisfactorily complete or submit all required documentation and/or demonstrate documented evidence of good faith effort within **five (5) calendar days after the bid opening or proposal/cost due date** shall result in rejection of a Bid as non-responsible.

1.6.3 If the two lowest Bidders/highest ranked Proposers submit the DBE forms, but fail to meet the DBE goal, the OCR/OBD will consider the efforts made to determine if a Bidder/Proposer/Prime has in fact demonstrated a good faith effort. **See article 2.0**

1.6.4 If it is determined that satisfactory good faith efforts were not made to include DBE participation on the contract, NJT shall consider awarding the contract to the next lowest bidder or highest ranked proposer who offers a reasonable price, meets the DBE goal and other bid requirements or requirements of 49

CFR Part 26 and/or satisfactorily demonstrates documented evidence of good faith effort.

2. GUIDANCE ON A GOOD FAITH EFFORT

2.1 To demonstrate a good faith effort to meet the DBE goal, a Bidder/Proposer/Prime shall provide written documentation in addition to Form D (article 2.3e), of the steps it has taken, prior to the bid opening/proposal due date, or during the life of the contract to obtain DBE participation. **The Bidder/Proposer/Prime can meet this requirement in either of two ways:**

(1) The Bidder/ Proposer/Prime can meet the goal.

(2) The Bidder/Proposer/Prime shall exhaust the available options referenced in **article 2.2** in making a continuous good faith effort to meet the assigned contract goal for the life of the contract.

(a) The efforts employed by the bidder should be those that one could reasonably expect a bidder to take if the bidder were actively and aggressively trying to obtain DBE participation sufficient to meet the contract goal.

(b) In determining a good faith effort, the OBD will consider the **quality**, **quantity**, and **intensity** of the different kinds of efforts that the Bidder/Proposer/Prime has made. Mere *pro forma* efforts will not be considered as demonstration of good faith effort to meet the DBE contract requirements.

(c) The Bidder/Proposer/Prime shall use good business judgment and consider a number of factors in negotiating with subcontractors/subconsultants, including DBE subcontractors/ subconsultants, and should take a firm's price and capabilities as well as contract goals into consideration. **The fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a Bidder's/Proposer's failure to meet the contract DBE goal, as long as such costs are reasonable as determined by NJT. Primes are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.**

(d) The Bidder/Proposer/Prime's **ability or desire to perform the work of a contract with its own organization (self-performance) does not relieve the Bidder/Proposer/Prime of the responsibility to meet the goal or demonstrate a good faith effort.**

(e) The Bidder/Proposer/Prime shall not reject DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The Bidder/Proposer/Prime's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example, union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the Bidder/Proposer/Prime's efforts to meet the assigned project goal.

(f) The OBD will support the Bidder/Proposer/Prime in indentifying ways to meet the assigned contract goal.

2.2 A GOOD FAITH EFFORT

The following is a list of actions that NJT will consider as evidence of a Bidder/Proposer/Prime's good

faith effort to obtain DBE participation. While exhausting the available options in this list may count as a good faith effort, this list is not intended to be a mandatory checklist, nor is this list intended to be exclusive or exhaustive of all the efforts a Bidder/Proposer/Prime might make to achieve the assigned DBE goal. NJT may require a Bidder/Proposer/Prime to take action above and beyond those listed below to meet the assigned DBE goal.

(a) The Bidder/Proposer/Prime shall solicit through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capacity to perform the work of the contract.

(1) The Bidder/Proposer/Prime must solicit this interest within sufficient time to allow the DBE to respond to the solicitation.

(2) The Bidder/Proposer/Prime must take appropriate steps to follow up on initial solicitations in order to determine with certainty if the DBE firms are interested.

(b) The Bidder/Proposer/Prime shall select portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the Prime might otherwise prefer to perform these work items with its own forces.

(c) The Bidder/Proposer/Prime shall provide interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(d) The Bidder/Proposer/Prime shall negotiate with a DBE(s) with the intent to enter into a contract. It is the Bidder/Proposer's responsibility to make a portion of the work available to DBE subcontractors/subconsultants and suppliers and to select those portions of the work or material needs consistent with the available DBE Primes and suppliers, so as to facilitate DBE participation.

(1) Evidence of such negotiation includes: the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

(e) The Bidder/Proposer/Prime shall make efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by NJT or the Prime contractor.

(f) The Bidder/Proposer/Prime shall make efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

(g) The Bidder/Proposer/Prime shall effectively use the services of available minority/women community organizations; minority/women Prime contractors groups; local, State and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs.

2.3 REQUIRED FORMS

(a) **Form A - First Tier DBE Utilization:** Lists all First Tier DBE firms scheduled to participate on this contract.

(b) **Form A1 - Bidder/Proposer Solicitation and Contractor Information**: Lists all DBE and Non-DBE sub contractor/subconsultants, including suppliers, solicited for, **and** participating on this contract.

(c) **Form A2- Non-DBE Sub Utilization**: Lists all **DBE and Non-DBE** subcontractors/ subconsultants, including suppliers, participating on this contract.

(d) **Form B - Intent to Perform as a DBE Sub**: Identifies the work the 1st Tier DBE intends to perform including scope of work, subcontract dollar value, etc.

(e) **DBE Good Faith Effort Form (if applicable):** Identifies any DBE subcontractor invited to quote, but declined to do so for any reason.

(f) **Trucking Commitment Agreement (if applicable):** Identifies all trucking firms (DBE and Non-DBE) participating on this contract, **at any tier**.

(g) **NJ UCP DBE Certification Profile & NAICS Code Verification:** Confirms the DBE status, name, address, contact information, business description and NAICS code(s) of each First Tier DBE subcontractor/subconsultant.

(h) ***Form E - Contractor's Monthly DBE Payment Report & Payment Certification Voucher (Post-Award)**: Records monthly payments issued to each DBE subcontractor/subconsultant/supplier and monthly payments issued by NJ TRANSIT to the Prime. Certifies that DBE subs have been paid for previous month's invoices.

(i) **Form E2 – DBE's Monthly Payment Report (Post-Award)**: Records monthly invoices submitted by the DBE, payments owed to the DBE on past due invoices and payments received from the prime by each DBE subcontractor/subconsultant.

(j) **Form E1- DBE Prime's Monthly Payment Report** *(For DBE Prime Only):* Records monthly payments issued to each DBE Prime by NJ TRANSIT to.

This form is due from the Prime in each month following the notice to proceed issued by NJ TRANSIT.* ***Refer to article 5.2.4*

2.4 SUPPLEMENTAL FORMS (REQUIRED IF APPLICABLE)

(a) **Form AA – Second Tier DBE Utilization:** Lists all Second Tier DBE firms scheduled to participate on the DBE sub-Prime's contract.

(b) **Form AA1 – Second Tier Bidder/Proposer Solicitation and Contractor Information**: Lists all Second Tier DBE firms participating on this contract as indicated on Form AA and Form AA2.

(c) **Form AA2- Second Tier Non-DBE Sub Utilization:** Lists all **DBE and Non-DBE firms** including suppliers participating on the DBE sub-Prime's contract.

(d) **Form BB - Intent to Perform as a Second Tier DBE Sub**: Identifies the work the 2nd Tier DBE intends to perform including scope of work, subcontract dollar value, etc.

(e) **NJ UCP DBE Certification Profile & NAICS Code Verification:** Confirms the DBE status, name, address, contact information, business description and NAICS code(s) of each Second Tier DBE subcontractor/subconsultant.

2.5 INSTRUCTIONS FOR COMPLETING REQUIRED FORMS (see glossary for definition of terms)

(a) **Form A - First Tier DBE Utilization:**

Form A is a formal agreement between the Bidder/Proposer and the DBE(s). Replacement/removal of DBE subcontractors/subconsultants/supplier identified on Form A is prohibited after the bid or proposal is submitted to NJT. **Refer to article 4.3**. A DBE Bidder/Proposer, which lists itself on Form A, is committed to performing the work indicated with its own personnel.

DBEs performing as second tier sub(s) to a **non-DBE sub Prime** should be listed with the name of the non-DBE sub Prime's firm name in parenthesis next to the DBE sub's name. {*Ex: DBE Electric Co. (Prime Contractor, Inc.)*}

(1) A first Tier DBE is required to perform at least 51% of its subcontract value with its own forces. Bidders/Proposers/Primes will not receive any credit for DBEs performing less than 51% and therefore must not be listed on this form.

(2) For DBE suppliers, identify all manufacturers, regular dealers, and brokers. If a DBE supplier is a ***manufacturer***, indicate the full value of its subcontract. If a DBE supplier is a ***regular dealer***, show its total contract value multiplied by 60% (Ex. $100K x 60%= $60K). If a DBE supplier is ***neither a manufacturer nor a dealer***, indicate the fee/commission only, ***not*** *the cost of materials or supplies*. See **article 3.0** for direction on determining credit toward the goal.

(3) A detailed scope of work must be provided; one-word descriptions are not acceptable. ***(Ex. Haul and dispose of approximately 192,000 tons of contaminated soil to a clean earth facility at $34.00 a ton).***

(b) **Form A1 - Bidder/Proposer/Prime Solicitation and Contractor Information:**

The Bidder/Proposer must complete and submit **page one** (1). The DBE and non-DBE subcontractors/subconsultants, including suppliers, solicited for, participating on, or expressed interest in this contract must complete **page two** (2).

(c) **Form A2- Non-DBE Sub Utilization:**

Bidders/Proposers are required to report and submit all dollars committed to non-DBE subcontractors/subconsultants/suppliers. The non-DBE portion of work is **not** counted toward the assigned DBE goal. **See article 3.0**

A detailed scope of work must be provided; one-word descriptions are not acceptable.

(Ex. Haul and dispose of approximately 192,000 tons of contaminated soil to a clean earth facility at $34.00 a ton).

(d) Form B - Intent to Perform as a First Tier DBE Sub:

Each DBE subcontractor/subconsultant/supplier listed on Form A must complete and sign Form B. **Note: The Bidder/Proposer/Prime is prohibited from completing any portion of the form and from directing DBE(s) to sign a blank form.**

(1) The Bidder/Proposer/Prime must provide interested DBEs with a copy of appropriate plans, specifications, and requirements of the contract in a timely manner to allow the DBE to prepare an appropriate price quote and submit on time.

(2) First Tier DBEs must perform at least 51% of the total dollar value of its subcontract, with its own forces. The firm must indicate the percentage of the total portion of work to be subcontracted to DBE and non-DBE firms. The non-DBE percentage of work is not counted toward the assigned goal.

(3) The OBD encourages DBE-to-DBE subcontracting in order to preserve DBE participation credit. **See article 3.0**

(4) The DBE must provide a detailed scope of work; one-word descriptions are not acceptable. Descriptions should include: *type of services provided, total number of units, price per unit, total cost, etc.*

(e) DBE Good Faith Effort: (If Applicable)

Form D applies to any Bidder/Proposer/Prime who failed to meet the assigned DBE goal. This form will assist the Bidder/Proposer/Prime in demonstrating a good faith effort.

If the DBE(s) solicited declines to sign this form, the completed form should be submitted with the Bidder/Proposer's signature only and the OBD will verify the information provided with the firm. **Refer to articles 2.0-2.2** for guidance.

(f) Trucking Commitment Agreement: (If Applicable)

DBEs must provide information for all DBE and non-DBE trucking firms it will lease from or subcontract to. Subcontracting to a non-DBE trucker means that the non-DBE will perform a portion of the DBE firm's subcontract. **Refer to article 3.4**

The following documents must be attached for all trucks owned: copy of title(s)/finance agreement(s), registration card(s), insurance card(s), apportioned cab card(s) and/or hazardous material license(s) if applicable. A copy of the title or finance agreement is the only acceptable proof of ownership.

The following documents must be attached for all trucks leased: copy of lease agreement(s) established between both firms, title(s), registration card(s), insurance card(s), lease agreement(s), apportioned cab card(s) and/or hazardous material license(s) if applicable.

(g) NJ UCP DBE Certification Profile and NAICS Code Verification:

All DBEs listed on Form A must be certified at the time of contract award. It is the Bidder/ Proposer's responsibility to ensure that DBEs are certified and that their NAICS code(s) match the scope of work to be performed on this contract. Credit will not be given for any work to be performed without the appropriate NAICS code. DBE status and profile can be verified and printed through https://njucp.dbesystem.com and NAICS codes descriptions can be verified through www.census.gov/eos/www/naics/.

(h) Form E - Contractor's Monthly DBE Payment Report & Payment Certification Voucher:

Beginning the month following the contract's notice to proceed, the Prime must report monthly payment activity for each DBE subcontractor/subconsultant/supplier; certifies each DBE sub has been paid any amounts due from previous or current progress payments paid to the Prime. (**article 5.2.4)**

All invoices 30 days past due from NJT must be listed in the appropriate field.

This report is due even if there is no payment activity. This form must be completed and submitted to the OBD **by the 7th of each month** to the attention of the OBD's Manager of Contract Compliance.

(i) Form E1- DBE Prime's Monthly Payment Report *(For DBE Prime Only)*

Beginning the subsequent month following the contract's execution date, the DBE Prime must report its monthly payments received by NJT. **Refer to article 5.2.5.**

All invoices 30 days past due from NJT must be listed in the appropriate field.

This report is due even if there is no payment activity. This form must be completed and submitted to the OBD **by the 7th of each month** to the attention of the OBD's Manager of Contract Compliance.

(j) Form E2 – DBE's Monthly Payment Report:

The Prime must provide a copy of the Form E2 to each DBE subcontractor/subconsultant/ supplier(s).

Beginning the subsequent month following the DBE's execution date, the DBE firm must report its monthly payment activity.

This report is due even if there is no payment activity. **This form must be completed and submitted by the DBE only** to the OBD **by the 7th of each month** to the attention of the OBD's Manager of Contract Compliance.

All invoices 30 days past due must be listed in the appropriate field. Identify concerns or issues in the comments section to be addressed by the OBD. **(Refer to article 5.2.6)**

2.6 INSTRUCTIONS FOR COMPLETING SUPPLEMENTAL REQUIRED FORMS:

(a) **Form AA – Second Tier DBE Utilization:** The Second Tier DBE **must perform 100%** of its subcontract with its own forces. A formal request to waive this requirement may be granted, solely at the discretion of the OBD; however, approval is required.

A detailed scope of work must be provided; one-word descriptions are not acceptable.

(Ex. Haul and dispose of approximately 192,000 tons of contaminated soil to a clean earth facility at $34.00 a ton).

(b) **Form AA1 – Second Tier Bidder/Proposer Solicitation and Contractor Information:**

The DBE sub-Prime must submit and complete **page one** (1). Second Tier DBE(s) solicited for and participating on this contract must complete **page two** (2).

(c) **Form AA2- Second Tier Non-DBE Subcontractor Utilization:**

DBE sub-Primes are required to report and submit all dollars committed to non-DBEs. The non-DBE portion of work is not counted toward DBE participation credit. **Refer to article 3.0**

A detailed scope of work must be provided; one-word descriptions are not acceptable.

(Ex. Haul and dispose of approximately 192,000 tons of contaminated soil to a clean earth facility at $34.00 a ton).

(d) **Form BB - Intent to Perform as a Second Tier DBE Subcontractor:**

Each DBE firm listed on Form AA, must complete, and sign. **Only Second Tier DBE(s) must complete and sign this form.**

The Second Tier DBE must provide a detailed scope of work; one-word descriptions are not acceptable. Descriptions should include: type of services provided, total number of units, price per unit, total cost, etc

(e) **NJ UCP DBE Certification Profile & NAICS Code Vérification:**

All DBEs listed on Form AA must be certified at the time of contract award. It is the Bidder/Proposer/Prime's responsibility to ensure that DBEs are certified and that their NAICS code(s) match the scope of work to be performed on this contract. Credit will not be given for any work to be

performed without the appropriate NAICS code. DBE status and profile can be verified and printed through https://njucp.dbesystem.com and NAICS codes descriptions can be verified through www.census.gov/eos/www/naics/.

3.0 GUIDANCE ON COUNTING DBE PARTICIPATION

3.1 If a firm is not currently certified as a DBE in accordance with 49 CFR part 26 at the time of the execution of the contract, the firm's participation will not count toward the DBE goal.

3.1.1 A DBE performing less than 51% of its subcontract will not count toward the assigned goal and should not be listed on any forms.

3.1.2 When a DBE subcontracts part of the work of its contract to another firm, the value of the subcontracted work may be counted toward DBE goals only if the DBEs subcontractor/subconsultant is a DBE.

(a) Work that a DBE subcontracts to a **non-DBE** firm does not count toward the DBE contract goal.

(b) When a DBE performs as a participant in a **joint venture with a Non-DBE**, count the portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work of the contract that the DBE performs with its own forces toward DBE goals.

(c) A DBE performs a *commercially useful function* when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing and supervising the work involved.

A DBE does not perform a *commercially useful function* if its role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of DBE participation.

3.2 COUNTING DBE PARTICIPATION

3.2.1 When a DBE participates in a contract, only the value of the work actually performed by the DBE is counted toward DBE goals.

(a) The entire amount of that portion of a contract that is performed by the DBE's own forces is counted. This includes the cost of supplies and materials obtained by the DBE for the work of the contract, as well as supplies purchased, or equipment leased by the DBE (*except supplies and equipment the DBE subcontractor/subconsultant purchases or leases from the Prime contractor or its affiliate*).

3.2.2 The entire amount of fees or commissions charged by a DBE firm for providing a bona fide service, such as professional, technical, consultant, or managerial services, or for providing bonds or insurance specifically required for the performance of a contract, is counted toward DBE goals, provided the fee is reasonable and not excessive as compared with fees customarily allowed for similar services by a DBE.

3.3 DBE PRIME CONTRACTOR GUIDANCE

3.3.1 If a **DBE Prime,** expenditures are counted toward DBE goals only if the DBE is performing a commercially useful function on that contract.

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3.3.2 A DBE Prime must perform or be responsible at least 30% of the total cost of its contract with its own workforce.

3.3.3 **If a DBE Prime does not perform or exercise responsibility for at least 30% of the total cost of its contract with its own workforce** or subcontracts a greater portion of the work of a contract than would be expected on the basis of normal industry practice for the type of work involved, NJT will consider that it is not performing a commercially useful function and the DBE Prime shall be in breach of the contract and subject to the appropriate remedies and penalties. **Refer to Articles 5.6-5.7**

3.4 DBE TRUCKING FIRMS GUIDANCE

3.4.1 A DBE **trucking firm** is performing a commercially useful function if:

(a) The DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there is not a contrived arrangement for the purpose of meeting DBE goals.

(b) The DBE itself **owns and operates at least one** fully licensed, insured, and operational truck to be used on the contract.

3.4.2 The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.

3.5 LEASING TRUCKS

3.5.1 Leased trucks must display the name and identification number of the DBE.

3.5.2 The DBE may lease trucks from another DBE firm, including an owner-operator that is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the contract.

3.5.3 The DBE may also lease trucks from a **non-DBE firm**, including an owner-operator.

(a) The DBE that leases trucks equipped with drivers from a non-DBE is entitled to credit for the total value of transportation services provided by non-DBE leased trucks equipped with drivers not to exceed the value of transportation services on the contract provided by DBE-owned trucks or leased trucks with DBE employee drivers.

(b) The DBE may lease trucks without drivers from a non-DBE truck leasing company. If the DBE leases trucks from a non-DBE truck leasing company and uses its own employees as drivers, it is entitled to credit for the total value of these hauling services

3.5.4 For the purposes of this section (Leasing), a lease must indicate that the DBE has exclusive use of and control over the truck.

(a) This does not preclude the leased truck from working for others during the term of the lease with the

consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck.

3.6 COUNTING MATERIALS AND SUPPLIES

3.6.1 Expenditures with DBEs for materials or supplies are counted toward DBE goals as provided in the following:

(a) If the materials or supplies are obtained from a **DBE manufacturer,** 100% of the cost of the materials or supplies are counted toward DBE goals.

(1) For purposes of this paragraph 3.6.1(a), a manufacturer is a firm that operates or maintains a factory or establishment that produces, on the premises, the material, supplies, articles, or equipment required under the contract and of the general character described by the specifications.

(b) If the materials or supplies are purchased from a **DBE regular dealer**, sixty percent (60%) of the cost of the materials or supplies is counted toward DBE goals.

(1) For purposes of this paragraph 3.6.1(b), a regular dealer is a firm that owns, operates, maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment of the general character described by the specifications and required under the contract are bought, kept in stock, and regularly sold or leased to the public in the usual course of business.

(2) The firm must be an established, regular business that engages, as its principal business and under its own name, in the purchase and sale or lease of the products in question.

(3) A person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business as provided above if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis.

(4) Packagers, brokers, manufacturers' representatives, or other persons who arrange or expedite transactions are not regular dealers within the meaning of this paragraph 3.6.1(b).

(c) With respect to materials or supplies purchased from a **DBE, which is neither a manufacturer nor a regular dealer**, only the entire amount of fees or commissions charged for assistance in the procurement of the materials and supplies, or fees or transportation charges for the delivery of materials or supplies required on a job site, is counted toward DBE goals, provided the fees are determined to be reasonable and not excessive as compared with fees customarily allowed for similar service. **However, any portion of the cost of the materials and supplies themselves do not count toward DBE goals.**

4.0 TERMINATION OF DBE(s) 26.53

In addition to post-award terminations, the provisions of this section apply to pre-award deletions of or substitutions for DBE firms put forward by bidders, and offerors in negotiated procurements.

4.1 The Bidder/Proposer/Prime shall not terminate a DBE sub listed in response to Article 1.6 (or an approved substitute DBE firm) for convenience, or any other reason without NJT/OBD's prior written consent. This includes, but is not limited to, instances in which a Bidder/Proposer/Prime seeks to perform work originally designated for a DBE sub with its own forces or those of an affiliate, a non-DBE firm, or with another DBE firm. **See Article 4.3.**

(A) The Bidder/Proposer/ Prime shall utilize the specific DBEs listed to perform the work and supply the materials for which each is listed unless you obtain OBD's written consent as provided in this paragraph (4.1); and

(B) That, unless (OBD's) consent is provided under this paragraph (4.1), the Bidder/Proposer/Prime shall not be entitled to any payment for work or material unless it is performed or supplied by the listed DBE.

(C) Before transmitting to you OBD its request to terminate and/or substitute a DBE sub, the Bidder/Proposer/Prime must give notice in writing to the DBE sub, with a copy to OBD, of its intent to request to terminate and/or substitute, and the reason for the request.

(D) The prime contractor must give the DBE five (5) days to respond to the prime contractor's notice and advise OBD and the Prime of the reasons, if any, why it objects to the proposed termination of its subcontract and why OBD should not approve the Prime's action.

(E) When a DBE subcontractor is terminated as provided in paragraph Article 4.1, or fails to complete its work on the contract for any reason, the Bidder/Proposer/Prime is required to make good faith efforts to find another DBE subcontractor to substitute for the original DBE. These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal established for the procurement. The good faith efforts shall be documented by the Bidder/Proposer/Prime and submitted within seven (7) days of NJT's request, which may be extended for an additional seven (7) days if necessary at the request of the contractor, and OBD shall provide a written determination to the contractor stating whether or not good faith efforts have been demonstrated.

Submission of all REQUIRED FORMS is mandatory for the following Articles 4.2 through 4.5

4.2 ADDITION OF DBE(s)

4.2.1 Should the Bidder/Proposer/Prime wish to add a DBE not listed on Form A, a written request for the addition of a DBE(s) must be submitted by the Bidder/Proposer/Prime.

4.2.2 The Bidder/Proposer/Prime must receive written approval of the OBD **prior to** the addition of the DBE subcontractor/subconsultant in order for the addition to be credited toward the goal.

4.3 REPLACEMENT OR REMOVAL OF DBE(s)

4.3.1 When a Prime is considering replacing or removing a DBE due to performance issues, the OBD must be contacted as soon as possible.

4.3.2 Request for DBE replacement or removal may be made under the following conditions:

1) The DBE materially fails to successfully perform the contract tasks.

2) Under unusual situations referenced in article 4.3.8.

4.3.3 A written request for replacement or removal of a DBE(s) listed on Form A, must be submitted by the Bidder/Proposer/Prime to the OBD with complete justification for the request. The process to follow such requests is as follows:

(a) Written communications (over a period) from the Prime and NJT's project manager to the DBE, notifying the DBE of its poor performance and the Prime's intent to terminate must be provided to the OBD. The prime contractor must give the DBE five (5) days to respond to the prime contractor's notice and advise NJT/OBD and the Prime of the reasons, if any, why it objects to the proposed termination of its subcontract and why NJT/OBD should not approve the Prime's action.

(b) **The OBD will arrange a meeting with the DBE, the Prime, and a representative from Procurement and project management to discuss the specifics of the performance issue.**

(c) The DBE must provide a written plan identifying the efforts it will make to correct the deficiencies.

(d) The Prime must provide the DBE with a minimum of 30 calendar days from acceptance of its plan to improve its performance. Throughout the 30-day window, the Prime and/or NJT PM/CM team must provide written communication to the DBE of any additional/continued performance issues, with a copy to the OBD.

4.3.4 The Bidder/Proposer/Prime must receive written approval of the OBD **prior to** replacement or removal of the DBE subcontractor/subconsultant can be made, regardless of the reason for the replacement or removal.

4.3.5 If the OBD issues written approval for the removal of a DBE(s), NJT will require a Bidder/Proposer/Prime to continue to demonstrate a good faith effort to replace the removed DBE to the extent needed to meet the contract goal established by NJT for the procurement. See Article 4.1(E)

These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the removed DBE to the extent necessary to meet the established contract goal.

4.3.6 Failure to obtain approval from the OBD **prior to** replacing or removing a DBE shall result in the Bidder/Proposer/Prime being found in breach of the contract and subject to the appropriate remedies,

audits and penalties. **Articles 5.6-5.7**

4.3.7 If NJT finds that the Bidder/Proposer/Prime upon submission of its bid/proposal committed itself to the goal in good faith, the Bidder/Proposer/Prime may, in "unusual situations", be permitted to substitute a DBE subcontractor(s)/subconsultant(s).

4.3.8 The term "*unusual situations*", includes, but is not limited to, the following circumstances:

(a) Failure to qualify as a DBE, or maintain DBE certification status.

(b) Death or physical disability of a key individual.

(c) Dissolution, if a corporation or partnership.

(d) Bankruptcy of the subcontractor/subconsultant, subject to applicable bankruptcy law, and only in instances where the bankruptcy affects the subcontractor/subconsultant's ability to perform.

(e) Inability to obtain, or loss of, a license necessary for the performance of the particular category of work.

(f) Failure or inability to comply with a requirement of law applicable to Primes or, subcontractors/subconsultants.

4.4 WITHDRAWN DBE(s)

4.4.1 When a DBE is unable to complete a subcontract (withdraws), for any reason, NJT will require a Bidder/Proposer/Prime to make a good faith effort to replace a withdrawn DBE at least to the extent needed to ensure that the Prime contractor is able to meet the contract goal established by NJT for the procurement. **These good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the removed DBE.**

4.4.2 The Bidder/Proposer/Prime is required to make a good faith effort to seek other DBE subcontractors/subconsultants in substitution of the original DBE. The good faith efforts described in **article 2** are required in finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, to the extent needed to meet the contract goal established for the procurement.

4.5 DECERTIFIED DBE(S)

4.5.1 If the Prime has reason to doubt that a proposed DBE is still eligible due to change in ownership, management, or size, the Prime shall, within 10 days of learning this information, notify NJT of that fact in writing.

4.5.2 If the subcontract has not been executed before the DBE's ineligibility occurs, the Prime will not receive credit toward the contract goal for the ineligible DBE. The Prime may continue to use the ineligible DBE, however, DBE participation credit will not be granted.

(a) To the extent necessary to meet the assigned contract goal, the Prime will make a good faith effort to replace the ineligible DBE within 10 days after notification by the OBD. The OBD will support the Prime in its efforts to replace with an eligible DBE firm in order to meet the contract goal.

4.5.3 If the contract has been executed before the firm has been notified of its ineligibility, the Prime may continue to use the firm on the contract and receive credit toward its DBE goal for the duration of that particular phase of or option in the contract. This may not apply to future phases or options, which will be handled on a case-by-case basis at the sole discretion of the OBD.

4.5.4 ***Exception***: If the DBEs ineligibility is caused solely by its having exceeded the size standard during the performance of the contract the Prime may continue to count its participation on that contract only toward the contract goals. This may not apply to future phases or options and will be subject to determination by the OBD.

5.0 AWARD OBLIGATIONS

5.1 The Prime must designate **a DBE Liaison Officer**. The liaison officer will be responsible to NJT regarding DBE subcontract matters.

5.1.1 If at any point during the contract's life, the Prime's DBE participation falls below the assigned goal, the Prime must identify additional work or new work items for which it will subcontract to DBEs to the extent necessary to meet the assigned goal. Any new scope of work issued to the Prime shall still be subject to the assigned goal.

5.1.2 The OBD will support the Prime in identifying current/future opportunities in the contract to meet the assigned contract goal.

5.1.3 Should the Prime seek a change that addresses the DBE's performance, or affects the work scope and/or compensation, the OBD must be notified, prior to implementation, for its review and approval of the changes as soon as possible. No change will be allowed without prior review and approval by the OBD. Failure to notify the office and obtain approval prior to a change shall result in breach of the contract and may be subject to the appropriate remedies, audits, and penalties.

5.1.4 Whenever NJT issues project change orders the goal may still apply; the OBD will determine if increased DBE participation will be required.

5.1.5 To ensure that all obligations under subcontracts awarded to DBEs are met NJT shall review the Prime's DBE involvement efforts during the performance of the contract.

5.2 POST AWARD DELIVERABLES

5.2.1 After the execution of a contract with NJT, **signed copies** of subcontractor/subconsultant agreements between the Prime and DBE subcontractors must be submitted to the OBD no later than 10 business days after the Prime's contract execution date. The agreement between the Prime and DBE subcontractor shall remain firm for the duration of the contract.

5.2.2 The Prime shall provide a list of the anticipated job start date for all DBE subcontractors/subconsultants **no later than two days** after the initial pre-construction meeting.

5.2.3 **Certification of DBE(s) Payments** – submit monthly with the Form E to the Manager of the OBD and with

its monthly invoice submittal to NJT project manager of this project. **Refer to article 5.3.2**

(a) The Prime will certify, prior to the issuance of each progress payment by NJT, that all DBE subs have been paid any amounts due on past due invoices from previous or current progress payments.

5.2.4 **Form E (Contractor's Monthly DBE Payment Report & DBE Payment Certification Voucher)** - submit monthly to the Manager of the OBD. **Refer to articles 2.5h and 5.3.2.**

Failure to submit this report on a monthly basis may result in breach of the contract and be subject to the appropriate remedies, penalties or liquidated damages as indicated in articles 5.6-5.7.

5.2.5 **Form E1 (DBE Prime's Monthly Payment Report)** *(For DBE Prime Only)* - **submit** monthly to the Manager of the OBD.

5.2.6 **Form E2 (DBE's Monthly Payment Report) – Refer to article 2.5j**

(a) Forms E/E1 and E2 will be reviewed monthly to determine compliance with the assigned DBE goal, the subcontractor prompt payment regulation, and the DBE Program.

(b) Attainment of goals will be monitored and based upon actual payments received by the DBE. Failure to submit Form E/E1 may result in suspension of payments or such other remedies as provided in **article 5.6.** I*f at any time, NJT has reason to believe that any person or firm has willfully and knowingly provided incorrect information or made false statements, it shall refer the matter to the USDOT for inquiry.*

5.3 PROMPT PAYMENT OF INVOICES TO SUBCONTRACTORS

5.3.1 The Prime must pay each subcontractor under this contract for satisfactory performance of its work **no later than ten (10) days** from the receipt of each payment the Prime receives from NJT for the subcontractor's work. Failure to comply with this requirement shall result in breach of the contract and shall be subject to the appropriate remedies as determined by OBD.

5.3.2 In accordance with 49 CFR 26.29, the Prime shall certify, prior to the issuance of a progress payment by NJT that all subcontractors have been paid any amounts due on past due invoices (greater than 30 days) from previous or current progress payments. **The Prime must submit the Certification of DBE(s) Payments with its monthly invoice submittals to NJT project manager, and with its Form E to the OBD.**

5.3.3 The Prime will not be reimbursed for work performed by subcontractors/subconsultants unless and until the Prime ensures that the subs are promptly paid for the work performed. Alternatively, the Prime shall certify that a valid basis exists under the terms of the subcontractor's/subconsultant's or supplier's contract to withhold payment from the subcontractor/subconsultant and therefore payment is withheld.

5.3.4 If the Prime withholds payment from the subcontractor/subconsultant, the Prime shall provide to the subcontractor/subconsultant or supplier written notice thereof. The notice shall detail the reason for withholding payment and state the amount of the payment withheld. If a performance/payment bond has been provided under this contract, the Prime shall send a copy of the notice to the surety providing the

bond for the Prime. A copy of the notice shall also be submitted to NJT with the certification that payments are being withheld.

5.3.5 If withholding payment is due to the Prime's failure to promptly pay the DBE in accordance with the prompt payment of invoices and/or retainage clauses, the OBD may request proof of payment to DBE(s) for delinquent invoices and/or retainage in order to issue release of payment to Prime.

5.3.6 Failure to comply with the above shall result in breach of the contract and may be subject to the appropriate penalties. **See article 5.6**

5.4 SUBCONTRACTOR PAYMENT DISPUTE RESOLUTION

5.4.1 The Prime is required to notify the OBD of its intention to withhold payment from a DBE as soon as possible and in advance of taking action. Should the Prime provide notice and proceed to withhold payment from any subcontractor/subconsultant or supplier due to a performance issue or unapproved work performed, an OBD representative shall make an effort to resolve the dispute.

(a) OBD's efforts shall be limited to meeting with the Prime and the subcontractor/ subconsultant, and reviewing the relevant facts with both parties.

(b) OBD will not act as a decider of fact nor will OBD direct a settlement to the dispute.

(c) Any OBD effort is solely intended to assist the parties in understanding their respective positions and to encourage a reasonable resolution of the dispute. The Prime is required to send written notification of the above to the OBD immediately.

5.4.2 Should payments be withheld that are not related to the previous items mentioned, and/or a determination can be made that the withholding of payments violates the prompt payment clause, NJT may execute the appropriate remedies in accordance with article 5.6.

5.5 PROMPT PAYMENT OF SUBCONTRACTOR RETAINAGE (FOR CONSTRUCTION CONTRACTS ONLY)

5.5.1 **The Prime must include a contract clause in the subcontractor agreement obligating the Prime to pay <u>all retainage</u> owed to the subcontractor/subconsultant for satisfactory completion of the accepted scope of work no later than 15 days after the DBE subcontractor's/subconsultant's work is satisfactorily completed.**

5.5.2 Only subcontractors/subconsultants whose work has been 100% completed, including all punch list work or remaining work, and who have supplied closeout documents shall be eligible for release of retainage. *Any delay or postponement of payment from the above referenced time frame may occur only for good cause <u>following written approval of NJT</u>.*

5.5.3 NJT may agree to release an equivalent amount of Prime retainage provided that:

(a) There is no offsetting claims from NJT (including, but not limited to, liquidated damages), other subcontractors/subconsultants, material men, or workers;

(b) None of the other reasons to withhold payments specified under the Prime contract exists.

5.5.4 Prior to release of the Prime's retainage, the Prime shall provide to NJT executed copies of the following subcontractor closeout documents, (shown in Appendix A of the contract) as appropriate:

(a) Consent of Surety to Final Payment to the Subcontractor

(b) Certificate of Amounts Due and Owing to Subcontractor Employees

(c) Subcontractor Release of Claims

(d) Subcontractor Release of Liens and a Certificate of Final Acceptance of Subcontractor Work

5.5.5 Notwithstanding NJT's release or partial release of retainage, nothing in this clause shall be deemed to constitute NJT's partial or final acceptance of the work, or any portion thereof, unless either a Certificate of Partial Acceptance or a Certificate of Final Acceptance has been executed by NJT, in the form(s).

5.6 Audit and Sanctions

During the performance of any contract and for a period of up to three (3) years following completion of the contract work, NJ TRANSIT may conduct reviews for compliance with the requirements of the DBE Program. Such reviews may include, but not be limited to, the evaluation of monthly reports, desk audits, and site visitations.

5.6.1 Where a Prime is found to be in breach of the requirements of the DBE Program during the performance of the contract, and does not promptly take corrective action, the following sanctions may be instituted (singularly, in any combination, and in addition to any other contractual remedies or otherwise provided by law):

(a) The Prime may be ordered to stop work without penalty to NJT.

(b) The contract may be terminated for breach.

(c) Suspension or debarment proceedings may be commenced in accordance with New Jersey law.

(d) The relevant performance bond may be enforced.

(e) NJT may withhold payment of specific invoices.

5.7 LIQUIDATED DAMAGES

5.7.1 Liquidated damages (LD) may be assessed when the Prime fails to meet the established DBE goal on the contract.

5.7.2 If the DBE goal is not met, and the Prime has not demonstrated a good faith effort to do so, NJT may elect to subtract from the Prime's payment, as liquidated damages and not a penalty, the following:
The amount equal to the difference (in dollars) between the total contract value multiplied by the assigned DBE goal percentage, (originally established or as subsequently modified) and the actual DBE participation percentage (total dollars paid to DBEs divided by total dollars paid to the Prime).

5.7.3 This may be withheld from a series of payments or from the Prime's final payment, depending on the size of the liquidated damage.

5.7.4 If the Prime's final payment is not sufficient to satisfy the LD in full, the balance shall be due and owing from the Prime and subject to repayment terms as determined by NJT. NJT shall waive liquidated

damages where good cause is shown for the deficiency in DBE participation upon determination by the OBD.

Race Conscious

APPENDIX I

GLOSSARY

A Good Faith Effort-the efforts employed by the bidder, which should be those that one could reasonably expect a bidder to take if the bidder were actively and aggressively trying to obtain DBE participation sufficient to meet the contract goal.

Certification - means the process by which a business is determined to be a bona fide DBE. Any business applying for DBE certification must complete the appropriate NJ Unified Certification Program Application. Certification Applications are available at the OBD.

Disadvantaged Business Enterprise or DBE - means a small business concern:

Which is at least 51 percent owned by one or more socially and economically disadvantaged individuals, or in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more socially and economically disadvantaged individuals; and where one or more of the socially and economically disadvantaged owners controls management and daily business operations. A DBE shall not include a small business concern where that concern or a group of concerns controlled by the same socially and economically disadvantaged individual or individuals has annual average gross receipts in excess of **$23.98M** over the previous three fiscal years or is not otherwise eligible as a small business as defined by the Small Business Administration in 13 CFR Part 121.

DBE Goal - means numerically expressed objectives for DBE participation on federal contracts Prime contractors are required to make a good faith effort to achieve to the extent necessary to meet the assigned DBE goal.

DBE Sub-Prime - means any 1st Tier DBE subcontractor/subconsultant listed on the Form A that will subcontract any portion of its subcontract/scope of work to a DBE(s) and/or non-DBE(s) firm(s).

DBE Ineligibility – means a firm's DBE status changes or ceases due to change in ownership, management, or size, etc.

DBE Prime – means the successful Bidder is a DBE firm and has a direct contract with NJT.

DBE Trucking Firm – owns and operates at least one fully licensed, insured, and operational truck used on the contract. Is responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract.

First Tier DBE - refers to any DBE listed on the Bidder/Proposer/Prime's Form A and having a direct contract with the Prime.

Joint Venture–means an association of a DBE firm and one or more other firms to carry out a single, for-profit business enterprise, for which parties combine their property, capital, efforts, skills and knowledge, and in which the DBE is responsible for a distinct, clearly defined portion of the work of the contract and whose share in the capital contribution, control, management, risks, and profits of the joint venture are commensurate with its ownership interest.

Prime - means any contractor or consultant, including a DBE contractor/consultant, who enters into a direct

contractual relationship with NJT.

Race-conscious Measure or Program - is one that is focused specifically on assisting only DBEs, including women-owned DBEs.

Race-neutral Measure or Program- is one that is focused specifically on assisting all small businesses equally, including DBEs. Such activities include bonding, insurance, and technical assistance. For the purposes of this part, race-neutral includes gender-neutrality.

Reasonable Bid Price - means a price that shall be considered reasonable if the Bidder/Proposer/Prime would have been awarded the contract had the firm submitted the only bid.

Regular Dealer - means a firm that owns, operates, or maintains an establishment in which the materials or supplies required for the performance of a contract are bought, kept in stock and regularly sold to the public in the usual course of business.

The firm must engage in, as its principal business, and in its own name, the purchase and sale of products in question. Bulk items such as steel, cement and petroleum products need not be stocked, if the dealer owns or operates distribution equipment.

Note: Brokers and packagers are not regarded as regular dealers.

Second Tier DBE - refers to any DBE listed on the DBE Sub-Prime's Form AA.

Subcontractor/ Subconsultant - means any contractor/consultant, including suppliers, who enters into a contract issued by a Prime contractor.

Transit Vehicle Manufacturer (TVM) - is a manufacturer of vehicles used by NJT for the primary program purpose of public mass transportation (e.g., buses, railcars, vans). The term does not apply to firms, which rehabilitate old vehicles, or to manufacturers of locomotives or ferryboats. The term refers to distributors of or dealers in transit vehicles with respect to the requirements of 49 CFR Section 26.49.

U.S. DOT – means the U.S. Department of Transportation, including the Office of the Secretary, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the Federal Railroad Administration (FRA).

Withdrawn DBE – a DBE withdraws, drops out of its contract, or fails to complete its work on the contract for any reason.

Updtd p.3, 1.48; p.4, 1.6.1; pg.7, 2.3(g); p.8, 2.4, 2.4(e); p.9, 2.5(g); pg.10(g);2.3; p.11, 2.6(e) on 11.22.19 lmc
Updtd Table of Contents – removed RN from Title; Changed to RN Project from Goal Updtd 1.6.1 remvd certif/replac with Cert Profile 10.25.19
Updated 3.53(a)(b); (4.1(a-e) & $23.98m LMC 8/1/18
Updated 1.6.1 JGold 7/10/17
Rev 9/15/10

REQUIRED FORMS

ENCLOSED FOR COMPLETION (MANDATORY):

- **Form A; A1; A2; B; D & Trucking Commitment Schedule**

TO BE OBTAINED AND SUBMITTED (MANDATORY):

- **Copy of NJUCP DBE and NAICS Code Certification**

Consult DBE Program Requirements for further guidance.

Bidders Checklist
(Federal Contracts)

Upon completion of the Required and/or Supplemental Forms packet(s), please be sure that the completed checklist and the forms listed below are included for each DBE subcontractor listed on the Form A and submitted to the Office of Business Development (OBD) for review.

Note: Failure to complete and submit the forms below will delay the OBD from issuing approval to move forward in the contract award process.

Required Forms

☐ Form A - First Tier DBE Utilization

☐ Form A1 - Bidder/Proposer Solicitation and Contractor Information

☐ Form A2 - Non-DBE Sub Utilization

☐ Form B - Intent to Perform as a DBE Sub

☐ Form D - DBE Good Faith Effort Form

☐ Trucking Commitment Agreement (if applicable)

☐ Copy of NJUCP DBE and NAICS Code Certification

Supplemental Forms (if applicable)

☐ Form AA - Second Tier DBE Utilization

☐ Form AA1 - Second Tier Bidder/Proposer Solicitation and Contractor Information

☐ Form AA2 - Second Tier Non-DBE Sub Utilization

☐ Form BB - Intent to Perform as a Second Tier DBE Sub

☐ Trucking Commitment Agreement (if applicable)

☐ Copy of NJUCP DBE and NAICS Code Certification

Philip D. Murphy, Governor
Sheila Y. Oliver, Lieutenant Governor
Diane Gutierrez-Scaccetti, Acting Commissioner
Kevin S. Corbett, Executive Director

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

The New Jersey Unified Certification Program (NJUCP) DBE Directory is getting an Upgrade!

As of July 1, 2017 the NJUCP DBE Directory can be found at https://njucp.dbesystem.com

Please update your bookmarks

The certifying partners of the New Jersey Unified Certification Program (NJUCP), New Jersey Transit (NJT), the New Jersey Department of Transportation (NJDOT), and The Port Authority of New York and New Jersey (PANYNJ), are pleased to announce that we are improving service for our user community. A new web-based platform has been developed that will allow improved functionality, new communication tools, and real time updates to information.

The new address for the NJUCP directory of certified DBE firms will be https://njucp.dbesystem.com. The change to this address will take effect on July 1, 2017. **Please be sure to update your DBE directory bookmark and inform others who use this directory in your organization.**

Attention certified DBE firms: Please review the data shown in the directory for your firm and advise your certifying agency if any changes or updates are needed. An account has been created for all DBEs in the system. If you are certified with PANYNJ or also certified with the New York State Contract System (NYSCS) or the New York State Unified Certification Program (NYSUCP), you can log into your account in the system with the same username and password you use to access your account with those entities. If this is your first time logging into this system and/or you don't know your username and password click on "Log-in" to use the Account Lookup to find your information and log into your account. **All certified DBEs in the NJUCP have accounts in the system.** Contact customer support via any of the system links if you have any questions while attempting to access your account.

The NJUCP is committed to improving the service and support we provide to our DBEs and the greater contracting community. This new web site and underlying platform is provided by B2Gnow, which currently provides support for Port Authority's Diversity Management Program, NYSCS, and NYSUCP, as well as many other certifying entities and agencies across the country. You may already be familiar with the look and versatile search capability of the system. If it is brand new to you, support links are provided, as mentioned above.

Stay tuned for further announcements on improvements to this system and NJUCP services.

MANDATORY FORM FOR BIDDER/PROPOSER/PRIME: COMPLETE ENTIRELY

FORM A (Fed)

First Tier DBE UTILIZATION - FORM A

Project Name: _____ NJT Contract No: _____

Assigned DBE Goal %: _____ NJT Procurement Specialist: _____ Contract Value ($): _____

First Tier DBE must perform at least 51% of its subcontract value if subcontracting to a Second -Tier DBE or Non-DBE. Do not count Non-DBE portion toward the goal.

Name, Address and Telephone # of DBE Subcontractor/Subconsultant	Provide Detailed Scope of Work to be Performed (Identify all suppliers)	Dollar Value of Subcontract/Sub-consultant Work ($) Awarded	Percentage of Subcontract Work (%)
			%
			%
			%
			%
			%
For DBE suppliers, show original subcontract value multiplied by 60% ($2,000*60%=$1200). For DBE portion of work, subtract Non-DBE portion of work from original subcontract value.	**TOTALS**	**$**	**%**

The undersigned will enter into a formal agreement with the DBE(s) listed in this schedule conditioned upon execution of a contract with NJ TRANSIT for the above referenced project. The undersigned understands that removal/replacement of the DBE(s) listed is NOT PERMISSIBLE for any reason (pre or post-award), without submitting a written request to the Office of Business Development and receiving WRITTEN APPROVAL from the Office of Business Development. Failure to obtain written approval shall result in the breach of contract and subject to corrective action to be determined by NJ TRANSIT.

Company Name: _____ Authorized Signature: _____

Company Address: _____ Print Name: _____

_____ Title: _____

Federal Tax ID #: _____ Prime Contractor's DBE Liaison Officer: _____

Company Tel #: _____ Date Signed: _____

To Add Subs Use Additional Forms

MANDATORY FORM: COMPLETE ENTIRELY

Form A1 (Fed)

BIDDER SOLICITATION & CONTRACTOR INFORMATION - FORM A1

Project Title:_____

Date: _____

Prime Contractor/Consultant:_____ NJT Contract #:_____

Telephone #: _____

Complete the information below for Bidder/Proposer/Prime(s) working on this project. Use Page 2 for all subcontractors/subconsultants

	Bidder/Proposer/Prime	Bidder/Proposer/Prime	Bidder/Proposer/Prime
Company's Full Name			
Address			
City and State			
Zip			
County			
Phone			
Fax			
E-mail			
Owner			
Date Established			
Date Certified			
Ethnicity			
Gender			
Certification Status: **DBE or Non-DBE**			
Federal Tax ID # / SSN #			
Annual Gross Receipts: A – Less than $500K B - $500K to $1M C - $1M to $2M D - $2M to $5M E - $5M and over **indicate the letter that applies**			
Primary NAICS Code:			

To Add Subs Use Additional Forms

MANDATORY FORM: COMPLETE ENTIRELY

Form A1 (Fed)

BIDDER SOLICITATION & CONTRACTOR INFORMATION - FORM A1

Project Title:_____

Prime Contractor/Consultant:_____ NJT Contract #:_____

Date: _____

Telephone #: _____

COMPLETE THE INFORMATION BELOW FOR "ALL" FIRMS INCLUDING SUPPLIERS SOLICITED; INCLUDING THOSE THAT WILL WORK ON THIS PROJECT.

	Subcontractor/Subconsultant	Subcontractor/Subconsultant	Subcontractor/Subconsultant
Company's Full Name			
Address			
City and State			
Zip			
County			
Phone			
Fax			
E-mail			
Owner			
Date Established			
Date Certified			
Ethnicity			
Gender			
Certification Status: **DBE or Non-DBE**			
Federal Tax ID # / SSN #			
Annual Gross Receipts: A – Less than $500K B - $500K to $1M C - $1M to $2M D - $2M to $5M E - $5M and over **Indicate the letter that applies**			
Primary NAICS Code:			

To Add Subs Use Additional Forms

MANDATORY FORM FOR BIDDER/PROPOSER/PRIME: COMPLETE ENTIRELY

FORM A2 (Fed)

NON-DBE SUBCONTRACTOR UTILIZATION - FORM A2

Directions: To be completed by any Bidder/Proposer/Prime for "all" subs including suppliers participating on this contract.

Bidder/Proposer Prime Name: _____ Project Title: _____

Date: _____ Prime Contract Value: _____

Name, Address and Telephone # of all Subcontractor/Subconsultants	FEIN #	Provide Detailed Scope of Work to be Performed	Dollar Amount of Subcontractor/Sub-consultant Work ($) Awarded	Percentage of Subcontract or Work (%)
			$	%
			$	%
			$	%
			$	%
			$	%
Must provide a detailed scope of work; one-word descriptions are not acceptable.		TOTALS	$	%

To Add Subs Use Additional Forms

INTENT TO PERFORM AS A 1ST TIER DBE - FORM B

The Bidder/Proposer/Prime is prohibited from completing any portion of this form and directing the DBE to sign a blank form.

DIRECTIONS: DBE(s) listed on the Form A must complete all information on this form.

Name of Bidder/Proposer/Prime: _____ **Name of DBE Firm:** _____

Project/Contract Name: _____ IFB/RFP Contract Number: _____

Does the undersigned DBE (Answer Accordingly):

Intend to perform subcontract work in connection with the above–mentioned project as a Joint Venture? Circle one. **(Yes or No)**

Intend to subcontract any portion of its scope of work to a DBE(s)? Circle one. **(Yes or No)**
If yes, DBE Sub-Primes must complete and submit Form AA. **At what percent? _____%**

Intend to subcontract any portion of its scope of work to a **Non-DBE(s)**? Circle one. **(Yes or No)**
If yes, must complete and submit Form AA2. **At what percent? _____%**

The undersigned will perform the following described work on the above-referenced project: (*Provide a detailed description of the type of work you will perform on your subcontract. Attach a copy of quote approved and signed by Bidder (optional)).*

_____

_____

Dollar Value of DBE Subcontract: $_____

Total Quantity/Units (if applicable): _____ **Per Unit Cost (if applicable): $**_____

The undersigned based the above scope of work and subcontract value on detailed project specs received from the Bidder contractor named above. Circle one. **(Yes or No)**

The Prime Contractor *projected* the following commencement and completion date for such work as follows:

DBE Contract Start Date: _____ DBE Contract Completion Date _____

The undersigned DBE will enter into a formal agreement for the above work with the Prime Contractor conditioned upon execution of a contract with NJ TRANSIT. As a DBE subcontractor, I will cooperate with the certification, compliance and monitoring process set forth by NJ TRANSIT. I attest that I will perform at least 51% of my subcontract with my own workforce for the referenced project.

Signature of 1st Tier DBE **Date** **Title**

Print Name **Telephone #:**

Failure to adhere to these instructions or the falsification of any information on this form shall result in breach of contract and subject to the appropriate penalties to be determined by NJ TRANSIT.

FORM D INSTRUCTION SHEET
PRE AND POST AWARD GOOD FAITH EFFORT (IF APPLICABLE)

Required for <u>all DBE subcontractors</u> who decline to provide a quote.
Applies in pre and post-award.

Important

Bidder/proposer/prime compliance with contract goals and good faith efforts are handled as a matter of responsibility. If the bidder/proposer/prime did not meet the goal, they must document that they made Good Faith Efforts to do so. This requirement is an important and serious one. The Subrecipient will make a fair and reasonable judgment as to whether the bidder made an adequate Good Faith Effort., which will be reviewed by NJ TRANSIT.

Bidders/proposers/primes are required to read the DBE Program Requirements and the guidelines/ instructions of all forms; and required to submit all forms in the Addendum (mandatory) and Supplemental Section (if applicable) with the bid/proposal or within seven (7) days after bid/proposal submission.

<u>Guidelines to Bidder/Proposer/Prime</u>:

- FORM D outlines actions that may be considered good faith efforts though it is not a mandatory checklist, nor is it intended to be exclusive or exhaustive. Please read DBE Program Requirements for further guidance.
- Bidder/Proposer/Prime must complete FORM D when it fails to meet the DBE goal.
- FORM D must be completed in this instance for any DBE firms which were solicited but declined to quote for the project.
- DBE firm must sign Page 2 of FORM D. If DBE declines to do so, submit completed form with bidder/proposer/prime signature only and the Office of Business Diversity will verify information with DBE.
- If/when the contract goal is not met, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Prime contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.
    - In short, unless the price difference is excessive or unreasonable, incurring additional costs in using and finding a DBE is <u>not</u> sufficient reason to reject the DBE quote or not to meet the contract goal.

<u>Instructions</u>:

- On Page 1 of FORM D, indicate with a check mark the various types of detailed good faith efforts made and attach documentation of such efforts. Types of acceptable documentation are listed on Page 2.
- Document any other type of good faith efforts <u>not listed</u> on Page 1.
- Complete this form <u>entirely</u>.

Bidders/proposers/primes are to provide the required forms and instruction sheet, including the Supplemental section to their 1st Tier DBE subs. DBE sub-primes must provide required forms under Supplemental section to their 2nd Tier DBE/Non-DBE subs, if applicable. Please contact the compliance officer identified for this contract at the pre-bid/proposal conference for guidance on completing any of these forms.

MANDATORY FORM (IF APPLICABLE): COMPLETE ENTIRELY

FORM D (Fed)

DBE GOOD FAITH EFFORT– FORM D

IFB/RFP Number: _____

Project Title: _____

Bidder/Proposer/Prime Name: _____

Address: _____

_____

Phone: _____ Email: _____

Date Signed: _____

The following is a list of the types of actions that may be considered good faith efforts. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases, however please check all that apply in this instance. Please provide documentation for ALL instances selected.

- ☐ Selected portions of work to be performed by DBEs and, where appropriate, broke down contracts into economically feasible units to facilitate DBE participation.
- ☐ Provided interested DBE with adequate information about plans, specifications, and requirements of the contract.
- ☐ Negotiated in good faith with interested DBE, not rejecting DBEs as unqualified without sound reasons based on a thorough investigation of their capabilities.
- ☐ Made efforts to assist interested DBE in obtaining bonding, lines of credit, or insurance required by NJ Transit or Bidder.
- ☐ Made efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- ☐ Advertised subcontracting opportunities in appropriate media.
- ☐ Used the services of minority organizations, minority contractors' groups, local state and federal minority business assistance offices and other organizations that provide assistance identifying subcontractors.
- ☐ Provided written notice to DBEs in sufficient time to allow the DBE to respond. (Provide copy of documentation with Page 2.)
- ☐ Followed up initial solicitation of interest by contacting DBE to determine interest. (Provide proof of follow up with Page 2.)

Describe any other efforts not covered above that may indicate Good Faith Efforts to obtain DBE participation on this project and provide documentation.

MANDATORY FORM (IF APPLICABLE): COMPLETE ENTIRELY

FORM D (Fed)

DBE GOOD FAITH EFFORT– FORM D

IFB/RFP Number: _____ Project Title_____

If the dollar value of the goal for DBE participation in this project has not been met, the Bidder/Proposer/Prime is required to complete the following questions to describe efforts to obtain DBE participation. Copies of correspondence, return receipts, telephone logs, or other documentation will be required to support good faith efforts. Please provide information for each DBE.

I, _____ _____
Name Title

of _____
Bidder/Proposer/Prime

Certify that on_____, I contacted the below named DBE to obtain a
Date
Bid/Proposal for work items to be performed on the Project named above.

DBE: _____
Firm Name

Type of work requested to be performed: _____

_____

Method of Contact: Phone Fax Mail Email

Date Contacted: _____

To the best of my knowledge and belief, said DBE was unavailable for work on this project and was unable to prepare a bid for the following reason(s):

No response

Not interested: Indicate Reason(s)_____

Unacceptable Sub Bid: Indicate Reason(s)_____

Please note: Unless the price difference is excessive or unreasonable, incurring additional costs in using and finding a DBE is <u>not</u> a sufficient reason to reject DBE quote.

_____ _____
Signature of Bidder/Proposer/Prime Date

The above statement is a true and accurate account of why I did not submit a bid on this project. (Below is to be signed by DBE firm only)

_____ _____
Signature of DBE Firm Date Name of DBE Firm

_____ _____
Print Name Address

_____ _____
Print Title Telephone #: ( )

MANDATORY FORM

DBE TRUCKING COMMITMENT

AGREEMENT

The DBE Trucking Firm Commitment Agreement sheet attached must be signed and completed entirely. Make duplicate copies for additional subcontractors as needed. Please read DBE Requirement Language for details.

- DBEs must provide information for all DBE/Non-DBE trucking firms it will lease from or subcontract to.
    - *Subcontracting to a Non-DBE trucker means that the Non-DBE will perform a portion of the DBE firm's subcontract.*
    - *2nd Tier DBE trucking firms must perform 100% of their total subcontract value.*
- For Non-DBE leased trucks, credit will only be given for the fee/commission that is received for arranging the transportation services.
    - *All DBE-leased trucks are required to reflect the DBE firm's company name and identification number.*

Copies of the following items must be attached for ALL trucks owned by the DBE:

- Proof of ownership: title(s) or finance agreement(s) ONLY
- registration card(s)
- insurance card(s)
- hazardous waste license(s), if applicable
- apportioned cab card(s), if applicable

MANDATORY FORM

Copies of the following items must be attached for ALL DBE/non-DBE trucks leased by the DBE:

- lease agreement(s)
- title(s)
- registration card(s)
- insurance card(s)
- hazardous waste license(s), if applicable
- apportioned cab card(s), if applicable

MANDATORY FORM

DBE TRUCKING FIRM COMMITMENT AGREEMENT

This commitment is subject to the award and receipt of a signed contract from NJ TRANSIT for the subject project. Note that copies of all supporting documents must be attached.

The DBE trucking firm will perform the following described work on the project: *(Specific work details should include: Type of material to be handled, quantities to be hauled, dollar amount per unit, location the material will be transported).*

_____

_____.

Dollar Value of DBE Subcontract: $_____

Total Quantity/Units (if applicable: _____ Per Unit Cost (if applicable): $_____

Total Number of fully operational DBE-owned trucks to be used on contract? _____.
Total Number of fully operational trucks to be leased from a DBE? _____.
(Provide a copy of lease agreement(s) for each trucking firm).
Total Number of fully operational trucks to be leased from a non-DBE? _____.
*(Provide a copy of lease agreement(s) for each trucking firm. *Note that subcontracting is different from leasing as it relates to trucking).*

Specify ALL Vehicle Information on Page 1 and 2, if applicable

1st Tier DBE Trucking Firm		*(T= Title, F=Finance Agreement, I=Insurance Card, R=Registration, A=Apportioned Cab Card, L= Lease Agreement)			
# Of Trucks Owned					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	*(Indicate T/F/I/R/A/L) OWNERSHIP DOCS

MANDATORY FORM

Non-DBE Trucking Firm					
# Of Trucks Leased From non-DBE Trucking Firm					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	(Indicate T/F/ I/R/A/L) OWNERSHIP DOCS
DBE Trucking Firm					
# Of Trucks Leased From DBE Trucking Firm					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	(Indicate T/F/I/R/A/L) OWNERSHIP DOCS

I hereby certify that the information present above is correct. I agree to inform the Office of Business Diversity in writing within 10 days, if anything changes.

1st Tier DBE Signature: _____ Date: _____

Print Name: _____

Mandatory Form Submit Monthly

PRIME CONTRACTOR Monthly DBE Payment Report - Form E

Name of Project: _____ NJT Contract #: _____

Prime Original Contract Value: _____ Report for the Month of: _____

Change Orders (Overall Inc/Dec.): _____ Notice to Proceed Date: _____

Total Contract Amount to Date: _____ NJT Project Mgr Name: _____

Total Payments Received from NJT Date: _____ Assigned DBE Goal %: _____

Name of DBE Subcontractor	Work Task Performed	Original Contract Amount $	Change Order Amount $ (+/-)	Amount of Invoice Received this Month ($)	Date of Invoice Received in this Month	Payment(s) Made to DBE in this Month in $$ (Itemize)	Date(s) Payment Made This Month	Total DBE Payments made to Date in ($)	% Overall Work Finished	Final Pmt (Y/N)
	Totals →	$	$	$	Totals →	$		$		

Itemize payments/invoices and dates if paid/received more than one payment/invoice between the 1st and 31st of THIS Month.

Prime Contractor Information:

Prime Firm Name: _____ Project Director Name: _____

Address: _____ Project Director Signature: _____

Telephone #: _____ Date: _____ Federal TIN #: _____

Prime's Past Due Invoice Information: List any invoice more than 40 days past due from the date **submitted** to NJT at the time you complete this form.

Invoice #	Invoice Date	Invoice Amount ($)	Number of Days Past Due	Comments:

This form is not to be altered in any way.

For assistance completing this form, call 973-491-7977,7539,8061,8614,7530,8941

Form E - Prime Contractor's DBE Payment Certification

1. Have **all** DBE subcontractors with executed subcontracts been paid amounts due from previous progress payments?

☐ **If yes, skip the next section and go to number 3.**

☐ **If no**, please complete fields in box below: (Use additional paper, if needed)

DBE SubContractor Name	Amount Withheld From Invoice ($)	Total of Invoice Amount ($)	Invoice Number	Invoice Date	Specific Reason for Withholding

2. Have you notified the DBE subcontractor(s) that you are withholding payment and the reason(s) why?

☐ **If yes**, provide a copy of written notification to the DBE subcontractor with this form, indicating the date of notification.

☐ **If no**, lack of prior written notification to the DBE(s) that you are withholding payment violates the prompt payment clause guidelines. **Please contact the DBE immediately, and submit a copy of written notification to the subcontractor with this form.**

☐ **If Not Applicable, check this box.**

3. By signing this form, I certify that all of the above represent true and accurate information.

Note: CFO or equivalent Sr. Manager must complete and sign off on this form.

PROJECT DIRECTOR NAME (PRINT) _____ PROJECT DIRECTOR (SIGNATURE) _____ ____/____/____ DATE

Additional Reasons/Comments for Withholding Payment:

DO NOT WRITE BELOW. DEPARTMENTAL USE ONLY.

☐ Approved

☐ Denied

THIS FORM IS DUE ON THE 7TH OF EACH MONTH Please forward to:

NJ TRANSIT
Office of Business Development
One Penn Plaza East, 6th Fl
Newark, New Jersey 07105-2246

This form is not to be altered in any way.

For assistance completing this form, call 973-491-7977,7539,8061,8614,7530,8941

MANDATORY FORM – SUBMIT MONTHLY & COMPLETE ENTIRELY

Form E-1 (Fed)

DBE PRIME CONTRACTOR'S MONTHLY PAYMENTS FROM NJ TRANSIT

INFORMATION ON CONTRACT

DATE CONTRACT EXECUTED: _____ **CONTRACT NUMBER:** _____ **REPORT FOR THE MONTH OF:** _____ **YEAR**_____

ORIGINAL CONTRACT AMOUNT: _____ _____ **FED TAX ID #:** _____

CHANGE ORDERS (OVERALL INC/DEC.): _____ **PURCHASE ORDER #:** _____

TOTAL CONTRACT AMOUNT TO DATE: _____ **NAME OF PROJECT:**_____

Original Contract Value	Change Order Amount +/-	Date of Change Order	New Contract Value	Payments Received This Month	Total Payments Received to Date	% Work Completed To Date	Final Pmt Y/N
TOTALS:							

PRIME INVOICE 30 DAYS PAST DUE FROM NJT:

Invoice Date **Reference #** **No. Days Past Due Amount**

_____

_____

NJ TRANSIT

Project Manager (Name): _____

Telephone #: _____

FORM IS DUE ON THE 7TH OF EACH MONTH.

PLEASE FORWARD TO:

NJ TRANSIT

Office of Business Development

One Penn Plaza East – 6th Flr

Newark, New Jersey 07105-2246

PRIME CONTRACTOR INFORMATION

Firm Name: _____

Compliance Officer (Name): _____

Date: _____ Telephone #: _____

THIS FORM IS NOT TO BE ALTERED OR CHANGED IN ANY WAY.

MANDATORY FORM. COMPLETE & SUBMIT BY DBE ONLY.

DBE SUBCONTRACTOR Monthly Payment Report - Form E2

Fed Form E2

Name of DBE Firm: _____

DBE's FEIN#: _____

DBE Address: _____

DBE Telephone #: _____

Report for the Month of: _____

Contract Number: _____

Contract Name: _____

DBE Contract Start Date: _____

Prime Contractor's Information:

Name of Prime: _____ Address: _____ Telephone #: _____

DBE PAYMENT INFO: ***Itemize payments/invoices and dates if received/submitted more than one payment/invoice between the 1st and 31st of THIS Month.***

Work Task Performed	Original Subcontract Amount $	Change Order Amount (+/-)	Invoice #(s) Submitted in this month	Dollar Amount of Each Invoice Submitted in this Month	Date of Invoice(s) Submitted this Month	Total Payments Received by DBE In this Month * ($)	Date Payment(s) Received in this Month	Total Payments Received by DBE To Date ($)	Total % Work To Date	Final Payment? Y or N
TOTALS →	$	$	TOTALS→	$	TOTALS→	$	TOTALS→	$		

Is retainage held on your subcontract? **Yes** *or* **No** (circle one) If yes, how much? $_____. Did your final payment include retainage? **Yes** or **No** (circle one)

Past Due Invoice(s) Information: List any invoice more than 40 days past due from date submitted to prime at the time you complete this form.

Invoice #	Invoice Date	Invoice Amount ($)	Number of Days Past Due	Comments: use additional paper if necessary

Note: CFO or equivalent Sr. Manager must complete and sign off on this form.

Name: _____ Signature: _____ Title: _____ Date: _____

THIS FORM IS DUE ON THE 7TH OF EACH MONTH IMMEDIATELY FOLLOWING DBE's SUBCONTRACT START DATE, EVEN IF PAYMENT NOT RECEIVED.

Please mail this form to:
NJ TRANSIT, Office of Business Development, One Penn Plaza East, 6th Fl, Newark, New Jersey 07105-2246

Do not alter this form in any way.

If you need assistance completing this form please call 973-491-7977,7539,8061,8614,7530,8941.

Rev Fed Form E2 – Sept 2010
Updated 3.30.18

SUPPLEMENTAL SECTION
REQUIRED FORMS

ENCLOSED FOR COMPLETION (IF APPLICABLE):

- **Form AA; AA1; AA2; BB; & Trucking Commitment Schedule**

TO BE OBTAINED AND SUBMITTED (IF APPLICABLE):

- **Copy of NJUCP DBE and NAICS Code Certification**

Consult DBE Program Requirements for further guidance.

MANDATORY FORM FOR First TIER DBE (IF APPLICABLE): COMPLETE ENTIRELY

FORM AA (Fed)

SECOND TIER DBE UTILIZATION– FORM AA

Project Name: _____ NJT Contract No: _____

DBE Sub-Prime (First Tier) Subcontractor Contract Value ($): _____

I plan to subcontract _____% of my subcontract to Second Tier DBE subcontractor(s)/subconsultant(s) listed on the chart below to perform/supply the following:

Second Tier DBE subs must perform 100% of their scope of work.

			%
			%
			%

The undersigned understands its approval to perform on the above contract is based upon its identified DBE team listed above and its Non-DBE team listed on the Form AA2. The DBE Sub-Prime must receive written approval from the Office of Business Development for any changes to its DBE and/or Non-DBE subcontractors, their dollar values or scope of work identified on the Form AA and/or AA2 before making any changes. It attests that the identified firms will perform all work. Failure to adhere to, or falsification of any information contained herein shall result in breach of contract and subject to corrective action to be determined by NJ TRANSIT.

DBE Sub-Prime Firm: _____ Authorized Signature: _____

Company Address: _____ Print Name: _____

_____ Title: _____

Federal Tax ID #: _____ Sub-Prime's DBE Liaison Officer: _____

Company Tel #: _____ Date Signed: _____

To Add Subs Use Additional Forms

MANDATORY FORM: COMPLETE ENTIRELY

Form AA1 (Fed)

BIDDER SOLICITATION & CONTRACTOR INFORMATION - FORM AA1

NJT Contract No: _____

DBE Sub-Prime: _____

Date: _____

Project Title: _____

Telephone #: _____

Complete the information below for Second Tier contractor(s) participating on the project.

Company Name			
Address			
City			
Zip			
Contact			
Phone			
Email			
Gender			
Race (Ethnicity)			
State Certified			
Ethnicity			
Gender			
Certification Status: DBE/non-DBE			
Federal Tax ID/SSN			
Annual Gross Receipts A – Less than $1MM B – $1MM to $3MM C – $3MM to $6MM D – $6MM to $10MM E – $10MM and over Indicate the letter that applies			
Primary NAICS code			

To Add Subs Use Additional Forms

MANDATORY FORM BY DBE SUB-PRIME: COMPLETE ENTIRELY

FORM AA2 (Fed)

NON-DBE SECOND TIER SUBCONTRACTOR UTILIZATION - FORM AA2

Directions: To be completed by any DBE Sub-Prime Contractor for "all" subs including suppliers participating on this contract.

NJ Transit Contract No: _____ Date: _____ DBE Sub-Prime Contract Value: _____

DBE Sub-Prime Contractor Name: _____ Project Title: _____

			$	%
			$	%
			$	%
			$	%
			$	%
		TOTAL	$	%

To Add Subs Use Additional Forms

INTENT TO PERFORM AS A SECOND TIER DBE - FORM BB

The Bidder is prohibited from completing any portion of this form and directing the DBE to sign a blank form.
DIRECTIONS: DBE(s) listed on the Form AA must complete all information on this form and must complete Form AA2 for any Non-DBE subcontractor performing a portion of its subcontract.

Name of First Tier DBE/Sub-Prime: _____ **Name of Second Tier DBE Firm:** _____

Project/Contract Name: _____ IFB/RFP Contract Number: _____

Does the undersigned intend to perform subcontract work in connection with the above-mentioned project as a Joint Venture? Circle one. **(Yes or No)**

Will you subcontract any portion of your scope of work to a DBE(s)? Circle one. **(Yes or No)**

Will you subcontract any portion of your scope of work to a Non-DBE(s)? Circle one. **(Yes or No)**

The undersigned will perform the following described work on the above-referenced project: (*Provide a detailed description of the type of work you will perform on your subcontract. Attach a copy of quote approved and signed by Bidder (optional)).*

_____

_____

Dollar Value of DBE Subcontract: $_____

Total Quantity/Units (if applicable): _____ **Per Unit Cost (if applicable): $**_____

The undersigned based the above scope of work and subcontract value on detailed project specs received from the DBE Sub-Prime named above. Circle one. **(Yes or No)**

The Prime Contractor *projected* the following commencement and completion date for such work as follows:

DBE Contract Start Date: _____ DBE Contract Completion Date _____

The undersigned DBE will enter into a formal agreement for the above work with the DBE Sub-Prime conditioned upon execution of a contract with the Prime on the project. As a Second Tier DBE subcontractor, I will cooperate with the certification, compliance and monitoring process set forth by NJ TRANSIT. I attest that I will perform 100% of my subcontract with my own workforce for the referenced project.

Signature of Second Tier DBE **Date** **Title**

Print Name **Telephone #:**

Failure to adhere to these instructions or the falsification of any information on this form shall result in breach of contract and subject to the appropriate penalties as determined by NJ TRANSIT.

MANDATORY FORM

DBE TRUCKING COMMITMENT

AGREEMENT

The DBE Trucking Firm Commitment Agreement sheet attached must be signed and completed entirely. Make duplicate copies for additional subcontractors as needed. Please read DBE Requirement Language for details.

- DBEs must provide information for all DBE/Non-DBE trucking firms it will lease from or subcontract to.
    - *Subcontracting to a Non-DBE trucker means that the Non-DBE will perform a portion of the DBE firm's subcontract.*
    - *2nd Tier DBE trucking firms must perform 100% of their total subcontract value.*
- For Non-DBE leased trucks, credit will only be given for the fee/commission that is received for arranging the transportation services.
    - *All DBE-leased trucks are required to reflect the DBE firm's company name and identification number.*

Copies of the following items must be attached for ALL trucks owned by the DBE:

- Proof of ownership: title(s) or finance agreement(s) ONLY
- registration card(s)
- insurance card(s)
- hazardous waste license(s), if applicable
- apportioned cab card(s), if applicable

Copies of the following items must be attached for ALL DBE/non-DBE trucks leased by the DBE:

- lease agreement(s)
- title(s)
- registration card(s)
- insurance card(s)
- hazardous waste license(s), if applicable
- apportioned cab card(s), if applicable

MANDATORY FORM

DBE TRUCKING FIRM COMMITMENT AGREEMENT

This commitment is subject to the award and receipt of a signed contract from NJ TRANSIT for the subject project. Note that copies of all supporting documents must be attached.

The DBE trucking firm will perform the following described work on the project: *(Specific work details should include: Type of material to be handled, quantities to be hauled, dollar amount per unit, location the material will be transported).*

_____

_____.

Dollar Value of DBE Subcontract: $_____

Total Quantity/Units (if applicable: _____ Per Unit Cost (if applicable): $_____

Total Number of fully operational DBE-owned trucks to be used on contract? _____.
Total Number of fully operational trucks to be leased from a DBE? _____.
(Provide a copy of lease agreement(s) for each trucking firm).
Total Number of fully operational trucks to be leased from a non-DBE? _____.
*(Provide a copy of lease agreement(s) for each trucking firm. *Note that subcontracting is different from leasing as it relates to trucking).*

Specify ALL Vehicle Information on Page 1 and 2, if applicable

1st Tier DBE Trucking Firm		*(T= Title, F=Finance Agreement, I=Insurance Card, R=Registration, A=Apportioned Cab Card, L= Lease Agreement)			
# Of Trucks Owned					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	*(Indicate T/F/I/R/A/L) OWNERSHIP DOCS

MANDATORY FORM

Non-DBE Trucking Firm					
# Of Trucks Leased From non-DBE Trucking Firm					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	(Indicate T/F/ I/R/A/L) OWNERSHIP DOCS
DBE Trucking Firm					
# Of Trucks Leased From DBE Trucking Firm					
VIN #	MAKE	YEAR	MODEL	(Indicate Yes/No/NA) HAZ WASTE DOC	(Indicate T/F/I/R/A/L) OWNERSHIP DOCS

I hereby certify that the information present above is correct. I agree to inform the Office of Business Diversity in writing within 10 days, if anything changes.

1st Tier DBE Signature: _____ Date: _____

Print Name: _____

EXHIBIT 4

EXHIBIT 4

MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L.1975, c.127)
N.J.A.C. 17:27 et seq.

GOODS, GENERAL SERVICES, AND PROFESSIONAL SERVICES CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or ex-pression, the contractor will ensure that equal employment opportunity is afforded to such applicants in recruitment and employment, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affection-al or sexual orientation, gender identity or expression, disability, nationality or sex. Such equal employment opportunity shall include, but not be limited to the following: employment, up-grading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprentice-ship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable 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 age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor will send to each labor union, with which it has a collective bargaining agreement, a notice, to be provided by the agency contracting officer, advising the labor union of the contractor's commitments under this chapter and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

The contractor or subcontractor agrees to make good faith efforts to meet targeted county employment goals established in accordance with N.J.A.C. 17:27-5.2.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, and labor unions, that it does not discriminate on the basis of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the targeted employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are

taken without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents:

Letter of Federal Affirmative Action Plan Approval;

Certificate of Employee Information Report; or

Employee Information Report Form AA-302 (electronically provided by the Division and distributed to the public agency through the Division's website at: http://www.state.nj.us/treasury/contract_compliance.

The contractor and its subcontractors shall furnish such reports or other documents to the Division of Purchase & Property, CCAU, EEO Monitoring Program as may be request-ed by the office from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Division of Purchase & Property, CCAU, EEO Monitoring Program for conducting a compliance investigation pursuant to N.J.A.C. 17:27-1.1 et seq.

EXHIBIT 5

EXHIBIT 5
STATEMENT OF JOINT VENTURE
FOR
PROFESSIONAL SERVICES

WE, THE UNDERSIGNED, BEING DULY SWORN ACCORDING TO LAW, UPON OUR RESPECTIVE OATHS DEPOSE AND SAY THAT:

1. THE CONSULTANT, UNDER WHOSE NAME WE HAVE AFFIXED OUR RESPECTIVE SIGNATURES, HAS DULY AUTHORIZED AND EMPOWERED US TO EXECUTE THIS STATEMENT OF JOINT VENTURE IN THE NAME OF AND ON BEHALF OF SUCH CONSULTANT FOR THE PURPOSES HEREIN FURTHER SET FORTH.

2. THE FOLLOWING NAMED CONSULTANTS:

(a)	.....;	.....;	.....;
	( ) Individual	( ) Partnership	( ) Corporation
(b)	.....;	.....;	.....;
	( ) Individual	( ) Partnership	( ) Corporation
(c)	.....;	.....;	.....;
	( ) Individual	( ) Partnership	( ) Corporation

HAVE ENTERED INTO A JOINT VENTURE FOR THE SPECIAL PURPOSE OF CARRYING ON THE WORK AND PROFESSIONAL SERVICES HEREINAFTER DESCRIBED.

3. UNDER THE PROVISIONS OF SUCH JOINT VENTURE THE ASSETS OF EACH OF THE CONSULTANTS NAMED IN PARAGRAPH 2 HEREOF, AND IN CASE ANY CONSULTANT SO NAMED ABOVE IS A PARTNERSHIP THE ASSETS OF THE INDIVIDUAL MEMBERS OF SUCH PARTNERSHIP, WILL BE AVAILABLE FOR THE PERFORMANCE OF SUCH JOINT VENTURE AND LIABLE THEREFOR AND FOR ALL OBLIGATIONS INCURRED IN CONNECTION THEREWITH.

4. THIS STATEMENT OF JOINT VENTURE IS EXECUTED SO THAT THE NAMED CONSULTANTS MAY, UNDER SUCH JOINT VENTURE, PROPOSE TO PERFORM THE WORK AND PROFESSIONAL SERVICES HEREIN MENTIONED AND THEY MAY, IF THE SUCCESSFUL PROPOSER THEREFOR, BE AWARDED THE CONTRACT FOR SUCH WORK AND PROFESSIONAL SERVICES. ANY CONTRACT RELATING TO THE WORK AND PROFESSIONAL SERVICES HEREINAFTER SPECIFIED SHALL BE EXECUTED BY ANY PERSON AUTHORIZED TO BIND ANY MEMBER OF THIS JOINT VENTURE, AND WHEN SO EXECUTED SHALL BIND THIS JOINT VENTURE AND EACH AND EVERY CONSULTANT NAMED HEREIN, SEVERALLY AND JOINTLY. SIMULTANEOUS WITH THE EXECUTION OF THE CONTRACT THE JOINT VENTURERS SHALL DESIGNATE AND APPOINT A PROJECT MANAGER/DIRECTOR TO ACT AS THEIR TRUE AND LAWFUL AGENT WITH FULL POWER AND AUTHORITY TO DO AND PERFORM ANY AND ALL ACTS OR THINGS NECESSARY TO CARRY OUT THE WORK AND PROFESSIONAL SERVICES SET FORTH IN SAID CONTRACT.

STATEMENT OF JOINT VENTURE
FOR
PROFESSIONAL SERVICES
(Continued)

5. AS JOINT VENTURERS, WE BIND THE CONSULTANT FOR WHOM WE RESPECTIVELY EXECUTE THIS STATEMENT OF JOINT VENTURE IN FIRM AGREEMENT WITH NJ TRANSIT THAT EACH OF THE REPRESENTATIONS HEREIN SET FORTH IS TRUE.

6. THE WORK AND PROFESSIONAL SERVICES FOR WHICH THIS JOINT VENTURE HAS BEEN ENTERED INTO IS IDENTIFIED AS:

.....

.....

.....

.....

SUBSCRIBED AND SWORN TO BEFORE ME,

THIS ..... DAY OF

..... , 20 .....

(a) .....
(Name of Consultant)

BY .....
(Also type or print name of signer)

SUBSCRIBED AND SWORN TO BEFORE ME,

THIS ..... DAY OF

..... , 20 .....

(b) .....
(Name of Consultant)

BY .....
(Also type or print name of signer)

SUBSCRIBED AND SWORN TO BEFORE ME,

THIS ..... DAY OF

..... , 20 .....

(c) .....
(Name of Consultant)

BY .....
(Also type or print name of signer)

TO BE EXECUTED BY EACH JOINT VENTURER

AUTHORIZATION AND DESIGNATION OF RESPECTIVE AFFIANTS TO THE STATEMENT OF JOINT VENTURE HERETO ATTACHED TO ACT FOR AND ON BEHALF OF THE CONSULTANTS NAMED IN PARAGRAPH 2 THEREOF:

(a) ..... HEREBY CERTIFIES THAT
(Name of Consultant)

..... HAS BEEN AND IS HEREBY EMPOWERED
(Name of Representative)

TO SIGN THE STATEMENT OF JOINT VENTURE ATTACHED HERETO AS THE AUTHORIZED

REPRESENTATIVE OF .....
(Name of Consultant)

FOR THE SPECIAL PURPOSE THEREIN EXPRESSED.

ATTEST ....

(SEAL NECESSARY IF CORPORATION)

• • • • • • •

(b) ..... HEREBY CERTIFIES THAT
(Name of Consultant)

..... HAS BEEN AND IS HEREBY EMPOWERED
(Name of Representative)

TO SIGN THE STATEMENT OF JOINT VENTURE ATTACHED HERETO AS THE AUTHORIZED

REPRESENTATIVE OF .....
(Name of Consultant)

FOR THE SPECIAL PURPOSE THEREIN EXPRESSED.

ATTEST ....

(SEAL NECESSARY IF CORPORATION)

• • • • • • •

(c) ..... HEREBY CERTIFIES THAT
(Name of Consultant)

..... HAS BEEN AND IS HEREBY EMPOWERED
(Name of Representative)

TO SIGN THE STATEMENT OF JOINT VENTURE ATTACHED HERETO AS THE AUTHORIZED

REPRESENTATIVE OF .....
(Name of Consultant)

FOR THE SPECIAL PURPOSE THEREIN EXPRESSED.

ATTEST ....

(SEAL NECESSARY IF CORPORATION)

EXHIBIT 6

OWNERSHIP DISCLOSURE FORM

STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY - DIVISION OF PURCHASE AND PROPERTY
33 WEST STATE STREET, P.O. BOX 230 TRENTON, NEW JERSEY 08625-0230

BID SOLICITATION # AND TITLE: _____

VENDOR NAME: _____

PURSUANT TO N.J.S.A. 52:25-24.2, ALL PARTIES ENTERING INTO A CONTRACT WITH THE STATE ARE REQUIRED TO PROVIDE A STATEMENT OF OWNERSHIP.

		YES	NO
1.	The vendor is a **Non-Profit Entity**; and therefore, no disclosure is necessary.	☐	☐
2.	The vendor is a **Sole Proprietor**; and therefore, no other disclosure is necessary. A Sole Proprietor is a person who owns an unincorporated business by himself or her-self. A limited liability company with a single member is not a Sole Proprietor.	☐	☐
3.	The vendor is a **corporation, partnership, or limited liability company**.	☐	☐

If you answered **YES** to Question 3, you must disclose the following: **(a)** the names and addresses of all stockholders in the corporation who own 10% or more of its stock, of any class; **(b)** all individual partners in the partnership who own a 10% or greater interest therein; or, **(c)** all members in the limited liability company who own a 10% or greater interest therein.*

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

		YES	NO
4.	For each of the corporations, partnerships, or limited liability companies identified above, are there any individuals, partners, members, stockholders, corporations, partnerships, or limited liability companies owning a 10% or greater interest of those listed business entities?	☐	☐

If you answered **YES** to Question 4, you must disclose the following: **(a)** the names and addresses of all stockholders in the corporation who own 10% or more of its stock, of any class; **(b)** all individual partners in the partnership who own a 10% or greater interest therein; or, **(c)** all members in the limited liability company who own a 10% or greater interest therein. The disclosure(s) shall be continued until the names and addresses of every non-corporate stockholder, individual partner, and/or member a 10% or greater interest has been identified.*

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

NAME			
ADDRESS			
ADDRESS			
CITY	**STATE**	**ZIP**	

5. As an alternative to completing this form, a Vendor with any direct or indirect parent entity which is publicly traded, may submit the name and address of each publicly traded entity and the name and address of each person that holds a 10% or greater beneficial interest in the publicly traded entity as of the last annual filing with the federal Securities and Exchange Commission or the foreign equivalent, and, if there is any person that holds a 10% or greater beneficial interest, also shall submit links to the websites containing the last annual filings with the federal Securities and Exchange Commission or the foreign equivalent and the relevant page numbers of the filings that contain the information on each person that holds a 10% or greater beneficial interest.*

_____

_____

_____

* *Attach additional sheets if necessary*

EXHIBIT 7

EXHIBIT 7
NEW JERSEY TRANSIT
SOURCE DISCLOSURE CERTIFICATION FORM

Consultant(Proposer):_____Contract Number:_____

The Consultant(Proposer) submits this form in response to an RFP issued by NJ TRANSIT in accordance with the requirements of N.J.S.A. 52:34-13.2.

PART 1

☐ All services will be performed by the Consultant(Proposer) and the Subconsultants in the United States. Skip part 2.

PART 2

☐ Services will be performed by the Consultant (Proposer) and/or Subconsultants outside of the United States. **Complete Part 2.**

Where services will be performed outside the United States, please list every country where services will be performed by the Consultant (Proposer) and all Subconsultants. If any of the services cannot be performed within the United States, the Consultant (Proposer) shall state, with specificity, the reasons why the services cannot be performed in the United States. Attach additional sheets, if necessary. The Contracting Officer will review this justification and, if deemed sufficient, may seek approval of the President and CEO (Executive Director).

Name of Consultant(Proposer)/ Subconsultant	Performance Location by Country	Description of Service(s) to be Performed Outside the United States	Reason Why the Service(s) Cannot be Performed in the U. S.

Any changes to the information set forth in this Certification during the term of any contract awarded under the referenced solicitation or extension thereof will be immediately reported by the Consultant (Proposer) to the Director of Contracts, NJ TRANSIT Corporation, One Penn Plaza East, Newark, NJ 07105.

If during the term of the Contract, the Consultant (Proposer) shifts the location of any of the services outside the United States, without a prior to a written determination by the Contracting Officer, that the services cannot be performed in the United States, the Consultant(Proposer) shall be deemed in breach of Contract, and the Contract will be subject to termination for cause pursuant to Article 16 of the Professional Services Agreement.

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Consultant(Proposer), that the foregoing information and any attachments hereto, to the best of my knowledge are true and correct. I acknowledge that NJ TRANSIT is relying on the information contained herein, and that the Consultant(Proposer) is under a continuing obligation from the date of this certification through the completion of any contract(s) with NJ TRANSIT to notify NJ TRANSIT in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with NJ TRANSIT, permitting NJ TRANSIT to declare any contract(s) resulting from this certification to be void and unenforceable.

Signature: _____ Date:_____

Print Name:_____ Title:_____

(Rev. February 2019)

EXHIBIT 8

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EXHIBIT 9

DISCLOSURE OF INVESTMENT ACTIVITIES IN IRAN FORM

STATE OF NEW JERSEY
DEPARTMENT OF THE TREASURY - DIVISION OF PURCHASE AND PROPERTY
33 WEST STATE STREET, P.O. BOX 230 TRENTON, NEW JERSEY 08625-0230

BID SOLICITATION # AND TITLE: _____

VENDOR/BIDDER NAME: _____

Pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4) any person or entity that submits a bid or proposal or otherwise proposes to enter into or renew a contract must certify that neither the person nor entity, nor any of its parents, subsidiaries, or affiliates, is identified on the New Jersey Department of the Treasury's Chapter 25 List as a person or entity engaged in investment activities in Iran. The Chapter 25 list is found on the Division's website at https://www.state.nj.us/treasury/purchase/pdf/Chapter25List.pdf. Vendors/Bidders must review this list prior to completing the below certification. If the Director of the Division of Purchase and Property finds a person or entity to be in violation of the law, s/he shall take action as may be appropriate and provided by law, rule or contract, including but not limited to, imposing sanctions, seeking compliance, recovering damages, declaring the party in default and seeking debarment or suspension of the party.

CHECK THE APPROPRIATE BOX

☐ I certify, pursuant to N.J.S.A. 52:32-57, et seq. (P.L. 2012, c.25 and P.L. 2021, c.4), that neither the Vendor/Bidder listed above nor any of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List of entities determined to be engaged in prohibited activities in Iran.

OR

☐ I am unable to certify as above because the Vendor/Bidder and/or one or more of its parents, subsidiaries, or affiliates is listed on the New Jersey Department of the Treasury's Chapter 25 List. I will provide a detailed, accurate and precise description of the activities of the Vendor/Bidder, or one of its parents, subsidiaries or affiliates, has engaged in regarding investment activities in Iran by completing the information requested below.

Entity Engaged in Investment Activities _____
Relationship to Vendor/ Bidder _____
Description of Activities _____
_____
_____

Duration of Engagement _____
Anticipated Cessation Date _____
Attach Additional Sheets If Necessary.

CERTIFICATION

I, the undersigned, certify that I am authorized to execute this certification on behalf of the Vendor/Bidder, that the foregoing information and any attachments hereto, to the best of my knowledge are true and complete. I acknowledge that the State of New Jersey is relying on the information contained herein, and that the Vendor/Bidder is under a continuing obligation from the date of this certification through the completion of any contract(s) with the State to notify the State in writing of any changes to the information contained herein; that I am aware that it is a criminal offense to make a false statement or misrepresentation in this certification. If I do so, I will be subject to criminal prosecution under the law, and it will constitute a material breach of my agreement(s) with the State, permitting the State to declare any contract(s) resulting from this certification void and unenforceable.

_____ _____
Signature Date

_____
Print Name and Title

EXHIBIT 10

EXHIBIT 10
CONTRACTOR'S CERTIFICATION OF ELIGIBILITY

The_____ (Insert Name of Company) hereby certifies that it and its Subcontractors are not listed on the State of New Jersey, Department of Labor and Workforce Development, Division of Wages and Hour Compliance, Prevailing Wage Debarment List or on the State of New Jersey, Department of Treasury, Consolidated Debarment Report.

_____(Insert Name of Company) and its Subcontractors has/have no exclusion(s) on the consolidated U.S. Government, Systems for Award Management (SAM) database located at www.SAM.gov.

I, being duly authorized, certify that the information supplied above is complete and correct to the best of my knowledge. I certify that all of the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

_____
Signature

_____
Type or Print Name

_____
Title

_____
Date

EXHIBIT 11

EXHIBIT 11
NON-COLLUSION AFFIDAVIT

STATE OF _____:

COUNTY OF _____:

I, _____ of the City of _____
in the County of _____ and the State of _____ ,of full age, being duly sworn according to law on my oath depose and say that:

I am _____of the firm of the Proposer making the Proposal for the above-named project, and that I executed the said Proposal with full authority so to do; that said Proposer has not, directly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in connection with the above-named project; and that all statements contained in said Proposal and in this affidavit are true and correct; and made with full knowledge that NJ Transit Corp. relies upon the truth of the statements contained in said Proposal and in the statements contained in this affidavit in awarding the Contract for the said project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such Contract upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by_____. (Name of Proposer)

_____
Signature

_____
Type or Print Name

Subscribed and sworn to before me this

_____ day of _____, 20_____.

Notary Public of

My commission expires _____, 20_____.

EXHIBIT 12

EXHIBIT 12a
AFFIDAVIT OF COMPLIANCE
NJ TRANSIT'S CODE OF ETHICS FOR VENDORS
AND
STATE OF NEW JERSEY ETHICS LAWS

I, _____ (*name of individual*), executing this document on behalf of the undersigned company, partnership, corporation, limited liability partnership, limited liability corporation, or entity hereinafter referred to as "Contractor", presently seeking to do business with NJ TRANSIT by way of a Request for Proposals ("RFP"), hereby warrant and affirm to NJ TRANSIT as follows:

1. I warrant and affirm that Contractor has received a copy of NJ TRANSIT's Code of Ethics for Vendors and that I have read and studied this document and distributed this document to all of Contractor's personnel, including but not limited to Subcontractors, involved in seeking to do business with NJ TRANSIT and required said personnel to fully read this document. In addition, I further warrant and affirm that Contractor has received from NJ TRANSIT a document entitled "Important Notice to All Contractors and Consultants" and that I have read and studied this document, including the page setting forth various New Jersey statutory provisions, and that Contractor has distributed this document to all of Contractor's personnel involved in seeking to do business with NJ TRANSIT and required said personnel to fully read this document.

2. Contractor warrants and affirms that it has issued written instructions to all of Contractor's personnel involved in seeking to do business with NJ TRANSIT instructing and requiring same to strictly adhere to the Contractor's responsibilities as set forth in NJ TRANSIT's Code of Vendor Ethics and in the "Important Notice to All Contractors and Consultants".

3. Contractor warrants and affirms that during the bidding or proposal process for the contract with NJ TRANSIT, no gratuities or other inducements have been offered or given or will be offered or given in any form including gifts, gratuities, benefits, inducements, meals (other than *de minimis* valued snacks such as coffee, tea, soda, pretzels, cookies, or similar non-meal items), entertainment, or any other thing of value or favors of any kind to any member of NJ TRANSIT's Board of Directors, officer or employee of NJ TRANSIT.

4. The Contractor warrants and affirms that during the RFP process for the contract with NJ TRANSIT, Contractor has not and will not make any offers of employment to any member of the NJ

TRANSIT Board of Directors, officer or employee directly involved with this contract or solicit or interview therefor, directly or indirectly, without first seeking and obtaining written approval from NJ TRANSIT's Chief Ethics Liaison Officer.

5. The Contractor warrants and affirms that during the RFP process for the contract with NJ TRANSIT it has and shall promptly report in writing to NJ TRANSIT every instance that comes to the Contractor's attention and knowledge regarding any member of NJ TRANSIT's Board of Directors, officer or employee of NJ TRANSIT or their immediate family member, who has either accepted, solicited or asked Contractor to provide any amount of money, gifts, loans, gratuities, benefits, inducements, food (with the exception of coffee, tea, soda, pretzels, donuts, or similar snacks, which may be provided to all attendees at a conference, seminar or business meeting), entertainment or any other thing of value or favors of any kind or has made any solicitation or request, directly or indirectly, for employment with or through the Contractor.

6. The Contractor acknowledges and accepts that for breach or violation of the foregoing warranties and affirmations, NJ TRANSIT shall have the discretion and legal right to disqualify Contractor from bidding or proposing for a contract between the Contractor and NJ TRANSIT.

_____
(Print Name of Contractor)

_____
(Signature of Authorized Principal or Officer)

_____
(Print Name and Title of Signator)

Sworn to and Subscribed to before me, this _____ day of _____, 20__

EXHIBIT 12b
IMPORTANT NOTICE
TO
ALL CONTRACTORS AND CONSULTANTS

NJ TRANSIT is an instrumentality of the State of New Jersey and its employees and officers, including members of the NJ TRANSIT Board of Directors, are public servants. NJ TRANSIT, its employees and officers are governed by a number of civil and criminal laws which control how NJ TRANSIT and its personnel do business with contractors and consultants. These provisions include the Conflicts of Interest Law, N.J.S.A. 52:13D-12 and contain unequivocal and stringent restrictions relating to gifts and gratuities.

Be advised that the law prohibits the receipt of gifts and gratuities by any NJ TRANSIT employee or officer from any person, company or entity doing business - or wanting to do business - with NJ TRANSIT. Concomitantly, NJ TRANSIT's own Code of Ethics and Code of Ethics for Vendors, prohibits NJ TRANSIT employees from accepting gifts and prohibits you, the contractors and consultants, from offering any gifts to any NJ TRANSIT employee.

The term "gift" is broadly and widely defined. It includes all things and objects, tangible or intangible, including services, gratuities, meals, entertainment, tickets to events, access to membership clubs, travel costs, and lodging. Simply put, a "gift" is anything of value.

Do not, under any circumstance, tempt or put an NJ TRANSIT employee in the awkward position of having to refuse a gift or return a gift, no matter how well- intentioned or innocuous the gift may be in your eyes.

The bright-line rule for you and your staff in doing business with NJ TRANSIT is simple: Offer nothing and give nothing to any NJ TRANSIT employee or officer. It is your responsibility to circulate this Notice in your company and educate accordingly all personnel who do business with NJ TRANSIT.

EXHIBIT 13

EXHIBIT 13
NEW JERSEY TRANSIT CORPORATION

CERTIFICATION FOR CONTRACTS, GRANTS, LOANS AND COOPERATIVE AGREEMENTS (Byrd Anti-Lobbying Certification)

The undersigned certifies, to the best of his or her knowledge and belief, that:

(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 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, the undersigned shall complete and submit "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 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 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.

_____
Signature of Authorized Official

_____
Print Name

_____
Title

_____
Firm

_____
Date

EXHIBIT 14

EXHIBIT 14
Per Diem (Major Cities)*
Effective October 1, 2018

*** $55 Standard Meal Rate applies to all destinations not specifically listed**
Average Per Diem Rates are listed below
A full listing of domestic Per Diem Rates can be found online at www.gsa.gov
Current foreign Per Diem Rates can be found at http://aoprals.state.gov

NJ TRANSIT
TRAVEL & BUSINESS REIMBURSEMENT GUIDELINES
FOR CONTRACTORS AND VENDORS

GENERAL:

All overnight travel must be authorized in writing by the Project Manager. Overnight lodging expenses for New York City are prohibited.

These guidelines are subject to periodic review and adjustment by NJ TRANSIT.

Meals: NJ TRANSIT has adopted the IRS-established "Major Cities" method for meal and incidental travel expenses within the continental United States.

The following table shows the average per diem rates for meals and incidental expenses while on travel. The M&IE rates differ by travel location. View the per diem rates for your destination to determine which M&IE rates apply.

M&IE Total	$55.00	$56.00	$61.00	$66.00	$71.00	$76.00
Breakfast	$13.00	$13.00	$14.00	$16.00	$17.00	$18.00
Lunch	$14.00	$15.00	$16.00	$17.00	$18.00	$19.00
Dinner	$23.00	$23.00	$26.00	$28.00	$31.00	$34.00
Incidentals	$5.00	$5.00	$5.00	$5.00	$5.00	$5.00

"Incidentals" as defined by the IRS include "fees and tips given to porters, baggage carries, bellhops, hotel maids, stewards and stewardesses and others on ships and hotel servants".

2. Conveyances: Travel expenses will be reimbursed subject to their reasonableness and subject to the following maximums (receipts required):

   1. Air-Fare: When authorized in writing and only at the prevailing coach rates. First class travel costs are not reimbursable.
   2. Rail or Bus: Only regular coach fares are reimbursable.
   3. Automobile: Mileage will be reimbursed at a rate of $0.58 cents per mile (effective January 1, 2019). Mileage claims in excess of 30 miles one-way must be supported with documentation from a reputable online service (e.g. Map Quest). Gas, tolls and parking fees will be reimbursed only when validated by receipt.

3. Lodging: Reimbursed for single occupancy rates at reasonable, actual costs for the location. Lodging costs exceeding $140.00 per night require prior approval of the Project Manager.

EXHIBIT 15

EXHIBIT 15

RFP NO. _21-059_

CERTIFICATION OF NO TAX LIABILITY OR FELONY CONVICTION

On behalf of _____
(Name of Entity/Company/Business Association) (hereinafter "Prospective Vendor"), I hereby certify that, as of the date of execution of this Certification, the Prospective Vendor:

1. Does not have any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and the Prospective Vendor

2. Has not been convicted of any felony criminal violation under any Federal law within the preceding 24 months; and the Prospective Vendor

3. Agrees that, if awarded any contract by NJ TRANSIT, the Prospective Vendor will flow down the requirements of Paragraphs 1 and 2 to all lower tier subcontractors or subconsultants involved in this work (including sub-subcontractors and sub-subconsultants, etc.), without regard to the value of any such subagreement (or sub-subagreement, etc.).

The Prospective Vendor further understands and acknowledges that the conditions and obligations herein continue through and until the date of any contract award. If any of the conditions stated herein change prior to the date of contract award, for us or for any subcontractor or subconsultant (or sub-subcontractor or sub-subconsultant, etc.), the Prospective Vendor will immediately notify the NJ TRANSIT contracting officer.

I certify under penalty of perjury that the foregoing statements made by me are true and correct. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

_____
Signature

_____
Type or Print Name

_____
Title

_____
Date

EXHIBIT 16

EXHIBIT 16

Intent to Propose Form

Please respond via email using the form below to indicate your organization's Intent to Propose by the date specified in the Timeline

RFP No. 21-059
Final Design, Engineering, and other Technical Services
for the Newark Penn Station Distributed Generation (DG) Project

All proposers must complete this page and email it to:

Faith Blair
NJ TRANSIT Procurement Officer
Email: fblair@njtransit.com

Name of Proposer: _____

We confirm the receipt of your request for proposal and will take the following action [check only one box]:

- ❑ **We intend to submit an electronic proposal**
- ❑ **We decline to submit a proposal [please provide reason]**

Signature: _____

Name (Print): _____

Telephone #: _____

Date: _____

Email Address: _____

Alternate Name (Print): _____

Alternate Email Address: _____

Intent to Propose Forms must be received by the date specified in the RFP timeline.

Once your Intent to Propose Form has been received by NJ TRANSIT, you will receive instructions on how to access the Secure File Transfer Site (SFTS) via Microsoft OneDrive. From this site, you will be able to download information as well as upload your electronic version of the proposal. The SFTS Microsoft OneDrive was utilized to provide a secure method for facilitating file transfers to and from outside parties.

Exhibit 17

NOTICE TO ALL PROSPECTIVE CONTRACTORS AND CONSULTANTS

Effective immediately and until further notice, the terms and conditions of New Jersey Executive Order No. 271 (Murphy 2021) ("EO 271"), and the attached Contract Rider attached, are applicable to this solicitation.

EO 271 addresses COVID-19 vaccination and testing requirements for certain contractors and consultants doing business with NJ TRANSIT. Please carefully review the attached documents.

NEW JERSEY TRANSIT CORPORATION

CONTRACT RIDER

STATE OF NEW JERSEY EXECUTIVE ORDER NO. 271
COVID-19 VACCINE AND TESTING REQUIREMENTS

Effective immediately and until further notice, the terms and conditions of New Jersey Executive Order No. 271 (Murphy 2021) ("EO 271"), attached hereto, are applicable to this contract.

EO 271 applies to all contracts, solicitations for a contract, extensions or renewals of an existing contract, and any exercise of an option on an existing contract, if such contract is for services, construction (including demolition, remediation, removal of hazardous substances, alteration, custom fabrication, repair work, or maintenance work), or a leasehold interest in real property through which covered workers have access to State property, and the cost or contract price thereof is to be paid, in whole or in part, with or out of New Jersey executive department or agency funds.

Prior to any contract award, all contractors must review EO 271 and, thereafter, return the attached Certification and Acknowledgment to the assigned NJ TRANSIT contract specialist.

EO 271 requires a covered contractor, as defined in EO 271, and any subcontractor, at any tier, that is party to the contract to maintain a policy that requires all "covered workers," as defined in EO 271, to either provide adequate proof to the contractor that they have been fully vaccinated or submit to COVID-19 testing at minimum one to two times weekly. This requirement shall be deemed incorporated into the contract between NJ TRANSIT and the contractor, and must be incorporated by the contractor into all subcontracts and lower-tier subcontracts.

A covered contractor may institute a vaccination or testing policy that includes additional or stricter requirements than EO 271, so long as such policy comports with the minimum requirements of EO 271.

Violation of EO 271 may result in penalties as set forth in EO 271, however contractors and subcontractors are also advised that failure to abide by EO 271 may subject the vendor to debarment, suspension, disqualification or any other such remedies as NJ TRANSIT may deem necessary.

Attachments:

1. EO 271
2. Certification and Acknowledgment of New Jersey Executive Order No. 271

EXECUTIVE ORDER NO. 271

WHEREAS, on March 9, 2020, I issued Executive Order No. 103, declaring the existence of a Public Health Emergency, pursuant to the Emergency Health Powers Act ("EHPA"), N.J.S.A. 26:13-1 et seq., and a State of Emergency, pursuant to the New Jersey Civilian Defense and Disaster Control Act ("Disaster Control Act"), N.J.S.A. App A:9-33 et seq., in the State of New Jersey for Coronavirus disease 2019 ("COVID-19"); and

WHEREAS, through Executive Order Nos. 119, 138, 151, 162, 171, 180, 186, 191, 200, 210, 215, 222, 231, 235, and 240, issued on April 7, 2020, May 6, 2020, June 4, 2020, July 2, 2020, August 1, 2020, August 27, 2020, September 25, 2020, October 24, 2020, November 22, 2020, December 21, 2020, January 19, 2021, February 17, 2021, March 17, 2021, April 15, 2021, and May 14, 2021, respectively, the facts and circumstances of which are adopted by reference herein, I declared that the COVID-19 Public Health Emergency continued to exist and declared that all Executive Orders and Administrative Orders adopted in whole or in part in response to the COVID-19 Public Health Emergency remained in full force and effect; and

WHEREAS, in accordance with N.J.S.A. App. A:9-34 and -51, I reserve the right to utilize and employ all available resources of State government to protect against the emergency created by COVID-19; and

WHEREAS, as COVID-19 continued to spread across New Jersey, I have issued a series of Executive Orders pursuant to my authority under the EHPA and the Disaster Control Act, to protect the public health, safety, and welfare against the emergency created by COVID-19, including Executive Order Nos. 104-133, Nos. 135-138, Nos. 140-166, Nos. 168-173, No. 175, Nos. 177-181, No. 183, Nos. 186-187, Nos. 189- 198, No. 200, Nos. 203-204, No. 207, and

Nos. 210-211 (2020) and Nos. 214-216, Nos. 219-220, Nos. 222-223, No. 225, Nos. 228-235, Nos. 237-244, No. 246, No. 249, Nos. 251-253, Nos. 263-264, and Nos. 266-267 (2021), the facts and circumstances of which are all adopted by reference herein; and

WHEREAS, on June 4, 2021, I signed Assembly Bill No. 5820 into law as P.L.2021, c.103 and issued Executive Order No. 244, which terminated the Public Health Emergency declared in Executive Order No. 103 (2020) but maintained the State of Emergency declared in that same Order; and

WHEREAS, P.L.2021, c.103 provided that following the termination of the Public Health Emergency declared in Executive Order No. 103 (2020), the Governor, Department of Health ("DOH") Commissioner (the "Commissioner"), and the head of any other State agency may continue to issue orders related to implementation of recommendations of the Centers for Disease Control and Prevention ("CDC") to prevent or limit the transmission of COVID-19 and related to vaccine distribution, administration, and management, COVID-19 testing, and data collection; and

WHEREAS, parties that contract with the State government provide essential services to the public and interact with the public on a regular basis, and because of the nature of their work, a significant portion of their workers are not able to work remotely; and

WHEREAS, ensuring the safety of the government workforce during this overall escalation in COVID-19 cases, hospitalizations, and deaths resulting from the B.1.617.2 ("Delta") variant is essential for continued operation and service to the public, and it is fitting and proper to require additional protections to the State workforce and public by requiring contractors to provide their vaccination or testing status as a

condition of entry onto State property and into State facilities, including property and facilities leased by a contractor; and

WHEREAS, the CDC has reported that new variants of COVID-19 have been identified in the United States, and that certain variants, particularly the Delta variant, are more transmissible than previous strains; and

WHEREAS, the State has experienced significant overall upticks in critical COVID-19 metrics since July of this year, including COVID-19 positive cases, the rate of transmission, spot positivity, and new hospitalizations, that warrant additional precautions in certain settings, especially those with a substantial number of unvaccinated individuals; and

WHEREAS, while over 5.7 million people in the State have been fully vaccinated against COVID-19, additional steps are necessary to ensure continued vaccinations of individuals in certain settings of concern to protect against the spread of COVID-19; and

WHEREAS, on July 6, 2021, the U.S. Department of Justice's Office of Legal Counsel issued an opinion concluding that Section 564 of the Food, Drug, and Cosmetic Act, 21 U.S.C. § 360bbb-3 does not prohibit public or private entities from imposing vaccination requirements while vaccinations are only available pursuant to Emergency Use Authorization ("EUA"); and

WHEREAS, ensuring that parties that contract with the State government provide adequate COVID-19 safeguards to their workers performing on or in connection with a State government contract will decrease worker absence, reduce labor costs, and improve the efficiency of contractors and subcontractors at sites where they are performing work for the State; and

WHEREAS, the CDC has emphasized that COVID-19 vaccines are effective, in that they can prevent individuals from getting and spreading the virus, and can prevent severe illness in individuals who do contract COVID-19; and

WHEREAS, this Order is related to vaccination management, COVID-19 testing, data collection, and the implementation of CDC recommendations, and is thus authorized under P.L.2021, c.103;

NOW, THEREFORE, I, PHILIP D. MURPHY, Governor of the State of New Jersey, by virtue of the authority vested in me by the Constitution and by the Statutes of this State, do hereby ORDER and DIRECT:

1. Each executive department and agency, including an independent authority, shall, to the extent permitted by law, ensure that contracts or agreements entered into by the executive department or agency include a clause that the contractor or any subcontractors, at any tier, that is party to the contract ("covered contractor(s)") must maintain a policy that requires all covered workers to either provide adequate proof to the covered contractor that they have been fully vaccinated or submit to COVID-19 testing at minimum one to two times weekly. This clause shall also be required to be incorporated into lower-tier subcontracts. Any covered worker subject to a policy maintained pursuant to this paragraph that has not provided adequate proof that the covered worker is fully vaccinated must submit to a minimum of weekly or twice weekly testing on an ongoing basis until fully vaccinated.

2. This Order shall apply to any new contract, new solicitation for a contract, extension or renewal of an existing contract, and exercise of an option on an existing contract, if it is a contract for services, construction, including demolition,

remediation, removal of hazardous substances, alteration, custom fabrication, repair work, or maintenance work, or a leasehold interest in real property through which covered workers have access to State property, and the cost or contract price thereof is to be paid, in whole or in part, with or out of executive department or agency funds. This Order shall not apply to financial assistance, including but not limited to grants, bonds, loans, or tax credits; contracts or subcontracts whose value is less than the State bid advertising threshold under N.J.S.A. 52:34-7; employees who perform work outside of the State; or contracts solely for the provision of goods.

3. Covered workers may demonstrate proof of full vaccination status by presenting the following documents to the covered contractor if they list COVID-19 vaccines currently authorized for EUA in the United States and/or the World Health Organization ("WHO"), along with an administration date for each dose:

a. The CDC COVID-19 Vaccination Card issued to the vaccine recipient by the vaccination site, or an electronic or physical copy of the same;

b. Official record from the New Jersey Immunization Information System (NJIIS) or other State immunization registry;

c. A record from a health care provider's portal/medical record system on official letterhead signed by a licensed physician, nurse practitioner, physician's assistant, registered nurse or pharmacist;

d. A military immunization or health record from the United States Armed Forces; or

e. Docket mobile phone application record or any state specific application that produces a digital health record.

Covered contractors collecting vaccination information from covered workers must comport with all federal and State laws, including but not limited to the Americans with Disabilities Act, that regulate the collection and storage of that information.

4. To satisfy the testing requirement, a covered worker must undergo screening testing at minimum one to two times weekly. Where a covered contractor requires an unvaccinated covered worker to submit proof of a COVID-19 test, the worker may choose either antigen or molecular tests that have EUA by the U.S. Food and Drug Administration ("FDA") or are operating per the Laboratory Developed Test requirements by the U.S. Centers for Medicare and Medicaid Services. Where a covered contractor provides the unvaccinated covered worker with on-site access to COVID-19 tests, the covered contractor may similarly elect to administer or provide access to either an antigen or molecular test. If the covered worker is not working on-site during a week where testing would otherwise be required, the covered contractor's policy need not require the worker to submit to testing for that week. This requirement shall not supplant any requirement imposed by the covered contractor regarding diagnostic testing of symptomatic workers or screening testing of vaccinated workers.

5. Covered contractors must have a policy for tracking test results from testing required by this Order and must report results to local public health departments.

6. An executive department or agency shall require bidders for contracts subject to this Order to certify at the time of bid or proposal or prior to executing a contract that the bidder, if

awarded a contract, shall comply with this Order by having the policies and practices required by this Order in place, and shall collect all data necessary for compliance with this Order. Covered contractors shall certify, at the time of submission of an invoice, that they have complied with this Order during the period of time covered by the invoice.

7. For purposes of this Order, "covered worker" means any full-time or part-time worker for a covered contractor working on or in connection with a contract with an executive department or agency that requires such worker to enter, work at, or provide services in any place, site, installation, building, room, or facility in which any executive department or agency conducts official business or is within an executive department or agency's jurisdiction, custody, or control, or that relates to offering services for State employees, their dependents, or the general public.

8. For purposes of this Order, a covered worker shall be considered "fully vaccinated" for COVID-19 two weeks or more after they have received the second dose in a two-dose series or two weeks or more after they have received a single-dose vaccine. Individuals will only be considered fully vaccinated where they have received a COVID-19 vaccine that is currently authorized for emergency use by the FDA or the WHO, or that are approved for use by the same. Workers who are not fully vaccinated, or for whom vaccination status is unknown or who have not provided sufficient proof of documentation, shall be considered unvaccinated for purposes of this Order.

9. Nothing in this Order shall prevent a covered contractor from instituting a vaccination or testing policy that includes additional or stricter requirements, so long as such policy

comports with the minimum requirements of this Order. A covered contractor may also maintain a policy that requires more frequent testing of covered workers.

10. The Commissioner is hereby authorized to issue a directive supplementing the requirements outlined in this Order, which may include, but not be limited to, any requirements for reporting vaccination and testing data to the DOH. Actions taken by the Commissioner pursuant to this Order shall not be subject to the requirements of the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq.

11. The State Director of Emergency Management, who is the Superintendent of State Police, shall have the discretion to make additions, amendments, clarifications, exceptions, and exclusions to the terms of this Order.

12. It shall be the duty of every person or entity in this State or doing business in this State and of the members of the governing body and every official, employee, or agent of every political subdivision in this State and of each member of all other governmental bodies, agencies, and authorities in this State of any nature whatsoever, to cooperate fully in all matters concerning this Order, and to cooperate fully with any Administrative Orders issued pursuant to this Order.

13. No municipality, county, or any other agency or political subdivision of this State shall enact or enforce any order, rule, regulation, ordinance, or resolution which will or might in any way conflict with any of the provisions of this Order, or which will or might in any way interfere with or impede its achievement.

14. Penalties for violations of this Order may be imposed under, among other statutes, N.J.S.A. App. A:9-49 and -50.

15. This Order shall take effect immediately and shall remain in effect until revoked or modified by the Governor.

GIVEN, under my hand and seal this 20th day of October, Two Thousand and Twenty, and of the Independence of the United States, the Two Hundred and Forty-Sixth.

[seal]

/s/ Philip D. Murphy

Governor

Attest:

/s/ Parimal Garg

Chief Counsel to the Governor

CERTIFICATION AND ACKNOWLEDGEMENT OF NEW JERSEY
EXECUTIVE ORDER NO. 271 (MURPHY 2021) ("EO 271")

On behalf of _____ (Name of Entity/Company/Business Association) (hereinafter "Prospective Contractor"), I hereby certify that, as of the date of execution of this Certification and Acknowledgment, the Prospective Contractor:

1. Has read and reviewed the terms and conditions of EO 271; and

2. Has the policies and practices required by EO 271 in place; and

3. If awarded a contract by NJ TRANSIT, will collect all data necessary for compliance with EO 271; and

4. If awarded a contract by NJ TRANSIT, will certify, at the time of submission of an invoice, that we have complied with this Order during the period of time covered by the invoice; or

5. Already has a vaccination or testing policy in place that includes the same, additional or stricter requirements than EO 271, and such policy comports with the minimum requirements of EO 271.

The Prospective Contractor understands and acknowledges that the conditions and obligations must be flowed down to, and made a part of, all contracts with subcontractors at any tier.

The Prospective Contractor further understands that the requirements of EO 271 have the same force and effect as if they were included in the contract documents, and that all remedies available to NJ TRANSIT in the contract documents are applicable to the Prospective Contractor's compliance with EO 271 and the representations contained within this Certification.

I certify under penalty of perjury that the foregoing statements made by me are true and correct. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

_____
Signature

_____
Type or Print Name

_____
Title

_____
Date

Philip D. Murphy, Governor
Sheila Y. Oliver, Lieutenant Governor
Diane Gutierrez-Scaccetti, Commissioner
Kevin S. Corbett, President & CEO

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

January 7, 2022

Addendum No. 1

To Whom It May Concern:

Re: NJ TRANSIT's RFP No. 21-059
Final Design, Engineering and other Technical Services for the Newark Penn Station DG Project

The following constitutes Addendum No. 1 and must be acknowledged with each proposal. Prospective proposers are advised of the following clarifications, additions and/or revisions to the above referenced Request for Proposal (RFP):

1. **RFP Pre-Proposal Conference Presentation**

   The Pre-Proposal Presentation summarizing information discussed at the Pre-Proposal Conference held on **Wednesday, January 5, 2022** is enclosed as Attachment A.

2. **RFP Pre-Proposal Conference Attendance Sheet**

   The Attendance Sheet from the Pre-Proposal Conference held on **Wednesday, January 5, 2022** is included as Attachment B.

This concludes Addendum No. 1. An authorized representative of your organization shall acknowledge receipt of this Addendum in the Exhibit provided with its proposal. Failure to acknowledge receipt of all Addenda may cause the rejection of the Proposal as non-responsive.

Sincerely,

fblair

Faith Blair
Managing Contract Specialist
Procurement Department

Enc.

ADDENDUM NO. 1

ATTACHMENT A

REQUEST FOR PROPOSAL NO. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

PRE-PROPOSAL CONFERENCE – PRESENTATION

NJ TRANSIT RFP No. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DISTRIBUTED GENERATION (DG) PROJECT

PRE-PROPOSAL CONFERENCE
WEDNESDAY, JANUARY 5, 2022

Faith Blair
Managing Contract Specialist

PRE-PROPOSAL CONFERENCE AGENDA

- Introduction
- Proposal Process & Requirements
- Disadvantaged Business Enterprise (DBE) Goal Assignment and DBE Program Compliance Requirements
- Project Overview & Technical Requirements
- Question and Answer Session

KEY DATES

Questions and Requests for Information Due	**Wednesday, January 19, 2022 by 5:00 p.m.**
Intent to Propose Form Due	**Thursday, February 10, 2022 by 5:00 p.m.**
Technical Proposal Due	**Thursday, February 17, 2022 By 3:00 p.m.**

COMMUNICATIONS

- Communications regarding this Request for Proposal are to be conducted through NJ TRANSIT's Procurement Department.

- All other contacts are considered improper and are prohibited. Violation of this prohibition may be cause for removal of a proposer from consideration for award of this contract.

COMMUNICATIONS (CONT'D)

- Proposers are also advised that any discussions held during this meeting are considered informal and are not binding. The only means for modifying the RFP is through a formal written Addendum. Therefore, any inquiries or requests for clarification must be submitted in writing.

- Any response NJ TRANSIT elects to make will be made by a written Addendum to the RFP and made available to all listed holders of the RFP Package via Microsoft One Drive.

REQUESTS FOR INFORMATION & QUESTIONS

- To be given consideration, all such inquiries must adhere to the following:
  - Be received in writing no later than **Wednesday, January 19, 2022, at 5:00 p.m.**
  - Reference RFP name and number, section and page number
  - Requests for information must be emailed in a non-scanned electronic format to **Faith Blair** at fblair@NJTransit.com.
- The Proposer shall also carefully review NJ TRANSIT's Professional Services Agreement (Exhibit 1). The Proposer must identify and submit any questions, requests for clarifications, exceptions or proposed modifications to the Agreement, with suggested changes to the Agreement and the reasons(s) therefore, during the Request for Information period.



ADDENDUM ACKNOWLEDGEMENT

- Any response that NJ TRANSIT may choose to make will be by a written Addendum to the RFP and will be available via Microsoft One Drive.
- NJ TRANSIT will not be bound by any informal explanation, clarification, or interpretation, oral or written, by whoever made, that is not incorporated into an addendum.
- Copies of all such Addenda will be available via Microsoft One Drive.
- **Proposers are required to acknowledge receipt of all addenda by signing the "Acknowledgement of Receipt of Addenda" form (Exhibit 2). Failure to acknowledge receipt of all Addenda may render the proposal nonresponsive.**

INTENT TO PROPOSE FORM

Prospective Proposers are required to register as an interested party by completing the "Intent to Propose Form" (**Exhibit 16**) and submitting the Acknowledgement on or before **Thursday, February 10, 2022, at 5:00 P.M.** ,via email, to the attention of **Faith Blair** at fblair@NJTransit.com.

This form is required in order to submit a Proposal but does not bind a prospective Proposer in any way. Failure to timely submit the notice of intent may result in NJ TRANSIT rejecting any proposal later submitted.

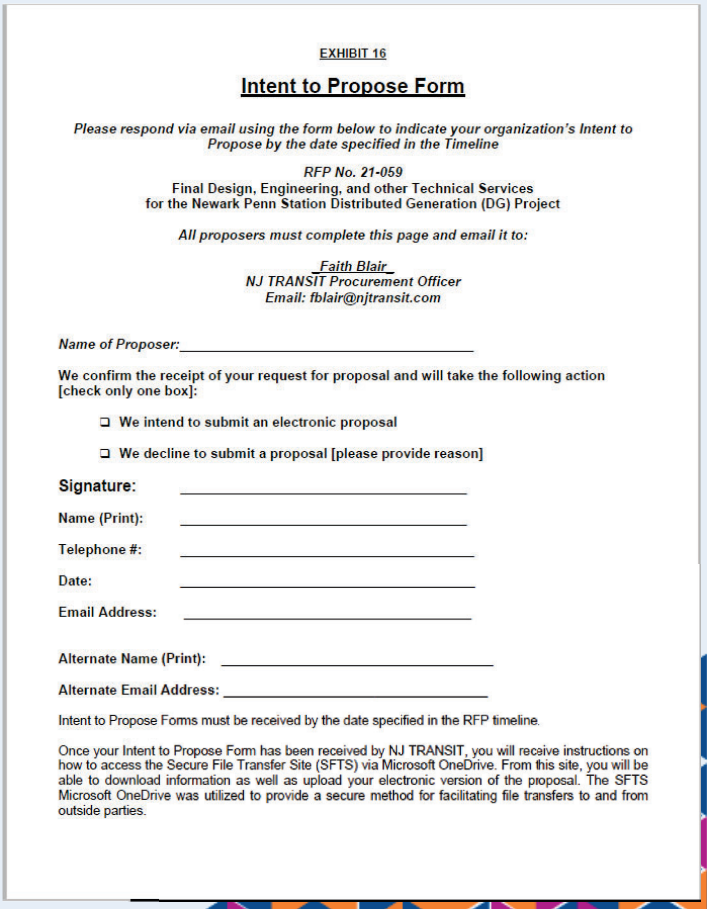


EXHIBIT 16

Intent to Propose Form

Please respond via email using the form below to indicate your organization's Intent to Propose by the date specified in the Timeline

RFP No. 21-059
Final Design, Engineering, and other Technical Services
for the Newark Penn Station Distributed Generation (DG) Project

All proposers must complete this page and email it to:

Faith Blair
NJ TRANSIT Procurement Officer
Email: fblair@njtransit.com

*Name of Proposer:*_____

We confirm the receipt of your request for proposal and will take the following action [check only one box]:

- ❑ We intend to submit an electronic proposal
- ❑ We decline to submit a proposal [please provide reason]

Signature: _____

Name (Print): _____

Telephone #: _____

Date: _____

Email Address: _____

Alternate Name (Print): _____

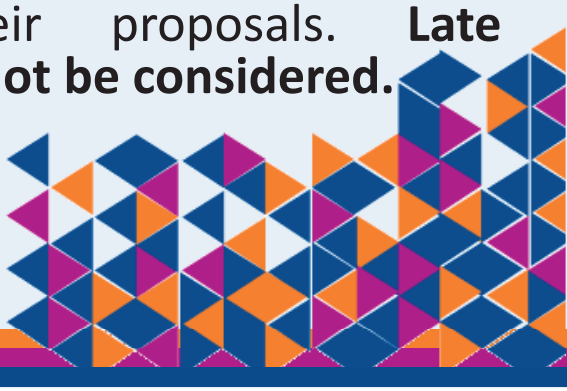
Alternate Email Address: _____

Intent to Propose Forms must be received by the date specified in the RFP timeline.

Once your Intent to Propose Form has been received by NJ TRANSIT, you will receive instructions on how to access the Secure File Transfer Site (SFTS) via Microsoft OneDrive. From this site, you will be able to download information as well as upload your electronic version of the proposal. The SFTS Microsoft OneDrive was utilized to provide a secure method for facilitating file transfers to and from outside parties.

PROPOSAL SUBMISSION INFORMATION

- A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. Prospective proposers are required to register as an interested party by completing the “Intent to Propose Form” shown on the previous slide.
- The Technical Proposal shall be delivered via Microsoft OneDrive on or before **3:00 P.M., Thursday, February 17, 2022**.
- Firms will be fully responsible for the delivery of their proposals. **Late submissions may not be considered.**



TECHNICAL AND COST PROPOSAL SUBMITTAL

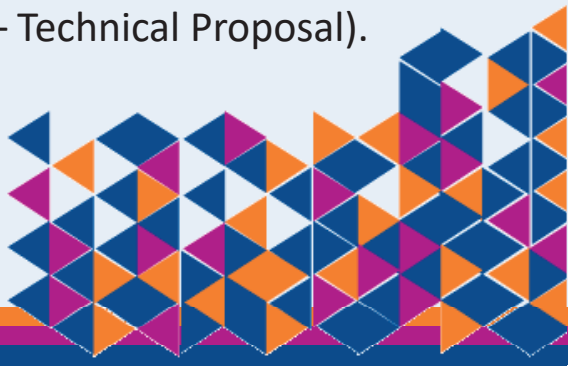
- Technical and Cost Proposals shall follow the format outlined in the RFP, Section VI.

- Technical and Cost Proposals shall be valid for the period of time it takes to negotiate and execute an agreement with the successful firm. Said period of time is not expected to exceed six (6) months from the date of proposal receipt.

- All Technical Proposals are to be submitted via Microsoft OneDrive;

- Proposers are requested to begin each file name with abbreviated RFP Number, name of firm and include content description or Attachment Number, if applicable. (For example, RFP No. 21-059 – Firm ABC – Technical Proposal).

- A Cost Proposal will be requested from the highest technically qualified proposer.



CONSULTANT CERTIFICATIONS AND FORMS

- The Technical Proposals and Consultant Certifications shall be uploaded separately, in the format outlined above, to the provided Microsoft OneDrive link no later than **3:00 pm, Thursday, February 17, 2022**

- Consultant Certifications: This section shall include signed copies of the certifications and affidavits required under this solicitation for the **Consultant and Subconsultants.**

CONSULTANT CERTIFICATIONS AND FORMS (CONT'D)

Proposers must submit the following with the Technical Proposal:

- Acknowledgment of Receipt of Addenda
- Equal Employment Opportunity Requirements
- Statement of Joint Venture (if applicable)
- Ownership Disclosure Form
- Source Disclosure Certification Form
- Disclosure of Investment Activities in Iran (with Technical Proposal or prior to the award of a Contract)
- Contractor's Certification of Eligibility
- Non-Collusion Affidavit
- Affidavit of Compliance (Code of Vendor Ethics)
- Certification of Contracts, Grants, Loans & Cooperative Agreements (Byrd Anti-Lobbying Certification)
- Travel & Business Reimbursement Guidelines
- Certification of No Tax Liability or Felony Conviction
- Notice of Executive Order No. 271 Requirements Relating to COVID-19

PROPOSAL EVALUATION

- Written Technical Proposals will be evaluated and ranked against the technical evaluation criteria enumerated in **Attachment A** of the RFP.

- Reference checks will be performed for each Consultant firm/team deemed within the competitive range. Reference checks will not be scored per se, they will be used to validate information in the Technical Proposals.

ORAL PRESENTATIONS

- Oral presentations shall be made before the TEC and shall consist of an introduction of the Consultant's project team, a general discussion on why the team should be selected for the project, and a detailed account of the particular experience of each major team member.
- The Technical Evaluation Committee (TEC) will use the Oral Presentations to confirm and/or reassess its understanding of the written Technical Proposals and incorporate that information into its evaluation by revising the written technical evaluation scores accordingly.

NEGOTIATIONS AND AWARD

- NJ TRANSIT will enter into negotiations with the highest qualified proposer to reach an agreement on scope of services and fees.

- NJ TRANSIT considers all elements of the Proposer's proposal subject to negotiations.

- Once negotiations have been completed, a recommendation for award of the contract will be issued for approval by NJ TRANSIT's Board of Directors for the Proposer whose proposal is determined to be the most advantageous and provides the best value to NJ TRANSIT.

NJ TRANSIT's
OFFICE OF BUSINESS DEVELOPMENT (OBD)

Disadvantaged Business Enterprise (DBE) Assigned Goal and DBE Program Compliance Requirements

Jacquelin Rush-Gilbert
Senior Contract Compliance Specialist
973.491.8614
JRush-Gilbert@NJTransit.com

Presenter: Adonis Abreu

ROLE OF OFFICE OF BUSINESS DEVELOPMENT (OBD)

- Administer NJ TRANSIT's DBE program in accordance with the Federal requirements.
- Provide guidance and direction to potential Proposers, NJ TRANSIT's project team, and DBE firms.
- Answer questions, issues, or concerns regarding DBE requirements of the contract and meeting the assigned contract goal.
- Conduct DBE Program compliance review of proposal submission. OBD shall contact each subcontractor firm you listed to ensure they were contacted them, and they know they will perform on this project.



DBE GOAL ASSIGNMENT

NJ TRANSIT is committed to its Disadvantaged Business Enterprise (DBE) Program and has assigned a **twenty-two percent (22%) Race Conscious DBE** goal on the gross sum amount of the cost proposal for DBE subcontracting utilization.

OBD has identified subcontracting opportunities in this contract for DBE firms to participate and encourages bidders to identify areas for utilization as well.

The Proposers can refer to **https://njucp.dbesystem.com/** which provides a searchable database of all registered and approved Disadvantaged Business Enterprise firms certified by the New Jersey Department of Transportation, New Jersey Transit Corporation and the Port Authority of New York and New Jersey.



DBE PROGRAM COMPLIANCE REQUIREMENTS

- The Mandatory Forms are the **Form A, A1, A2, B** and a **copy of the DBE's Certified Profile page** from the NJUCP DBE Directory.

- Proposers are requested to review carefully and complete the forms entirely, with no blank fields.

- Notwithstanding the date of submission of the mandatory DBE forms, all negotiations between a Proposer and any potential DBE subcontractor, subconsultant, or supplier shall be completed prior to the proposal due date. All DBE forms are included in **Exhibit 3** of the RFP.

- Failure to submit any and all mandatory DBE documentation **within five (5) calendar days of the proposal due date** shall result in a rejection of a Proposal as non-responsible.



DBE PROGRAM COMPLIANCE REQUIREMENTS (CONT'D)

A firm must be certified in the NJUCP by the proposal due date to receive DBE credit toward the contract's assigned DBE goal. Firms pending NJUCP DBE certification will not count toward meeting the assigned goal.

For technical guidance and/or assistance identifying active DBE firms listed in the NJUCP DBE directory at **https://njucp.dbesystem.com** you may contact the OBD representative identified on this Request for Proposal.



DBE PROGRAM COMPLIANCE REQUIREMENTS (CONT'D)

Proposer **should** not accept a DBE's Certification Letter as **sole evidence** that its DBE status is current and valid.

Proposers must check the NJUCP DBE Directory at https://njucp.dbesystem.com. Click on the firm's name to view the Certified Profile page and the DBE designation located in the Certification Information box.

Proposers must print the NJUCP DBE Certified Profile page and submit with all other required DBE forms.



NJUCP DIRECTORY

https://njucp.dbesystem.com



NJUCP DIRECTORY (CONT'D)

Search Certified Directory

Search results may be downloaded to Excel, by clicking the "Download Results to Excel" button after your search results are displayed. To download the full Certification Directory do not enter search criteria, scroll to the bottom of the page and click the "Download Entire Directory to Excel" button.

NOTE: This online directory lists firms that are DBE certified by the NJDOT, NJ Transit or The Port Authority of NY/NJ on behalf of the New Jersey Unified Certification Program (NJUCP). Firms that appear in the directory are currently certified and approved to be utilized toward meeting established contract goals in their displayed certification type(s). Firms that are noted as suspended cannot be utilized for-credit in new contracts until the suspension is removed. For additional details please reference the US DOT Regulations or contact the firm's certifying agency: NJDOT at DOT.DBE_ESBEPrograms@dot.nj.gov. NJ Transit at OBDP@njtransit.com; or The Port Authority of NY/NJ at certhelp@panynj.gov

Search by Certification Type

Certifications

- ☑ Disadvantaged Business Enterprise (DBE)
- ☑ Airport Concessionaire Disadvantaged Business Enterprise (ACDBE)

Search by Business Name or DBA

Business Name/DBA

Tip: Try just a few letters of the firm's name.

Search by Business Description

Business Description

Tip: Try just a few letters of a keyword.

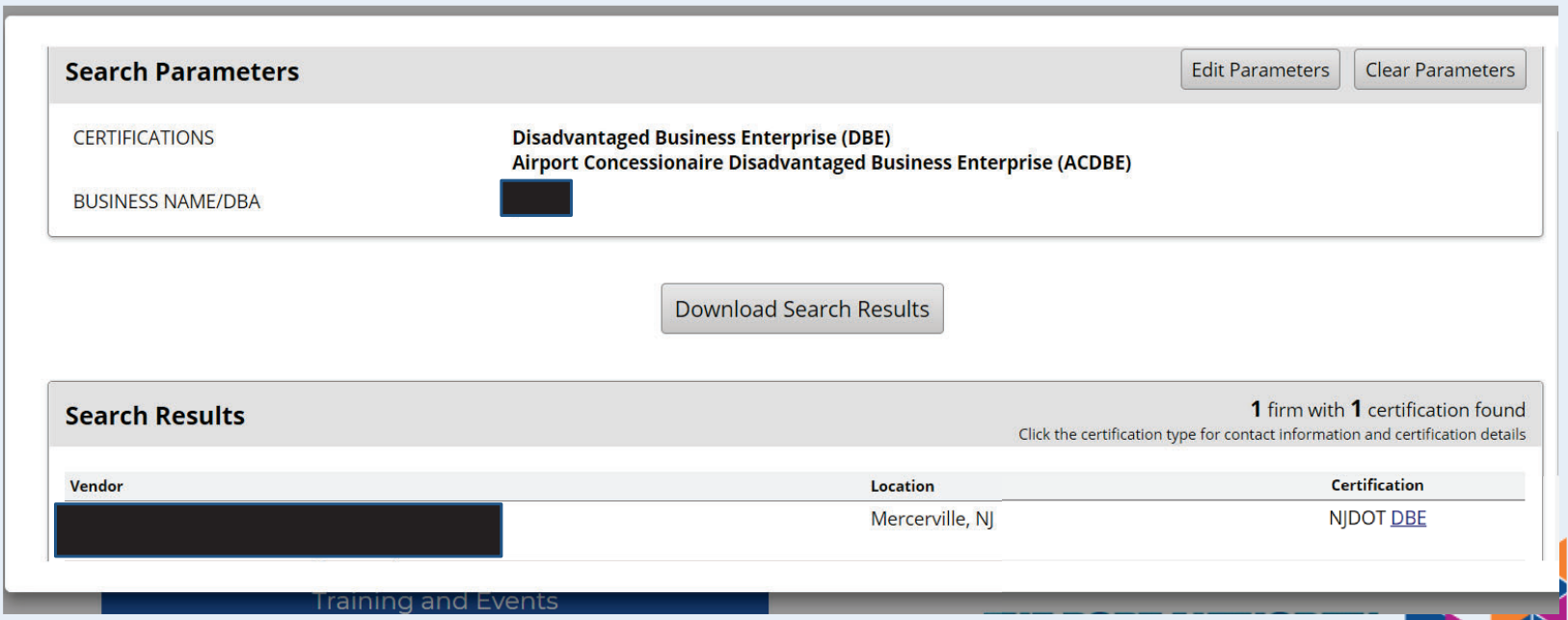
Search by Commodity Code

Commodity Codes

Click to Lookup Commodity Codes

Search by Contact Person

NJUCP DIRECTORY (CONT'D)



Search Parameters

Edit Parameters | Clear Parameters

CERTIFICATIONS	**Disadvantaged Business Enterprise (DBE)** **Airport Concessionaire Disadvantaged Business Enterprise (ACDBE)**
BUSINESS NAME/DBA	[redacted]

Download Search Results

Search Results

1 firm with **1** certification found

Click the certification type for contact information and certification details

Vendor	Location	Certification
[redacted]	Mercerville, NJ	NJDOT DBE

Training and Events

NJUCP CERTIFIED PROFILE PAGE
DBE BUSINESS PROFILE

Business & Contact Information

BUSINESS NAME	[redacted]& Associates
OWNER	Ms. [redacted]
ADDRESS	[redacted] Map This Address
	Pelham, NY 10803
PHONE	[redacted]
FAX	[redacted]
EMAIL	[redacted]
WEBSITE	[redacted]

Certification Information

CERTIFYING AGENCY	**New Jersey Transit**
CERTIFICATION TYPE	**DBE - Disadvantaged Business Enterprise**
CERTIFIED BUSINESS DESCRIPTION	**Historical preservation; environmental consulting; and cultural resource assessment.**

Commodity Codes

Code	Description
NAICS 541340	Drafting services
NAICS 541620	Environmental consulting services
NAICS 541690	Other Scientific and Technical Consulting Services
NAICS 541720	Research and Development in the Social Sciences and Humanities
NAICS 541990	All Other Professional, Scientific, and Technical Services

MANDATORY FORM FOR BIDDER/PROPOSER/PRIME: COMPLETE ENTIRELY FORM A (Fed)

First Tier DBE UTILIZATION - FORM A

Project Name: _____ NJT Contract No: _____

Assigned DBE Goal %:_____ NJT Procurement Specialist: _____ Contract Value ($):_____

First Tier DBE must perform at least 51% of its subcontract value if subcontracting to a Second -Tier DBE or Non-DBE. Do not count Non-DBE portion toward the goal.

Name, Address and Telephone # of DBE Subcontractor/Subconsultant	Provide Detailed Scope of Work to be Performed (Identify all suppliers)	Dollar Value of Subcontract/Sub-consultant Work ($) Awarded	Percentage of Subcontract Work (%)
			%
			%
			%
			%
			%
For DBE suppliers, show original subcontract value multiplied by 60% ($2,000*60%=$1200). For DBE portion of work, subtract Non-DBE portion of work from original subcontract value.	TOTALS	$	%

The undersigned will enter into a formal agreement with the DBE(s) listed in this schedule conditioned upon execution of a contract with NJ TRANSIT for the above referenced project. The undersigned understands that removal/replacement of the DBE(s) listed is NOT PERMISSIBLE for any reason (pre or post-award), without submitting a written request to the Office of Business Development and receiving WRITTEN APPROVAL from the Office of Business Development. Failure to obtain written approval shall result in the breach of contract and subject to corrective action to be determined by NJ TRANSIT.

Company Name: _____ Authorized Signature: _____

Company Address: _____ Print Name: _____

_____ Title: _____

Federal Tax ID #: _____ Prime Contractor's DBE Liaison Officer: _____

Company Tel #: _____ Date Signed: _____

To Add Subs Use Additional Forms

MANDATORY FORM: COMPLETE ENTIRELY Form A1 (Fed)

BIDDER SOLICITATION & CONTRACTOR INFORMATION - FORM A1

Project Title:_____ Date: _____

Prime Contractor/Consultant:_____ Telephone #: _____

Complete the information below for Bidder/Proposer/Prime(s) working on this project. Use Page 2 for all subcontractors/subconsultants

	Bidder/Proposer/Prime	Bidder/Proposer/Prime	Bidder/Proposer/Prime
Company's Full Name			
Address			
City and State			
Zip			
County			
Phone			
Fax			
E-mail			
Owner			
Date Established			
Date Certified			
Ethnicity			
Gender			
Certification Status: **DBE or Non-DBE**			
Federal Tax ID # / SSN #			
Annual Gross Receipts: A – Less than $500K B - $500K to $1M C - $1M to $2M D - $2M to $5M E - $5M and over **indicate the letter that applies**			
Primary NAICS Code:			

MANDATORY FORM: COMPLETE ENTIRELY Form A1 (Fed)

BIDDER SOLICITATION & CONTRACTOR INFORMATION - FORM A1

Project Title: _____ Date: _____

Prime Contractor/Consultant: _____ Telephone #: _____

COMPLETE THE INFORMATION BELOW FOR "ALL" FIRMS INCLUDING SUPPLIERS SOLICITED; INCLUDING THOSE THAT WILL WORK ON THIS PROJECT.

	Subcontractor/Subconsultant	Subcontractor/Subconsultant	Subcontractor/Subconsultant
Company's Full Name			
Address			
City and State			
Zip			
County			
Phone			
Fax			
E-mail			
Owner			
Date Established			
Date Certified			
Ethnicity			
Gender			
Certification Status: **DBE or Non-DBE**			
Federal Tax ID # / SSN #			
Annual Gross Receipts: A – Less than $500K B - $500K to $1M C - $1M to $2M D - $2M to $5M E - $5M and over **indicate the letter that applies**			
Primary NAICS Code:			

MANDATORY FORM FOR BIDDER/PROPOSER/PRIME: COMPLETE ENTIRELY FORM A2 (Fed)

NON-DBE SUBCONTRACTOR UTILIZATION - FORM A2

Directions: To be completed by any Bidder/Proposer/Prime for "all" subs including suppliers participating on this contract.

Bidder/Proposer Prime Name: _____ Project Title: _____

Date: _____ Prime Contract Value: _____

Name, Address and Telephone # of all Subcontractor/Subconsultants	FEIN #	Provide Detailed Scope of Work to be Performed	Dollar Amount of Subcontractor/Sub-consultant Work ($) Awarded	Percentage of Subcontract or Work (%)
			$	%
			$	%
			$	%
			$	%
			$	%
Must provide a detailed scope of work; one-word descriptions are not acceptable.		TOTALS	$	%

To Add Subs Use Additional Forms

MANDATORY FORM FOR 1st TIER DBE: COMPLETE ENTIRELY FORM B (Fed)

INTENT TO PERFORM AS A 1ST TIER DBE - FORM B

The Bidder/Proposer/Prime is prohibited from completing any portion of this form and directing the DBE to sign a blank form.

DIRECTIONS: DBE(s) listed on the Form A must complete all information on this form.

Name of Bidder/Proposer/Prime: _____ **Name of DBE Firm:** _____

Project/Contract Name: _____ IFB/RFP Contract Number: _____

Does the undersigned DBE (Answer Accordingly):

Intend to perform subcontract work in connection with the above-mentioned project as a Joint Venture? Circle one. **(Yes or No)**

Intend to subcontract any portion of its scope of work to a DBE(s)? Circle one. **(Yes or No)**
If yes, DBE Sub-Primes must complete and submit Form AA. **At what percent? _____%**

Intend to subcontract any portion of its scope of work to a **Non-DBE(s)?** Circle one. **(Yes or No)**
If yes, must complete and submit Form AA2. **At what percent? _____%**

The undersigned will perform the following described work on the above-referenced project: *(Provide a detailed description of the type of work you will perform on your subcontract. Attach a copy of quote approved and signed by Bidder (optional)).*

_____

_____

Dollar Value of DBE Subcontract: $_____

Total Quantity/Units (if applicable): _____ **Per Unit Cost (if applicable): $_____**

The undersigned based the above scope of work and subcontract value on detailed project specs received from the Bidder contractor named above. Circle one. **(Yes or No)**

The Prime Contractor *projected* the following commencement and completion date for such work as follows:

DBE Contract Start Date: _____ DBE Contract Completion Date _____

The undersigned DBE will enter into a formal agreement for the above work with the Prime Contractor conditioned upon execution of a contract with NJ TRANSIT. As a DBE subcontractor, I will cooperate with the certification, compliance and monitoring process set forth by NJ TRANSIT. I attest that I will perform at least 51% of my subcontract with my own workforce for the referenced project.

Signature of 1st Tier DBE **Date** _____ **Title** _____

Print Name _____ **Telephone #:** _____

Failure to adhere to these instructions or the falsification of any information on this form shall result in breach of contract and subject to the appropriate penalties to be determined by NJ TRANSIT.

MANDATORY FORM FOR 1st TIER DBE: COMPLETE ENTIRELY NJT Fed Form B – rev Sept 2010

Understanding the Form B

- The Proposer is not permitted to pre-fill **any** portion of the Form B on behalf of their DBE team. (*A pre-filled Form B shall be deemed as **Fraud***)
- The DBE firm must be doing a minimum of 51% of their work to be serving a Commercial Useful Function on the contract.
- Only the DBE firm is permitted to complete a Form B and they must complete the document in their own words.

Should a DBE require to sublet work to another firm, then it's recommended to seek out an additional DBE firm to preserve the Proposer's DBE utilization credit.

- The Form B must be signed and dated by an authorized member of the DBE firm.

PROJECT OVERVIEW & TECHNICAL REQUIREMENTS

Charles Hentz
Project Manager



PROJECT OVERVIEW

RESTORE SERVICE AND OPERATIONS

Identify damaged infrastructure, deploy resources to effect immediate repairs and make service restoration a priority.

REPAIR IN A RESILIENT MANNER

Rebuild and replace assets in a resilient manner. Incorporate designs and materials that resist and better withstand **commercial grid outages and** future extreme weather events.

PREPARE FOR FUTURE EXTREME WEATHER EVENTS

Develop comprehensive plans and employ cutting-edge technology to inform decision making.

RESILIENCY

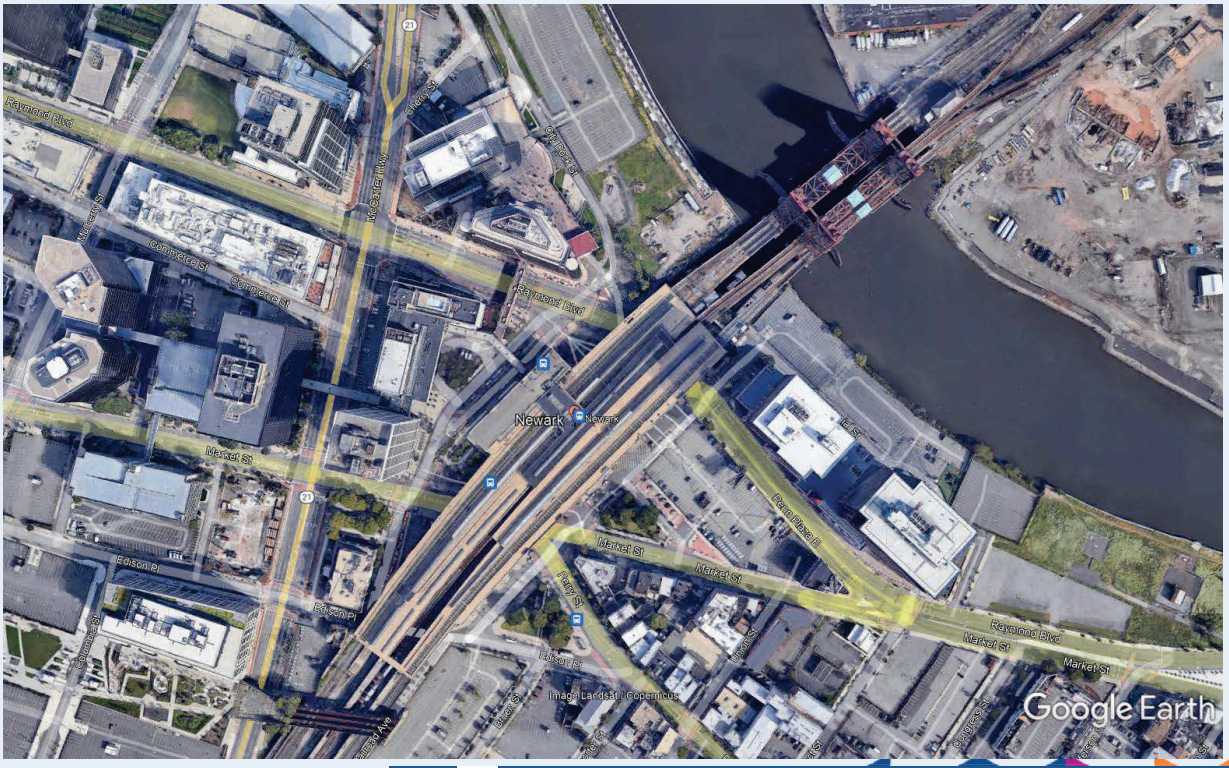
Implement projects that make the system more **resilient incorporating renewable energy technologies to the maximum extent feasible.**

PROJECT OVERVIEW (CONT'D)

KEY LESSONS LEARNED FROM SUPERSTORM SANDY

ENERGY RESILIENCE KEY TO TRANSPORTATION	After floodwater subsides, electric power needed to resume service.
ENERGY SPEEDS RECOVERY	Electrical outages serve only to complicate the path to recovery forcing reliance on emergency generators to energize key equipment, pump stations, and facilities.
DIESEL GENERATORS ARE NOT THE SOLUTION	1. Fuel supply "severely impaired" following Superstorm Sandy. 2. Generators operated well beyond continuous run time. 3. Generators raised air quality and emissions concerns.

PROJECT OVERVIEW (CONT'D)



Newark Penn Station

Questions?



KEY DATES

Questions and Requests for Information Due	**Wednesday, January 19, 2022 by 5:00 p.m.**
Intent to Propose Form Due	**Thursday, February 10, 2022 by 5:00 p.m.**
Technical Proposal Due	**Thursday, February 17, 2022 By 3:00 p.m.**



ADDENDUM NO. 1
ATTACHMENT B

REQUEST FOR PROPOSAL NO. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

ATTENDANCE SHEET

RFP No. 21-059 - Final Design, Engineering and other Technical Services for the Newark Penn Station DG Project
Pre-Proposal Conference
January 5, 2022 @ 11:00 A.M.

Attendance List

	Name	Firm	Email Address	Phone #
1	Jonathan E. Zeller	**Siemens Industry, Inc.**	jonathan.zel+D8:D40ler@siemens.com	484-743-7322
2	Ariganjan (Gary) S. Guleria	**A.G. Consulting Engineering, PC**	gguleria@agceng.com	
3	Amit S. Guleria	**A.G. Consulting Engineering, PC**	aguleria@agceng.com	
7	Zachary Tatum	**A.G. Consulting Engineering, PC**	ztatum@agceng.com	646-573-1739
8	Evan Pilnick	**GdB Geospatial (DBE)**	epilnick@gdbgeospatial.com	516-579-3111
9	Patricia Rodriguez	**PAR Engineering PLLC**	prodriguez@par-eng.com	646-791-6140
10	Eugene Chuang	**Garg Consulting Services, Inc. (DBE)**	tdewolf@gargengineering.com	860-563-0582
11	Mike Natenzon	**Systra**	mnatenzon@systra.com	
12	Francisco Ruela	**Systra**	fruela@systra.com	
13	Atly Botas	**AmerCom Corp. (DBE)**	abotas@amercom.org	973-402-6111
14	Gail Lalla	**T and M Associates**	GLalla@tandmassociates.com	732-865-9502
15	Michael P. Walton	**Burns Engineering**	mwalton@burns-group.com	215-608-7823
16	Daniel Guralchuk	**Burns Engineering**	dguralchuk@burns-group.com	
17	Ali Estefam	**Melissa Johnson Associates**	aestefam@melissajohnsonassociates.com	917-932-0077
18	Allan Hunte	**Grant Engineering & Construction Group (DBE)**	ahunte@grantecg.com	973-358-5020
19	Brian Grant	**Grant Engineering & Construction Group (DBE)**	bgrant@grantecg.com	
20	Fred Chen	**PS&S**	fchen@psands.com	732-584-0679
21	Michael Cohen	**PS&S**	Mcohen@psands.com	

RFP No. 21-059 - Final Design, Engineering and other Technical Services for the Newark Penn Station DG Project
Pre-Proposal Conference
January 5, 2022 @ 11:00 A.M.

Attendance List

22	Priyan De Silva	**Helios Electric LLC (DBE)**	pdesilva@helioselectric.net	240-582-3900
23	Brian Daly	**Envision Consultants, Ltd. (DBE)**	briandaly@eclimited.com	267-639-6185
24	Leon Baptiste	**LB Electric Co., LLC**	lbaptiste@lbelectricco.com	
25	Gokulakrishnan Baskaran	**LB Electric Co., LLC**	gbaskaran@lbelectricco.com	
26	Aswanth Venkatesan	**Distinct Engineering Solutions, Inc. (DBE)**	avenkatesan@distinctengineering.com	
27	Michele Delisfort	**Nishuane Group, LLC (DBE)**	mdelisfort@nishuanegroup.com	
28	Alex Jagnanan	**Jag M.E.P Corporation (Mechanical, Electrical and Plumbing) (DBE)**	jagmepcorp@gmail.com	516-353-0966
29	Erin Gehan	**Dewberry**	egehan@Dewberry.com	973-576-9698
30	Joe Masiello	**Dewberry**	jmasiello@Dewberry.com	646-434-3354
31	Hillary Lobo	**Arup**	Hillary.Lobo@arup.com	212-896-3000
32	Edmund Wilson	**OMNI Procurement Solutions (DBE)**	ewilson@omni-ops.com	315-391-3438
33	Patricia Toro	**Dynamic US, Inc.**	PToro@DynamicUSInc.com	
34	Roger F. Daub	**Dynamic US, Inc.**	RDaub@DynamicUSInc.com	
35	Bradley Bathgate	**PWI Engineering, Inc.**	bbathgate@pwius.com	
36	Marek Kunicki	**Dynamic US, Inc.**	mkunicki@dynamicusinc.com	
37	Mirza Sajjal	**Dynamic US, Inc.**	MSajjal@DynamicUSInc.com	
38	Larry Head	**Gannett Fleming, Inc.**	lhead@GFNET.com	610-650-7730
39	George Campanella	**Gannett Fleming, Inc.**	gcampanella@GFNET.com	
40	Stephen Jang	**Gannett Fleming, Inc.**	sjang@gfnet.com	

RFP No. 21-059 - Final Design, Engineering and other Technical Services for the Newark Penn Station DG Project
Pre-Proposal Conference
January 5, 2022 @ 11:00 A.M.

Attendance List

41	Andrea Lane	**Gannett Fleming, Inc.**	alane@gfnet.com	
42	Mrunmayee Atre	**Nishuane Group, LLC**	matre@nishuanegroup.com	
43	Randy Hubler	**WSP USA**	randy.hubler@wsp.com	
44	Andrew Koch	**WSP USA**	andrew.koch@wsp.com	
45	Ambrish Desai	**WSP USA**	ambrish.desai@wsp.com	
46	David Fraytak	**WSP USA**	david.fraytak@wsp.com	609-512-3643
47	Judith Mondre	**Mondre Energy, Inc. (DBE)**	jmondre@mondreenergy.com	215-275-0285
48	Steve Miller	**Mondre Energy, Inc. (DBE)**	smiller@mondreenergy.com	
49	Kent Herzog	**Burns & McDonnell**	kent.herzog@1898andco.com	
50	Megan Paznik	**Chelsea Videos (DBE)**	megan@chelseavideos.com	646-467-0880
51	Richard Umbrino	**Mott MacDonald**	Richard.umbrinjr@mottmac.com	
52	Eric Pretorius	**Mott MacDonald**	Eric.Pretorius@mottmac.com	973-912-2547
53	Tim Banach	**Endurant Energy (Formerly GI Energy)**	tbanach@endurant.com	347-640-2743
54	Tommy Huang	**UrbanTech (DBE)**	thuang@urbantechusa.com	212-627-3366
55	Faith Blair	**NJ TRANSIT**	fblair@njtransit.com	
56	Charles Hentz	**NJ TRANSIT**		
57	Nicholas Marton	**NJ TRANSIT**		
58	Evelyn Gonzales	**NJ TRANSIT**		
59	Adonis Abreu	**NJ TRANSIT**		

Philip D. Murphy, Governor
Sheila Y. Oliver, Lieutenant Governor
Diane Gutierrez-Scaccetti, Commissioner
Kevin S. Corbett, President & CEO

NJTRANSIT
One Penn Plaza East
Newark, NJ 07105-2246
973-491-7000

February 2, 2022

Addendum No. 2

To Whom It May Concern:

Re: NJ TRANSIT's RFP No. 21-059
Final Design, Engineering and other Technical Services for the Newark Penn Station DG Project

The following constitutes Addendum No. 2 and must be acknowledged with each proposal. Prospective proposers are advised of the following clarifications, additions and/or revisions to the above referenced Request for Proposal (RFP):

1. **RFP Section C. "ANTICIPATED CONSULTANT SELECTION SCHEDULE"**

   The schedule for this RFP is being revised. The updated schedule is below and all revised dates are bolded:

Issue RFP	December 21, 2021
Preproposal Conference	January 5, 2022
Requests for Information/Questions Due	January 19, 2022
Intent to Propose Form Due	**February 24, 2022**
Proposal Due Date	**March 3, 2022**
Oral Presentations	**Week of March 27, 2022**
Cost Proposals Due	**Week of April 10, 2022**
Begin Negotiations	**Week of April 24, 2022**
Selection of Firm	**May 2022**
Board Approval	**September 2022**
Contract Award	**October 2022**

2. **RFP REQUEST FOR INFORMATION / QUESTIONS**

   The responses to all questions received are included as Attachment A to this Addendum No. 2.

3. RFP DOCUMENTATION

- The twenty percent (20%) design document for the Newark Penn Station DG Project is included as Attachment B to this Addendum No. 2.

- The twenty percent (20%) drawings for the Newark Penn Station DG Project are included as Attachment C to this Addendum No. 2.

This concludes Addendum No. 2. An authorized representative of your organization shall acknowledge receipt of this Addendum in the Exhibit provided with its proposal. Failure to acknowledge receipt of all Addenda may cause the rejection of the Proposal as non-responsive.

Sincerely,



Faith Blair
Managing Contract Specialist
Procurement Department

Enc.

ADDENDUM NO. 2

ATTACHMENT A

REQUEST FOR PROPOSAL NO. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

RESPONSES TO QUESTIONS

REQUEST FOR PROPOSAL (RFP) NO. 21-059 - FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

ADDENDUM NO. 2

RESPONSES TO QUESTIONS

	QUESTIONS/REQUEST FOR CLARIFICATIONS/EXCEPTIONS OR PROPOSED MODIFICATIONS	NJ TRANSIT'S RESPONSE
1	The Newark Penn Station DG project was originally part of a previous design-build RFP, however the 21-059 RFP envisions this project taken to 100% CDs and then competitively bid. Do you foresee the project changing paths and turning into a design-build project?	NJ TRANSIT does not intend to make this project a design-build project.
2	As an integrated design and construction firm, if we submit a proposal for engineering services or we are included as part of a larger team to provide design and constructability services, will we be disqualified from bidding on the project as a contractor in the future?	Issues of organizational conflicts of interest and competitive imbalance are evaluated by NJ TRANSIT on a case-by-case basis. Every bidder or proposer on NJ TRANSIT public solicitations must complete a non-collusion certification which, among other things, verifies that it has taken no action in restraint of free and competitive bidding. Individual firms with concerns about potential organizational conflicts of interest are encouraged to raise the issue while any bid or proposal is pending and, in some cases, are required to do so by NJ TRANSIT's solicitation documents.
3	In order to move forward, would you please share the 20% design package mentioned in the RFP (p.57, attached, highlighted)?	The AECOM 20% Design document is included as Attachment B to this Addendum No. 2.
4	Please confirm if the scope of work excludes construction administration (CA) services for the project. Page 7 of the RFP pdf, paragraph 3 does not identify CA as being part of the services for this RFP.	RFP No. 21-059 does not include CA Services.
5	General Project Information, Section F, page 11 of the RFP pdf. The contract period is identified as thirty months. Please identify schedules for Design and Bid Assistance/Bid period, assuming the contract period excludes CA.	NJ TRANSIT anticipates 18 months to complete design and 12 months for bid assistance and support of all prebid reviews/activities.
6	Page 21 of the RFP pdf, bullet item 2. Can we get a list of the projects that may impact this RFP work.	NJ TRANSIT will provide a list of projects that will be impacted by this RFP to the selected firm.
7	Page 22 of the RFP pdf. Have there been any agreements with PJM and PSE&G for interconnection of the distributed generation to the grid? If yes, can this information be provided with the RFP?	The selected firm will be responsible for securing any/all referenced agreements.
8	Page 28 of the RFP pdf. Please confirm that the submissions will be in electronic format. It appears that this submission is required as hard copies in separate sealed envelope.	A Secure File Transfer Site (SFTS) via Microsoft OneDrive is being utilized to provide a secure method for facilitating file transfers from outside parties. NJ TRANSIT requires that all prospective Proposers advise NJ TRANSIT of their intent to either submit or not submit a proposal by e-mailing the "Intent to Propose Form", included as Exhibit 16 on or before the due date listed in the RFP. Once the "Intent to Propose Form" has been received from the Proposer, the Proposer will receive an email with a link to Microsoft OneDrive where they can upload the Technical Proposals and Consultant Certifications in separate .pdf files to the provided Microsoft OneDrive link . Proposers are requested to begin each file name with the abbreviated RFP Number, name of firm and include content description or Attachment Number, if applicable. (For example, RFP No. 21-059 – Firm ABC – Technical Proposal).

9	Technical Services contemplated in the RFP, page 57 of the RFP pdf, paragraph 2 indicates the Sandia report and the preliminary 20% design performed by AECOM included in the Appendix. These documents are not provided with the RFP Appendix. Can these documents be provided as they are key for working out the technical scope of work?	The SANDIA report is included as Attachment D to the RFP and the AECOM 20% Design document is included as Attachment B to this Addendum No. 2.
10	Can we assume that participants/bidders for this RFP are not in conflict with the team working on NJT's Newark Penn Station Modernization project?	Participation in this RFP does not conflict with the Newark Penn Station Modernization Project.
11	Can we assume that the participants/bidders for this RFP are not in conflict with teams supporting the NJT Transgrid project?	Participation in this RFP does not conflict with the NJ TRANSITGRID Project.
12	As key documents are not yet available for responding to this RFP, can the technical submission due February 17, 2022 be extended by at least two weeks?	The Technical Proposal due date has been revised. Technical Proposals must be received on or before **Thursday, March 3, 2022** at **3:00 P.M.** An updated schedule is included in this Addendum No. 2.
13	"Please confirm that a consultant firm whose employees provide cost estimating services during the final design phase of this project would not be precluded from future construction management work so long as the specific staff performing cost estimation (1) are sequestered from other staff working on NJ TRANSIT projects, (2) are subject to a Non-Disclosure Agreement (NDA) and conflict mitigation plan, and (3) those specific individuals are do not participate in any future phase of this project."	Because issues of organizational conflicts of interest and competitive imbalance are evaluated on a case-by-case basis specific to the scope of work at issue, that specific question cannot be answered at this time. Firms are referred to the response to question 2 for further information.
14	11. INDEMNIFICATION: The Consultant shall ~~defend~~, indemnify, ~~protect~~ and save harmless the State of New Jersey, NJ TRANSIT, the U.S. Department of Transportation (USDOT), the Federal Transit Administration (FTA) (if the Agreement is in whole or part Federally funded), and their directors, officers, employees, servants and agents ("Indemnified Parties") from and against all suits, 11 of 60 Federal Brooks Professional Services Agreement Rev. Feb. 2021 actions, claims demands or ~~damages of whatsoever kind or nature arising out of or related~~"to the extent caused by the negligent" to the performance of this Agreement including, but not limited to, ~~expenditures~~ the reimbursement of reasonable expenses for and costs of investigations, hiring of expert witnesses, court costs, counsel fees, settlements, judgments or otherwise, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of said Consultant or its Subconsultant in the performance of the work, specified in this Agreement or because of any act, omission, neglect, or misconduct of said Consultant or its Subconsultant in the performance of the work specified in this Agreement; or from any claims or amounts arising or recovered under the Worker's Compensation Act, or any other law, ordinance, order, or decree.	NJ TRANSIT rejects the proposed changes to this Section.

15	12. INSURANCE: The Consultant, and any of its contracting parties, shall carry and maintain, in its name as Insured, the following minimum insurance coverages: a.ā. Professional Liability/ ~~Medical Malpractice~~ Insurance of the type necessary to protect the Consultant ~~and its Affiliates~~ from professional liability arising out of the negligent acts, errors or omissions of the Consultant ~~or its Affiliates,~~ in connection with the performance of the Consultant's services pursuant to this Agreement. Said insurance shall be in an amount not less than ~~$10,000,000~~ $5,000,000 for any one claim and annual aggregate with a deductible not to exceed $50,000 for any one claim, unless approved otherwise by NJ TRANSIT. The Consultant agrees to maintain this coverage for six (6) years after completion of this Agreement including any amendments thereto. There shall be no exclusions in coverage for the insured's interest in a Joint Venture or Limited Liability Company or Limited Liability Partnership. There shall be no exclusions in coverage for pollution, mold or asbestos. T~~he policy shall include contractual liability coverage.~~ b.b. Commercial General liability Insurance using ISO Occurrence Form CG0001 10/93 or equivalent. The policy shall provide a minimum amount of $10,000,000 each occurrence, $10,000,000 personal and advertising injury, $10,000,000 per project general aggregate, and $10,000,000 products completed operations aggregate. Coverage provided under this liability policy shall be on an occurrence basis and shall include, but not be limited to, bodily injury and property damage coverage including products liability/completed operations coverage, premises operations liability, blanket contractual liability, personal injury liability, advertising injury coverage, independent contractors liability, mobile equipment, damage from explosion, collapse and underground hazards, and cross liability and severability of interests clause. Additional insured endorsement CG2026 11/85, together with ISO Form CG 20 10 10 01, and CG 20 37 13 of 60 Federal Brooks Professional Services Agreement Rev. Feb. 2021 10 01 or functional equivalents (but only if modified to include both ongoing and completed operations and written on a broad form) naming NJ TRANSIT and the State of New Jersey and the Indemnified Parties and coverage must apply on a primary and non-contributory basis.	NJ TRANSIT accept the changes to Section 12. a. and b.
16	e. Security and Privacy Liability (Cyber) insurance with a limit of not less than $5,000,000 per any one claim covering actual or alleged acts, errors, or omissions committed by Consultant, its agents, employees or any other person or entity. he policy shall also extend to include the intentional, fraudulent, or criminal acts of Consultant, its agents, or employees and all other persons or entities. ~~The policy shall also extend to include the intentional, fraudulent, or criminal acts of Consultant, its agents, or employees and all other persons or entities.~~ The policy shall expressly provide, but not be limited to, coverage for the following perils: (i) unauthorized use of and/or access to Company Systems, Consultant's computer system or any other system in which Consultant has 14 of 60 Federal Brooks Professional Services Agreement Rev. Feb. 2021 stored Company Data; (ii) defense of any regulatory action involving a Security Incident; (iii) failure to protect Confidential Information from disclosure; and (iv) Notification Related Costs, whether or not required by statute. If the policy is subject to an aggregate limit, the aggregate limit shall be per project or per location where Work is performed. The policy required to be maintained by Consultant shall include,~~without limitation~~ , coverage for legal fees; notifications; investigation/forensic and restoration costs; crisis management/public relations; credit monitoring/identity protection services; call center expenses; network interruption and extra expense/business interruption; and cyber threat extortion costs. ~~The Policies shall include the Indemnified Parties as additional insureds.~~ The insurers shall waive the right to subrogate against the Indemnified Parties. ~~f. The Consultant agrees to carry, and shall require its assignees and Subconsultants, if any, to carry, Contractor's pollution liability insurance covering the liability arising out of any sudden and/or non-sudden pollution or impairment of the environment, including clean-up and disposal costs and defense that arise from the operation of Consultant or its Subconsultants. Coverage under this policy shall have limits of liability with a minimum of $5,000,000 per occurrence .~~ ~~g. In the event the Consultant, its assignees or its Subconsultants, if any, is considered a railroad, Employers Liability coverage shall be extended to cover the Federal Employers Liability Act with a limit of not less than $10,000,000 each accident, illness or occurrence. h. The Consultant agrees to carry, and shall require its assignees and Subconsultants, if any, to carry, Contractor's pollution liability insurance covering the liability arising out of any sudden and/or non-sudden pollution or impairment of the~~	NJ TRANSIT responses are as follows: (e) Cyber - NJ TRANSIT has added a qualifier for clarification, the coverage is only needed if the Consultant will have access to NJ TRANSIT online systems. NJ TRANSIT does not expect the Consultant to buy cyber coverage if they will not have this access. NJ TRANSIT reject removing the extension for intentional, fraudulent or criminal acts as many insurers will provide this coverage for indemnity or at least defense costs. We accept the other proposed changes in this section. (f) Pollution, NJ TRANSIT only requires this coverage if there is drilling or invasive activities. Our understanding of this project is that there will be boring and hydrocarbons may be found. (g) FELA coverage, NJ TRANSIT agrees to remove this, as we understand that neither the Consultant or their Subconsultants will be working on the rails.

	~~environment, including clean-up costs and defense that arise from the operation of Consultant or its Subconsultants. Coverage under this policy shall have limits of liability with a minimum of $5,000,000 per occurrence. This policy shall name NJ TRANSIT and the indemnified parties as additional insured at no cost to NJ TRANSIT.~~	
17	Attachment C, Scope of Services, page 8 of 81: It states "Technical Services in this RFP includes environmental/regulatory compliance technical engineering support and documents for this project as directed by NJ TRANSIT to support Permit Applications and Regulatory Approvals prepared by others." Please confirm the role of the Consultant selected under this RFP does not include preparing air quality and other permit application/approvals.	The selected Consultant will be required to provide data and satisfy other administrative functions, including but not limited to, completing necessary paperwork as directed by NJ TRANSIT and or other regulatory agencies.
18	Pages 36 and 67 of 81: It states "The format of the Cost Estimate reports shall be consistent with NJTRANSIT's Superstorm Sandy Recovery and Resilience Program requirements." Do we know what format this is and what is involved in the Report? How many alternatives are to be costed?	Cost estimate formatting shall be guided by the following FTA guidelines: https://www.transit.dot.gov/funding/grant-programs/capital-investments/standard-cost-categories-capital-project

ADDENDUM NO. 2
ATTACHMENT B

REQUEST FOR PROPOSAL NO. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

20% DESIGN DOCUMENT FOR THE NEWARK PENN STATION DG PROJECT

AECOM

NJ TRANSIT Distributed Generation Project

20% Design Document for Newark Penn Station

FINAL

Submitted by:
AECOM Technical Services
125 Broad Street, 15th Floor
New York, NY 10004

April 9, 2019

Quality information

Prepared by	Checked by	Verified by	Approved by
Damee Choi, PE Technical Lead	Alpesh Dharia Deputy Project Manager	Zaid Sulaiman, PE, PMP Lead Verifier	Zaid Sulaiman, PE, PMP Project Manager

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1. Project Background

AECOM is pleased to submit this 20% Design Report for Newark Penn Station to meet NJ TRANSIT's goal of developing a first-of-its-kind distributed generation (DG) system capable of providing reliable power to NJ TRANSIT's critical facilities. The overall goals for the proposed DG option, described in this report, are:

- ✓ Design a reliable power source that would allow the facility to operate without power from the local utility company, Public Service Electric and Gas Company (PSE&G), for a minimum of 14 days;
- ✓ Provide the ability to lower the Dock Bridge during islanded mode;
- ✓ Design a system that is safe, simple, and cost effective for the current facility staff to operate and maintain; and
- ✓ Design a system that could be monetized to recoup operating costs.

To achieve the above goals, AECOM recommends the following:

- ✓ Two (2) gas-fired generator sets, each rated at standby rating of 1000 kilowatts (kW)/1250 kilovolt-amperes (kVA) to serve the facility loads and to power the Dock Bridge tower for an emergency closure; and
- ✓ One (1) emergency standby diesel-fired generator set rated at 450 kW/562 kVA to serve the facility emergency "life safety" loads.

A new generation building will be installed to house the major equipment for the DG solution. We have chosen to use the Old Boiler House (OBH) building that houses abandoned coal boilers from the old Newark Penn Station (NPS) boiler plant. This building is in an optimal location outside the floodplain and adjacent to the track about 600 feet from the NPS main concourse. NJ TRANSIT has shown previous interest in cleaning out and renovating this building. This design will allow us to complete this renovation and repurpose the building as a power generation facility. Existing track infrastructure will be used to support conduit runs to the NPS electric rooms.

One (1) 450 kW, 480V backup emergency diesel generator (EDG) will be connected as the primary source to a new 480V, 1000A emergency/standby automatic transfer switch (ATS) (EM-1 ATS), which feeds a new 480V Main Emergency Power Distribution Switchgear (MEPD). Conduit will be extended from the MEPD to a new 600A, 480V emergency ATS for the NPS emergency load. The NPS emergency load will be distributed via a new power panel in the main concourse basement Substation #2 room and a downstream power panel in the Raymond Boulevard Concourse (RBC) Substation #3 room. Conduit will also be extended from the MEPD to a new 480V fire pump emergency ATS. The EDG will be the primary emergency source for the connected emergency loads during a utility failure.

Two (2) 1000 kW standby gas generators (SGGs) will be connected to a new 4160V, 1200A Main Standby Power Distribution Board (MSPD). Conduit will be extended from the MSPD to the secondary side of two (2) new 1200A ATS units that will feed respectively into each side of the main-tie-main Substation #1 Switchgear at NPS (NPS Substation #1). This will allow the new ATS units to feed all Substation #1 loads (all main concourse loads). The two connections, EC4031 and EC4014, as seen in design drawing E601, of the Substation #3 (all RBC loads) Kirk Key interlock will be rerouted to a second lug on the load side of each of the two (2) new 1200A ATS units. Each of these feeds will have a breaker close coupled to the ATS units. This will allow the standby generators to power either side of the Substation #3 Kirk Key interlock. The primary side of each new ATS unit will be fed by an individual PSE&G utility service via the existing FS4031 and FS4014 utility cabinets, as seen in design drawing

E601. The SGGs will be used to power the facility loads at NPS and the Dock Bridge tower equipment loads during a utility failure. The MSPD will also contain a new 3000 kVA 4160V/480V stepdown transformer that feeds a new 480V, 4000A bus. The 480V side of the bus will feed power to the standby loads at the OBH and also two (2) new 1000 kW load banks. It will also feed the secondary side of the EM-1 ATS. Once the SGGs are up and running, the emergency life safety loads will be transferred over from EDG power to SGG power via the EM-1 ATS.

The MSPD switchgear will contain an integral programmable logic controller (PLC) controller for automation and control of the DG solution. The DG solution automation and controls will consist of the hardware and software required for control of the engine-generator plant and associated ties and distribution circuit breakers. The system will include all automation controllers, Human/Machine Interface (HMI) touchscreens, power transducers, supervisory networks, and all ancillary control equipment necessary to automatically execute the functional sequence as specified in design drawings E610 and E611. The Master Control functions will include, but not be limited to, the automatic start of the generator plant, automatic operation of all necessary dead-bus startup functions, and automatic load shed/add based upon pre-programmed load demand priority. The PLC controller will also include a remote terminal unit integral to the MSPD that will interface with the automation and control system that currently exists at Substation #1 in the basement of the NPS main concourse. Upgrades will be made to the existing controls network backbone to accommodate the additional data points to both the Substation #1 location and the Rail Operations Center (ROC). The design will allow for full control of the DG plant from the NPS control room and the monitoring of the DG plant at the ROC. A sample data point registry table from a similar plant has been included in Appendix E as a baseline for the number of added data points.

This project has been designed to allow for the future expansion of a 500 kW Bloom Solid Oxide Fuel Cell System on the roof of the OBH building. The fuel cell system itself and the associated gas boosters, inverters, energy modules, and water cabinets have not been included in the scope of this project. It is our recommendation that the fuel cell system is procured via a third-party Power Purchase Agreement (PPA) to meet the budgetary constraints of this project. This project has been designed to include the structural platform for the fuel cell, the 750 kVA step-up transformer, and the associated switchgear and cabling necessary for paralleling. The fuel cell intertie breakers will be installed within existing spares on each side of the Substation #1 intertie breaker. This will allow the fuel cells to parallel with each of the utility sources during normal blue sky operation. During islanded mode operation, the new ATS units will transfer the power to the SGGs and the fuel cells will have the capability of paralleling to them.

1.1 Existing Conditions

NPS is located at 1 Raymond Plaza West & Market Street in Newark, N.J. It is a four-story building, which includes a ground-level concourse, second floor, mezzanine, and basement. The station houses 217,800 square feet of space for waiting rooms, vendor spaces, offices/conferences spaces, rail platforms, bus lanes, and maintenance shop. The facility operates 24/7, 365 days a year, and is used by approximately 300,000 to 900,000 passengers a day.

The main heating, cooling, and ventilation are provided for the track platforms and main concourses via equipment in a main boiler room adjacent to the Raymond Boulevard bus lanes, a main mechanical room on track 5, and a main fan room on platform H.

Main heating for NPS is provided by four 3000 MBH boilers; one is used as backup. Three pumps (each has backup) distribute the heated hot water to three separate loops: one to fan coil units, one to air handling units, and one to domestic hot water heaters. To supplement heating throughout the facility, three packaged units and one split system heat pump supply heat to the tracks, conductor's office, and waiting area. In addition, there are 10 10kW electric wall heaters located typically at the bottom of escalators leading to the platforms. RBC is heated by

its own 2009 MBH boiler that provide heated hot water to fan coil units located in the platform waiting rooms. The bus lanes on Raymond Boulevard Concourse are heated by four 35 kW packaged units, while the bus lanes on Market Street are heated by two 20 kW heat pump units.

Cooling at the facility is provided by two natural gas-fired engine chillers, rated at 160 tons. Two pumps (each has backup) distribute chilled water to two separate loops, one to fan coil units and another to air handling units. The chillers reject heat to two 95-ton two-cell cooling towers. In addition, a 3 kW split system packaged unit cools the conductor's office and track 5. RBC has its own air-cooled chiller rated at 60 ton cooling capacity. The ventilation system comprises the air handling units, two returns fans, and eight exhaust fans. Many of the air handling units were equipped with VFDs in 2007/2008.

Two (2) PSE&G 1200A services supply power to the primary side of each main facility ATS at 4160V, which feeds the NPS main-tie-main Substation #1. NPS has six (6) main switchgear assemblies. Three of these are the major Substations #1, #2, and #3. The other three switchgear assemblies include a 480V/277V power distribution switchgear (SPP), a 208V/120V lighting distribution switchgear (SLP), and a 4160V metal clad bridge equipment power distribution switchgear (DP). The DP 4160V metal clad switchgear provides power to three large Ward Leonard Motor Generator (MG) sets (750 HP, 600 HP, and 450 HP) that operate Dock Bridge. The MG sets provide a steady DC current to the bridge motors for each of the three bridge spans. Substation #1 parallels with the utility and distributes power to Substation #2, SPP, SLP, and DP. Substation #2 feeds the major equipment room MCCs. Substation #3 parallels with the utility and feeds equipment at the RBC.

There is an backup EDG rated at 2000 kW capacity. All loads for the facility are supplied by this generator. The facility has a 5-day diesel fuel tank that is built in underneath the generator enclosure. The existing diesel generator will be disconnected and repurposed by NJ TRANSIT upon completion of the DG project.

1.2 Data Collection and Site Evaluation Activities

1.2.1 Field Data Collection

After reviewing initial data received from NJ TRANSIT, such as reference documents and utility data, AECOM collaborated with NJ TRANSIT to prepare a schedule for field data collection. The field data collection was used to compile missing data needed for different analyses as well as to verify key information and assumptions from the previous studies and original drawings. The field data collection team consisted of electrical and energy audit disciplines where each discipline had a small group of one to two people to collect pertinent data at the facility. The teams collected data through in-depth interviews with facility staff, photographs, and an electronic data collection tool.

The energy audit generally consisted of identifying and documenting HVAC and process equipment loads and efficiency, and operating schedule information. The team observed all major equipment and recorded existing conditions and the necessary nameplate data for HVAC equipment and process equipment.

The electrical audit was conducted to identify and verify the individual critical operation loads. The team photographed and verified all electrical panels and panel schedules. This information from the site visit, interview notes, and the drawings were used to confirm large and individual critical loads, such as the MG sets at Dock Bridge and the elevator motors at NPS.

1.2.2 Site Evaluation Visits

Upon completion of the field data collection, several subject-matter expert teams conducted site evaluation visits. These site evaluation visits aimed for solution development. For NPS, four site evaluation visits were made comprising the lighting audit, solar PV evaluation, structural survey, flood mitigation evaluation, and DG solution development survey.

The structural team and topographical survey team verified the facility elevations at multiple locations within the DG project scope. The facility elevation was then compared to the design flood elevation (DFE) of the area to determine the flood mitigation needs. A site visit was also conducted with intent to observe the facility first-hand, and be advised of details of the significant flooding that occurred during Superstorm Sandy in 2012. Details are provided in the Flood Mitigation Measure section later in the report.

The DG expert team visited the site to determine the feasibility of the DG solution. The team visited potential locations for installing considered DG solution(s). Space constraints and constructability of the project were evaluated, and electrical and utility interconnections were also evaluated during the visits. Our electrical team also visited the Dock Bridge tower electrical rooms to survey the existing Amtrak electrical equipment and switchgear to document the existing conditions and limitations.

1.2.3 Drawings Evaluated

AECOM evaluated all drawings received from NJ TRANSIT and collected from the facility during the site visits. The obtained drawings were evaluated to develop an understanding of the systems currently in place. A list of drawings is provided in Appendix A and the digital files are included in the electronic submission of the 20% Design Report.

2. Project Requirements

2.1 Loss of Utility Power – 14-Day Facility Operations

The NJ TRANSITGrid Distributed Generation project is designed for a scenario where the existing grid is unavailable to supply power to the rail infrastructure for an extended period of time. The NJ TRANSITGrid Distributed Generation project is designed to close Dock Bridge if the bridge is open and then to supply power to the critical loads at NPS for a minimum of 14 days, which is 7 days more conservative than the design basis threat defined in the Sandia Report – NJ TRANSITGrid Feasibility Study dated February 2014.

2.2 FEMA Flood Design Requirement

The DFE for the project is 2.5 ft. above the Federal Emergency Management Agency (FEMA) 100-year flood level as defined by the Sandia Report – NJ TRANSITGrid Feasibility Study dated February 2014. The FEMA 100-year base flood elevation (BFE) for NPS is 11 ft. (NAVD 88). Therefore, the DFE for NPS is 13.5 ft. (NAVD 88) based on the design basis threat defined in the Sandia Report.

2.3 Selection Criteria for Critical Equipment/Systems Required for Facility Operation

The proposed DG solution is capable to supply power to all of the electrical loads at the facility; therefore, no selection criteria are required for the critical equipment/systems.

3. Basis of Design

3.1 Load Profile

NJ TRANSIT also provided interval data in half-hour intervals, which were averaged to produce hourly interval data. This information was used to determine the peak and minimum electrical loads, or the facility's operating band, which was used to assess the size and type for potential DG systems.

A graph of the hourly interval data from November 2015 through October 2016 is shown in the figure below.

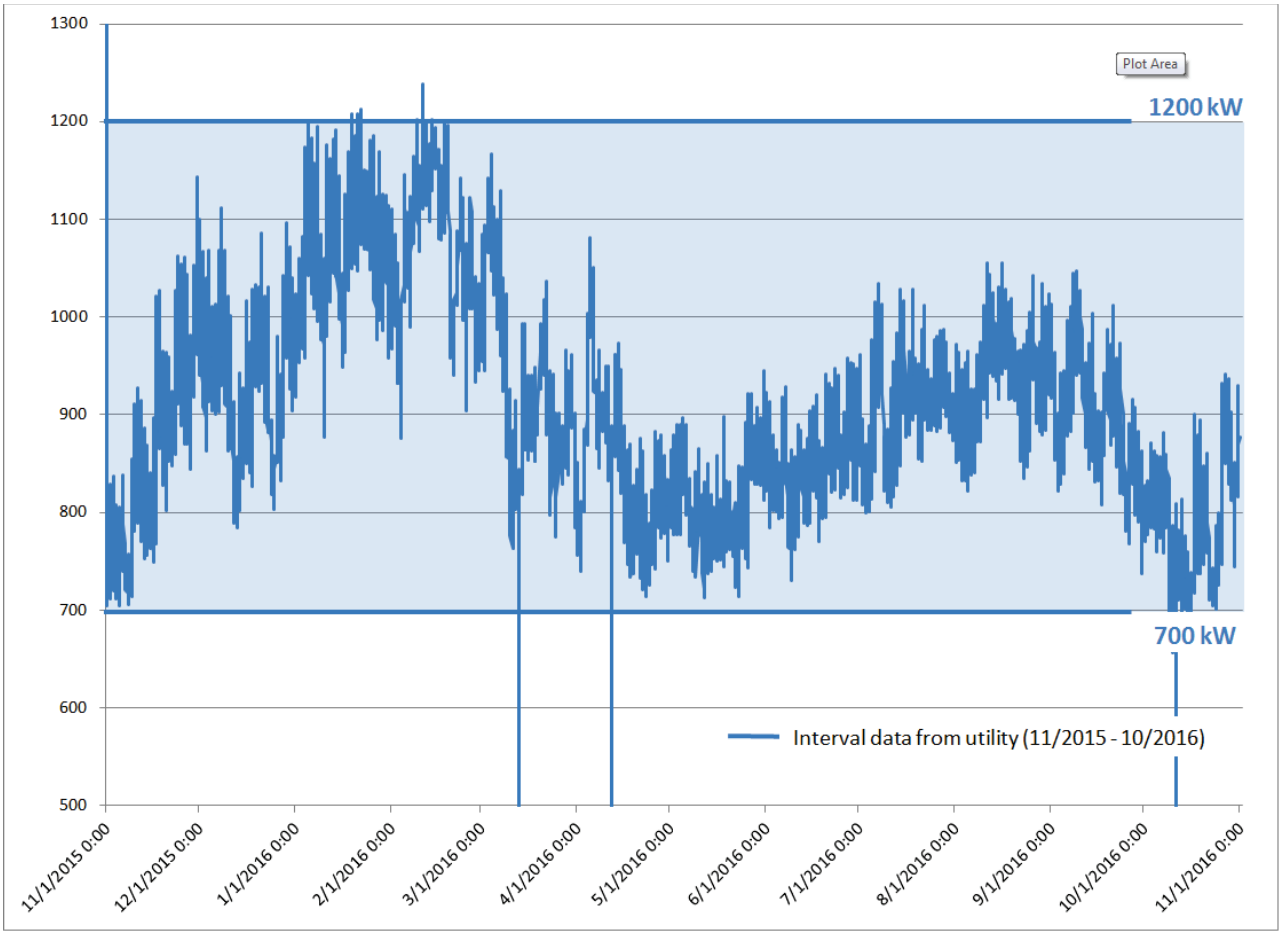


Figure 1: Newark Penn Station Interval Data

3.2 Connected Load List

The DG source at NPS will be able to power the entire facility load and the Dock Bridge MG sets during power outage. The following section summarizes the connected loads by operation that are being served by the DG project in the event

of a utility power outage for an extended period of time. The following connected loads were identified based on facility drawings and field surveys.

NPS (Summer):

- Dock Bridge Tower Equipment
- EF-1, EF-2, EF-3, EF-5, EF-6, EF-9, EF-10, EF-11, RF-1, RF-2
- AHU-3, AHU-4, AHU-5, AHU-6, AHU-7, AHU-8, AHU-9 & condenser, AHU-10, AHU-11, AHU-12 & condenser
- Raymond Boulevard AHUs 1, 2, 3, & 4
- CT-1, CT-2, CW pump 1, CW pump 2
- Track 5 heat pump, Market Street heat pump 1, Market Street heat pump 2, air compressor 1, air compressor 2
- Raymond Boulevard chiller, CHW pump 1, CHW pump 2, dual temp pump 1, dual temp pump 2
- Main concourse and Raymond Boulevard elevators and escalators
- Air curtains, wall heaters, roof electric heaters, electric unit heaters
- All emergency loads
    - Main concourse Elevator 2, 3/4 (Americans with Disabilities Act [ADA] basement life safety egress); Raymond Boulevard Elevators A, B, C, D, and E (ADA platform level life safety egress)
    - Em Panel: main concourse emergency lighting (all other emergency lighting on 90-minute uninterruptible power supply [UPS])

NPS (Winter):

- Dock Bridge Tower Equipment
- EF-1, EF-2, EF-3, EF-5, EF-6, EF-9, EF-10, EF-11, RF-1, RF-2
- AHU-3, AHU-4, AHU-5, AHU-6, AHU-7, AHU-8, AHU-9 & condenser, AHU-10, AHU-11, AHU-12 & condenser
- Raymond Boulevard AHUs 1, 2, 3, & 4
- Track 5 heat pump, Market Street heat pump 1, Market Street heat pump 2, air compressor 1, air compressor 2
- Main concourse and Raymond Boulevard elevators and escalators
- Air curtains, wall heaters, roof electric heaters, electric unit heaters
- All emergency loads
    - Main concourse Elevator 2,3/4 (ADA basement life safety egress); Raymond Boulevard Elevators A, B, C, D, and E (ADA platform level life safety egress)
    - Em Panel: main concourse emergency lighting (all other emergency lighting on 90-minute UPS)

OBH Generation Building:

- 2 (two) Engine Supply Air Intake Fans for SGGs
- 2 (two) 1000 kW load banks for bridge operation
- All emergency loads
- Fire pump

Table 1: Newark Penn Station (Summer) Critical Load List by System Type

System Type	Total Connected Load (kW)	Total Connected Load (kVA)	Demand Factor Assigned for Each System Type (%)	Loads after Applying Demand Factor (kVA)
Exhaust Fans	53.89	67.4	100%	67.4
Packaged Air Handler Units	375.84	469.8	100%	469.8
Cooling Tower 1 (2 cells)	9.31	11.6	100%	11.6
Cooling Tower 2 (2 cells)	9.31	11.6	0%	0.0
Raymond Boulevard Chiller	75.31	94.1	100%	94.1
Condenser Water Pump 1	17.96	22.5	100%	22.5
Condenser Water Pump 2	17.96	22.5	0%	0.0
Chilled Water Pump 1	13.97	17.5	100%	17.5
Chilled Water Pump 2	13.97	17.5	0%	0.0
Dual Temp Pump (AHU)	5.05	6.3	100%	6.3
Dual Temp Pump (FCU)	7.32	9.2	100%	9.2
Domestic Hot Water Pump	2.26	2.83	100%	2.83
Track 5 Heat Pump (Cooling)	3.03	3.8	100%	3.8
Market Street Heat Pump 1 (Cooling)	5.05	6.3	100%	6.3
Market Street Heat Pump 2 (Cooling)	5.05	6.3	0%	0.0
Air Compressor 1	6.99	8.7	100%	8.7
Air Compressor 2	6.99	8.7	0%	0.0
Escalators	242.4	303	100%	303
Elevators	316.92	396.15	25%	99.1
Lights	360	450	100%	450
	1548.58	**1935.78**		**1572.13**

Table 1: Newark Penn Station (Winter) Critical Load List by System Type

System Type	Total Connected Load (kW)	Total Connected Load (kVA)	Demand Factor Assigned for Each System Type (%)	Loads after Applying Demand Factor (kVA)
Exhaust Fans	53.89	67.4	100%	67.4
Packaged Air Handler Units	375.84	469.8	100%	469.8
Rooftop Electric Heaters	60	75	100%	11.6
Wall Heaters	100	125	100%	125
Domestic Hot Water Pump	2.26	2.83	100%	2.83
Raymond Boulevard HW Pump	5.05	6.32	100%	6.32
HW Pump (AHU)	13.97	17.5	100%	17.5
HW Pump (FCU)	1.4	1.75	100%	1.75
Dual Temp Pump (AHU)	5.05	6.3	100%	6.3
Dual Temp Pump (FCU)	7.32	9.2	100%	9.2
Track 5 Heat Pump (Heating)	3.03	3.8	100%	3.8
Market Street Heat Pump 1 (Heating)	20	25	100%	25
Market Street Heat Pump 2 (Heating)	20	25	0%	0.0
Boiler Room Electric Unit Heaters	24	30	100%	30
Air Compressor 1	6.99	8.7	100%	8.7
Air Compressor 2	6.99	8.7	0%	0.0
Air Curtains	95	118.75	100%	118.75
Elevators	316.92	396.15	25%	99.1
Escalators	242.4	303	100%	303
Lights	360	450	100%	450
	1720.11	**2150.15**		**1765.05**

Table 3: Old Boiler House Critical Load List by System Type

System Type	Total Connected Load (kW)	Total Connected Load (kVA)	Demand Factor Assigned for Each System Type (%)	Loads after Applying Demand Factor (kVA)
Engine Intake Fan 1 &2	165	206.3	100%	206.3
Electric & Fire Pump Room AHU	10	12.5	100%	12.5
	175	**218.8**		**218.8**

Table 4: Emergency Life Safety Load List by System Type

System Type	Total Connected Load (kW)	Total Connected Load (kVA)	Demand Factor Assigned for Each System Type (%)	Loads after Applying Demand Factor (kVA)
Newark Penn Station				
Main Concourse Elevator 2 & ¾; Raymond Boulevard Elevators A, B, C, D, & E*	146.41	183.1	25%	45.8
Main Concourse Emergency Lighting	37.3	46.6	100%	46.6
Old Boiler House				
Fire Pump	34.6	43.2	100%	43.2
	218.31	**272.9**		**135.6**

*Elevators segregated for ADA-compliant life safety egress

Table 5: Total Critical Load List by Location

System Type	Total Connected Load (kW)	Total Connected Load (kVA)	Demand Factor Assigned for Each System Type (%)	Loads after Applying Demand Factor (kVA)
Newark Penn Station*	1720.11	2150.5	82%	1756.1
Old Boiler House	209.6	262	100%	262
	1929.71	**2412.5**		**2018.1**

*Winter load selected as it is larger than summer load

3.3 Flood Elevation Design Requirements

As indicated in Section 2.2, the project DFE requirement for NPS is 13.5 ft. (NAVD 88) based on the FEMA 100-year flop map database and the design basis threat defined in the Sandia Report – NJ TRANSITGrid Feasibility Study dated February 2014.

Based on the topographical survey, the elevation of the OBH is 14.0 ft. (NAVD 88), which is higher than the DFE defined as 13.5 ft. Therefore, no flood mitigation measure is recommended at OBH.

The elevation of the new ATS room is 12.2 ft. (NAVD 88), which is short by 1.3 ft. from the project DFE of 13.5 ft. The flood barrier for the ATS room is currently designed for 4 ft. above the ground level, which exceeds the project DFE requirement.

In addition to these two project locations, the existing flooding points were also identified and evaluated based on the interviews with the facility staff who experienced Superstorm Sandy. Three access doors were evaluated along Raymond Boulevard (Bus Lane 1), i.e., the Exit C door and the access doors to the Response Center Office and the Boiler Room. The elevations of these door sills range between 10.9 ft. and 11.1 ft. (NAVD 88), which is below the project DFE of 13.5 ft. The flood barriers for these three sets of doors are currently designed for 4 ft. above the ground level, which exceeds the project DFE requirement. Detailed design information is provided in Section 4.2.

4. DG Solution

4.1 DG Solution Scope Description

As discussed in earlier sections, AECOM is proposing that NPS be supported by one (1) 450 kW (emergency standby rating), 480V, 3 Phase, 4 wire, 0.8PF, 60 Hz diesel-fired generator set, and two (2) 1000 kW (standby rating), 4160V, 3 Phase, 4 wire, 0.8PF, 60Hz natural gas-fired generator sets. Along with the generators, the DG solution design includes the balance of system that allows the installation of a 500 kW solid oxide fuel cell system. The fuel cell is not part of the DG project; however, it is AECOM's understanding that NJ TRANSIT is exploring an option to procure the fuel cell system via a third-party PPA to allow for the system to fit within the budget. This section further describes the DG solution.

4.2 DG Sizing Analysis

The standby gensets supply power to a combination of linear and nonlinear loads in addition to large elevator motor loads that cycle on and off. This application with motors presents the most sizing issues. The dynamic interactions of motors and gensets—along with the impact of motor starters, system inertia, motor loading, frequency dip, genset preload and nonlinear loading—makes manual genset sizing difficult, if not impossible. Therefore, the Caterpillar SpecSizer software was used to size the DG generator.

The NPS and OBH buildings critical load list includes a large quantity of motors (elevators, HVAC units, exhaust fans, fire pumps, etc.). Motor loads cause difficulty because a motor draws high current when started at full voltage. Starting current is typically six times a motor's rated full-load current and this inrush current stays high until the motor reaches about 75%of rated speed. When a motor is started on normal utility power, the high inrush current will cause only a small voltage dip because the utility is a more robust voltage source. However, when a motor is started on a limited capacity genset, the high inrush currents (measured in kVAs can result in a large voltage dip that can inhibit the motor from reaching its operating speed. The genset has to be sized to handle the motor-starting load, but also to minimize the impact on the other connected loads that may be affected by voltage dips or frequency dips.

NPS includes a set of antiquated Ward Leonard MG sets that are used to drive the DC Dock Bridge tower motors at a constant speed. The MG sets have experienced some issues the past few years that have been tested and documented. Tests of the motors in the existing MG set system have yielded data showing an initial inrush of 10 times the motor's rated full-load current for 34 seconds in the worst case. This is significantly higher than the typical motor inrush seen, which is around six times the rated full-load current for around 10 seconds. As such, a specific tailored design must be implemented to allow the DG solution to adequately power the bridge equipment for an emergency closure if necessary. The specific motor inrush characteristics and required additional equipment are beyond the limitations of an engine sizing program and have been left out of this portion of the report. The design specifics for bridge operation have been included in Appendix D.

If the generator is sized to start all loads simultaneously, it will create significant transient voltage and frequency drops due to large motor loads. This will result in increasing the generator size considerably. To mitigate this and select a cost-effective generator set(s), sequential load steps were created and critical load equipment were grouped into different steps. In addition, a new EDG was leveraged. The EDG will be first started when utility loses

power and then loaded to supply all emergency loads. No new emergency loads are added as a result of the DG source addition project. After the EDG has assumed all emergency loads, the DG source will be started and loaded sequentially as indicated in the table below. After the DG Source is fully loaded, the EDG will be shut down and kept in a standby condition. This approach reduces the starting power requirement of the emergency loads on the DG source as the emergency loads will be started by the EDG and transferred to the DG source in an operating condition. The additional advantages of the EDG leverage are listed below:

- The DG source does not have to be classified as code required “life safety emergency power source.”
- The DG source does not have to meet the 10 second starting requirement of the emergency source.
- The DG source does not have to be witness tested upon installation and periodically afterwards.

A Demand Factor is applied to the Critical Loads based on the usage and type of equipment. The Demand Factor is the ratio of the maximum coincident demand of a system to the total connected load of the system. For example, the Demand Factor is 0.25 if one out of four elevators is coincidentally operating. For this analysis, all loads except the elevators are assumed to be operating continuously. The other important factor to be considered is the Coincidence Factor. It applies to loads that are not operating continuously 24/7. As loads other than elevators are operating continuously, the Coincidence Factor is considered 1.0.

While the aforementioned load analysis is sufficient to obtain a fair estimate of the instantaneous running load of the facility, the current industry standard is to utilize generator vendor software to obtain an accurate generator size. For the case of NPS, Caterpillar SpecSizer software was used. The software is able to take into account how limiting properties of the generator (such as transient voltage dip, frequency dip, alternator temperature rise, etc.) are affected by the quantities and types of loads it is supplying power to.

One diesel-fired generator was selected for the emergency life safety loads. The selected cost effective engine is rated at: 450 kW (emergency standby rating), 480V, 3Phase, 3 Wire, 60 Hz, 0.8 PF, diesel-fired unit. The EDG will meet National Fire Protection Association (NFPA) 110 requirements for emergency/life safety loads. Two engine generators operating in parallel were selected for the standby loads. The selected cost effective DG Source is rated at: 2-1000 kW (standby rating), 4160V, 3Phase, 3 Wire, 60Hz, 0.8PF, natural gas-fired generators. All three units will be operating in parallel to supply all critical loads. A typical gas-fired generator rated at 1000 kW is capable of running for 200 hour of continuous operation per year with a maximum expected usage of 500 hours per year. This rating meets the 14-Day Event design criteria requirement. Based on our initial discussion with manufacturer’s local representative in NJ, it is determined (2) x 1000 kW generators will be sufficient for the needs of the facility.

One (1) new 450 kW EDG will be connected to a new 4160V MEPD switchgear. The MEPD will distribute power to all emergency life safety loads. Two (2) 1000 kW SGGs will be connected to a new 4160V paralleling board that feeds a new 4160V Main Standby Power Distribution Board (MSPD). The MSPD will distribute power to all critical loads. The MSPD will include a PLC-based controller. which will sequence the loads in the eight (8) steps used in sizing the generators. The system will allow for paralleling of a new Solid Oxide Fuel Cells (SOFC) generator system that can be connected to a new paralleling board that feeds into existing spares on each side of the main-tie-main (normally open) Substation #1 switchgear at NPS. During normal operation, the SOFC will parallel with the two utility feeds at NPS to provide a baseload. During standby operation, the SOFC will parallel with the SGGs to provide a baseload. The new generation assets, associated switchgear, and auxiliary equipment will be located in the OBH building down the street from the NPS main building. Again, the DG solution is designed keeping the fuel cell in mind, so that the fuel cell is not precluded from the final design. It is our recommendation that the fuel cell system be procured via a third-party PPA. PPA structures are the primary arrangement for Bloom Energy Fuel Cell assets, and utilizing such an agreement will help to offset a large portion of the upfront cost of the overall project. This will allow for the additional capital to complete necessary upgrades to the existing electrical lineup to remove points of failure and also to provide resilient standby power for the Dock Bridge tower as well as NPS. A PPA

agreement is also desirable from a risk standpoint as fuel cells do not have a strong track record in heavy industrial applications.

The critical loads will be supplied from PSE&G/EDG and DG power sources. To facilitate supplying each critical load from both sources of power, ATSs will be used. During normal operation, PSE&G power will be supplied to these loads The SOFC system will parallel with the utility to provide baseload power. Should PSE&G power be lost, the EDG will be started and loaded with the emergency/life safety portion of critical loads and shortly after the DG generators will be started and synchronized. The PLC controller will then give transfer signals to the and breakers to transfer the loads per pre-programmed load sequence steps. There will be a pre-programmed load priority table for “bridge open” and a separate table for “bridge closed.” The “bridge open” table will shed preselected critical loads at the facilities to allow sufficient capacity to start the large Ward Leonard MG sets. The “bridge closed” table priority list will include all critical loads at each facility. After the DG generators have assumed all critical loads, the EDG will be stopped and placed in the standby condition.

Natural gas-fired generator sets, independent of application and rating, are typically designed for operation between 60% and 100%load. Without enough cylinder pressure to maintain oil control at low loads, gas engines can develop ash deposits, a reduced detonation margin, and damaged engine components. Similar to diesel generator sets, deposit build-up on valves, spark plugs, and behind piston rings can occur—which may cause cylinder liner polishing, power loss, poor performance, and accelerated component wear—ultimately increasing the likelihood of higher maintenance costs and downtime. Therefore, the gas-fired and diesel generator sets should not be operated below 30% rated load. The load banks provided for the bridge application (Appendix D) can provide the engines with a minimum load when the fuel cells are operating simultaneously with the SGGs.

The following figure shows the results from the SpecSizer software with the detailed list of assumptions and generators’ load characteristics included in Appendix B, Generating Sizing Report.

CATERPILLAR®

Project Sizing Report

Price List: U.S.

Modified Date	10-Sep-2018	**Electricity Supply**	60 Hz 4160/2402 V
Customer Name	NJ Transit	**Connection**	STAR
Project Name/Ref #	174086A NPS Solution (3)	**Max. Ambient Temperature**	77.0 F 30% Humidity
Prepared By	Andrew Koch	**Altitude**	30.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	1,231.8 SkVA	530.9 SkW	
Peak Transient Load	2,308.9 SkVA	1,984.2 SkW	
Final Running Load	1,901.4 kVA	1,821.9 kW	0.96 PF
Max Running Non Linear Load	299.0 RkVA		
Maximum Running Load	1,901.4 kVA	1,821.9 kW	

Generator Set

Genset Model	(2) of G3512	**Nameplate Rating**	1,035.0 kW / * 1,293.0 kVA 0.8 PF
Voltage Regulator and Slope	Standard, 2:1 slope		
Feature Code	512GE34	**Site Output**	1,034.8 kW / 1,293.0 kVA
Fuel	Gaseous Fuel (> 150ekW)	**Rating Type**	Standby
Dry Weight	0.0 lbs	**Enclosure Type**	Open
Length / Width / Height	223.4in / 91.9in / 99.2in	**Cooling System**	
Methane Number	84.70	**Nox Number**	0
Rating Strategy	EMERGENCY	**ISO Electrical Efficiency**	36.5

Alternator Motor Starting Capability *		Block Load (only) Transient Response *			
Instantaneous Voltage Dip * **	**skVA Capability**	**Load Change %**	**FDip %**	**VDip %**	**Recovery Time (sec)**
10%	780	**25**	5.5	12	5
20%	1,755	**50**	12.19	25	11.36
30%	3,008	**75**	16.33	46.52	14.78
35%	3,780	**100**	26.62	53.84	23.8

Engine Technical Data at 100% Rated Load

Make/Model	G3512	**Emissions/Certifications**	US EPA Cert
Aspiration	TA	**Governor**	ADEM4 W/ IM
Cylinder Configuration	VEE - 12	**Aftercooler Type**	SCAC
Displacement	3,158 Cubic Inch / 52 Liter	**Rejection To Jacket Water**	23,601 BTU/min
Speed	1800 RPM	**Rejection To Aftercooler**	0 BTU/min
Fuel Rate	0.0 scfm	**Rejection To Oil Cooler**	4,493 BTU/min
Exhaust Sound Level	0 dBA at 23 ft/7 m	**Rejection To Atmosphere**	9,099 BTU/min
Mechanical Sound Level	0 dBA at 23 ft/7 m	**Rejection To Exhaust**	59,428 BTU/min
Max Combustion Inlet Air Temp	32.0 F	**Exhaust Recoverable**	0 BTU/min
Combustion Airflow^	13,788.0 lb/hr	**Exhaust Stack Temperature**	984 F
Cooling System Ambient Capability	32.0 F	**Exhaust Flow Rate**	14,296.0 lb/hr
Cooling System Airflow **	0 cfm		
Engine Performance Number	EM1507		

Alternator Technical Data

Alternator Arrangement Number	2523954	**Insulation**	H
Alternator Type / Frame Size	SR5 / 1465	**Temperature Rise**	125 C
Alternator Winding Pitch	0.6667	**Rejection To Atmosphere**	3,423.5 BTU/min
Number Of Poles	4	**Peak Amps / Rated Amps**	**** / 179.5
Excitation / Winding Type	PM / FORM	**Short Circuit Ratio**	0.4700

Reactances		**per unit**	**ohms**	**Generator Time Constants**		**sec**
Subtransient - Direct Axis	X"d	0.1289	1.7244	**Open Circuit Transient - Direct Axis**	T'd0	1.2700
Subtransient - Quadrature Axis	X"q	0.1612	2.1564	**Short Circuit Transient - Quadrature Axis**	T'd	0.1590
Transient - Saturated	X'd	0.2321	3.1044	**Open Circuit Subtransient - Direct Axis**	T"d0	0.0230
Synchronous - Direct Axis	Xd	2.1827	29.1960	**Short Circuit Subtransient - Direct Axis**	T"d	0.0130
Synchronous - Quadrature Axis	Xq	1.3098	17.5200	**Open Circuit Subtransient - Quadrature Axis**	T"q0	0.0830
Negative Sequence	X2	0.1451	1.9404	**Short Circuit Subtransient - Quadtrature Axis**	T"q	0.0120
Zero Sequence	X0	0.0303	0.4056	**Armature Short Circuit**	TA	0.0260

Notes:

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response test results due to a variance in site altitude or ambient conditions.

** Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

*** Based on instantaneous voltage dip as defined per NEMA MG-1.

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

^ Flow is a nominal value with a tolerance of +/- 5%

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

Caterpillar makes no express warranties and disclaims all implied warranties including merchantability and fitness for a particular purpose regarding program. Caterpillar shall have no liability in law or equity for damages consequential or otherwise arising from use of program and related material or any part thereof. The analysis provided from SpecSizer is only for the expected results at the generator terminals. Analysis of transient conditions of any device downstream is the responsibility of the system designer.

Figure 2: Generator Sizing Report

4.3 Old Boiler House Restoration

The structural team performed a visual survey of the OBH to observe the structural deficiencies and develop a restoration design.

The structure is a 43± ft. x 50± ft. x 40± ft. high abandoned brick-clad building previously used as a 'heating plant' in functional service. It consists of eight (8) perimeter steel columns encased in brick pilasters, together with a center column, that support a roof comprising steel trusses, timber framing, and secondary steel framing that in turn support a tall brick enclosure bulkhead above the roof. There are large open areas in the roof, which have facilitated infiltration of water into the area over the apparently several decades of neglect and abandonment. The plant structure is flanked by a 20± ft. x 14± ft. single-story brick shed.

Visual observation of the OBH building revealed a consistent pattern of vertical cracks in the brick cladding primarily at or adjacent to the corners of the building. The same was also observed in the brick façade of the roof bulkhead, although. in collaboration with the NJT staff, it has since been decided that the latter structure should be demolished. However, this demolition work is deemed a delicate operation and would involve prior strengthening of the supporting steel trusses.

A specific reason for the precipitation of these cracks is not apparent, but it is plausible that lateral displacements of the building in tandem with water infiltration into the cracks and the cumulative effects of freeze-thaw cycles over the decades could have substantially contributed to these deficiencies. This is consistent with the observed elevation of these cracks as they are mostly concentrated towards the top of the building.

Although the noted cracks do not seem to impose any immediate danger to the stability of the building, it is highly recommended to repair the façade, in particular as the building is currently scheduled to house new equipment to be supported over new floors, and a new roof within it.

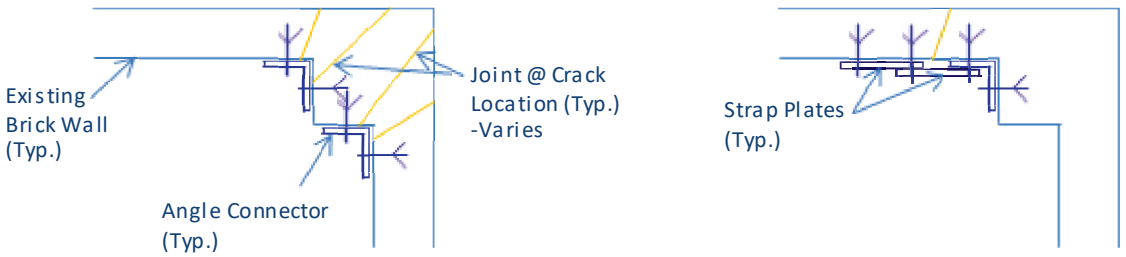
To this end, the following summarizes the scope of repair work to be performed:

- ***Brick Façade Crack Repairs at Corners of Building***:

If reinforcement is required, upon removal and replacement of cracked/dislodged bricks, provide one or combination of both of the following on the back side of the wall, depending on the location of the crack:

  - 6"- 8" wide (x 3/8" thick) vertical steel strap plate(s) centered on the previous crack and anchored onto the wall, as specified below.
  - L 6 x 6 x ½ or L 8 x 8 x ½ vertical steel angle at step changes in wall (e.g., existing buttresses at column locations), and anchored onto the wall as specified below.
  - Anchor Specification: ¼" (min.) threaded rods in horizontal pairs (one on each side of crack/joint) in HILTI HIT-HY 70 anchoring system at 16" vertical spacing along vertical strap plate or angle, and with 3" (min.) embedment into the brick.

A schematic part-plan is shown below for the proposed concept, covering the various conditions:



- ***Strengthening Support of Existing Roof Bulkhead for its Demolition:***

Provide a duplicate of each of the existing steel trusses that currently support the bulkhead. These will be raised into position and mounted directly to the underside of the existing trusses and connected onto the supporting columns at each end. The top chord of the new truss will be made level (with no pitch for roof drainage as in the existing) so as to be attached onto the bottom chord of the existing truss, at each location.

A new steel platform will be constructed within the OBH to house the DG systems. This will be a standalone platform with no load on the existing building façade.

4.4 Flood Mitigation

The flood mitigation measure consists of two components. The first component is to install a flood barrier to the doors that are below the DFE and the specific existing doors that experienced the flooding water infiltration during Superstorm Sandy. The other component is a proactive measure that increases the existing sump pump system capacity to add additional resiliency to the facility operation. The following sections further describe the measure in detail.

4.4.1 Flood Doors

AECOM performed a structural survey of the basement of the subject station on February 12, 2018, with the aim of identifying source(s) of water infiltration into the various equipment rooms and a subsequent solution to mitigate the same, in particular, during a future heavy storm, a notable example being the recent Superstorm Sandy.

In collaboration with the staff from New Jersey Transit, it was then decided to provide flood protection measures to three (3) exterior doors to the facility along Raymond Boulevard (Bus Lane 1), namely, Exit C door and access doors to the Response Center Office, and the Boiler Room.

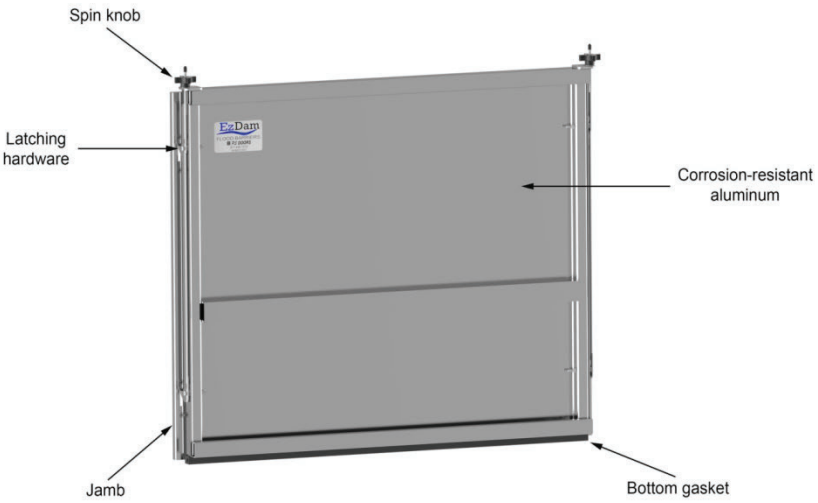
Details of the protection measures are as follows:

In general, floor protection of a door to a sensitive room must address two issues: (i) water leakage through the gaps below and along the sides of the door, and (ii) consequence of the hydrostatic pressure that may compromise the stability of the door and possibly destroy it with a resulting deluge/torrent of water cascading into the room. Typically, a “flood door,” which is a manufactured water-tight item, is specified to replace the existing door.

It is observed that the FEMA 100-year BFE for the station is at 11.0 ft. (per NAVD 88), and the DFE, being typically 2’-6”above BFE, would be at 13.5 ft. Separately, it is determined that the elevation of the door at adjacent Exit C is at 10.9 ft. Thus, there is potential for a future flood water height of 2’-7”±. Based on the above, it is observed that condition (ii) above is not considered serious enough to require a full-scale flood door. To this end, the recommendation comprises the addition of a “shallow barrier” that is temporary in nature and may be installed at short notice.

Several companies manufacture and provide flood barriers in this regard. Of particular interest for application here is EzDam Flood Barriers, a subsidiary of PS DOORS, which provides a rapid and easy lift-out mechanism whereby the barrier is latched onto the jambs alongside and in front of the door opening.

Details of such a panel together with a photo of one of the noted access doors are presented below:



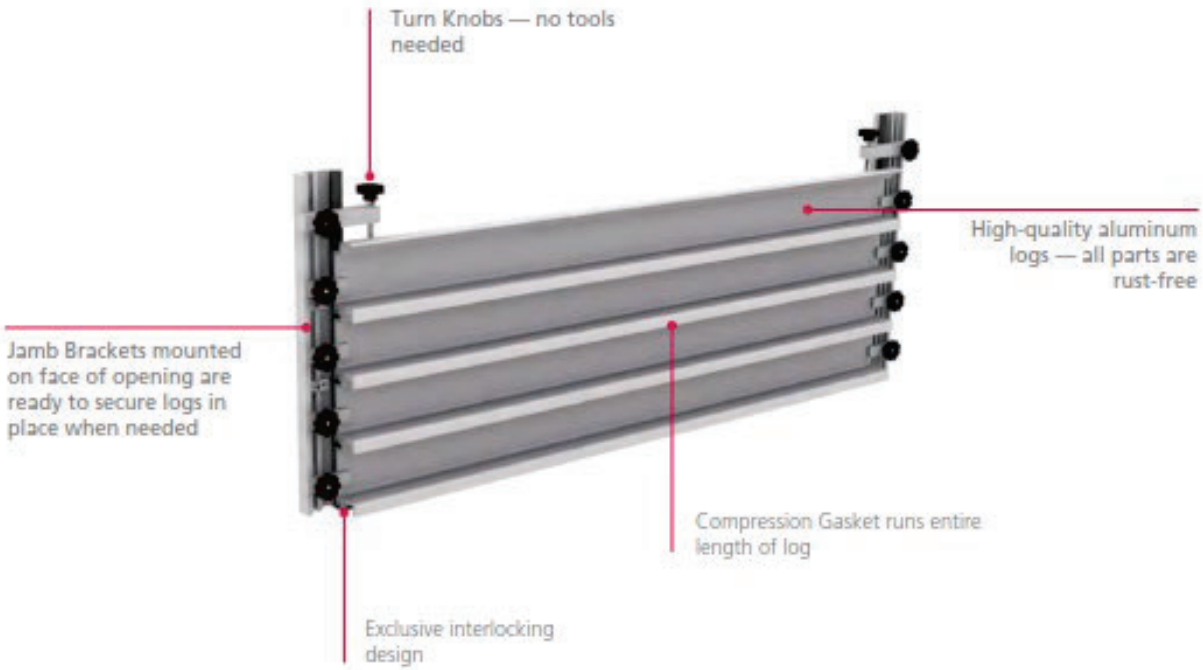


This product is an excellent alternative to heavy and messy sandbags, and is available in the width range: 42” to 52”, with heights up to 4’-0”, which comfortably accommodate the specific conditions at this site. The company also accommodates custom sizes; in this case, a wider panel (in the order of 9’-0”±) may be applicable in view of the “three-door” entrance access at one particular location.

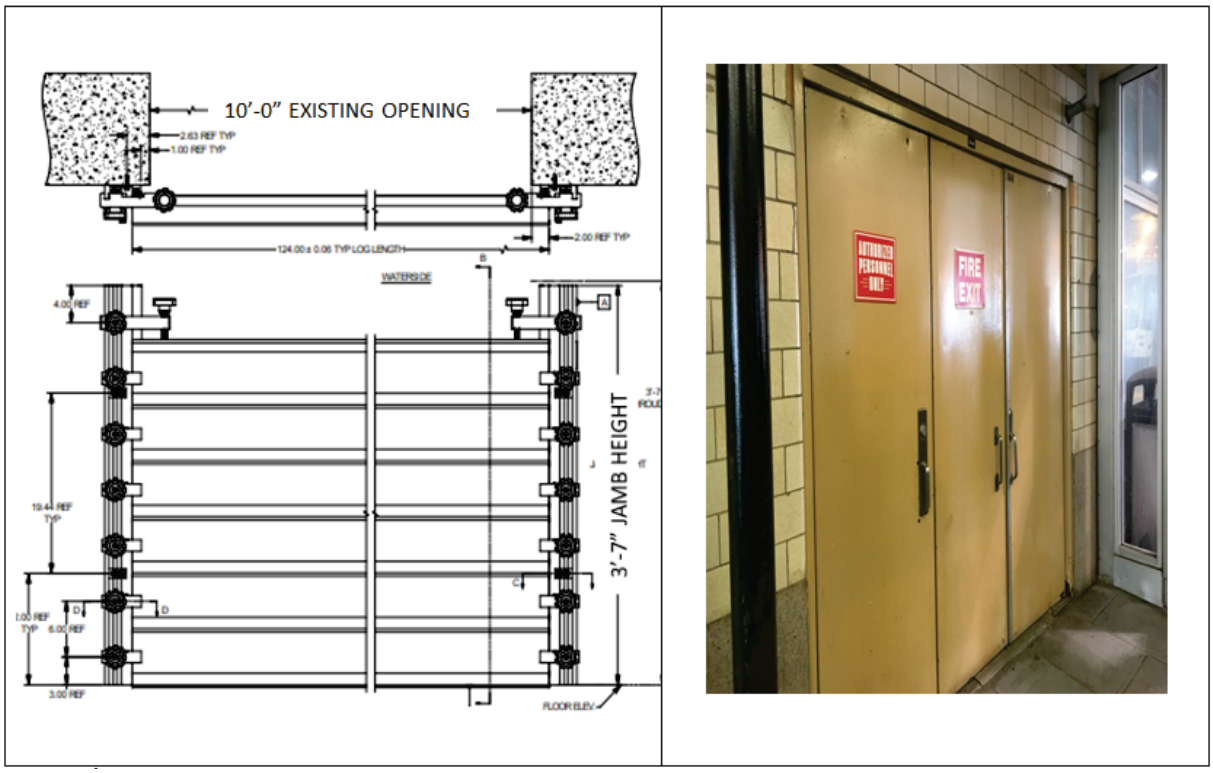
Furthermore, it is noted (and as observed from the above photo) that the exterior wall of the station along the subject access doors is of a robust cmu (or concrete) construction with tile facing, so that the stability of the wall in resisting the resultant hydrostatic load reactions of the floor doors during the subject flooding would not be compromised.

Should there be a production cost issue with EzDam Flood Barriers for a custom-made flood door for the required width at the “three-door” access location, another company, The Presray Corp., may be contacted for a similar-type flood barrier, notably, FastLogs. FastLogs are suitable for large openings, e.g., garage doors, that require rapid, easy-to-install protection with very low leakage of water. These are mounted in front of the opening using 6061-T6 aluminum jamb brackets on the face of the building. These brackets have mounting holes for concrete anchors and bolts providing options that include epoxy anchors for cmu block walls and studs for concrete embedment.

Details of such a panel are presented below:



A schematic example drawing of the panel is presented below for a 10’-0” wide opening (which is suitable for application to the “three-door” access opening at the site, shown in the photograph below):



4.4.1 Sump Pump System

The existing ground water sump pump system consists of two submerged units located at the bottom of an 8-ft. deep and 36-inch-diameter sump that is equipped with numerous small inlet openings on the perimeter. Openings require periodic cleaning to allow influent water to enter the sump at full capacity. The sump is located in the corner of a passageway to a sprinkler valve room and elevator machine room at the lowest part of the building in the basement level. The average inflow of ground water as measured in the field is 15 gallons per minute (gpm). It varies depending on water table fluctuation and atmospheric condition. The existing sump pump system was just able to handle the flooding during Superstorm Sandy. To increase the resiliency at NPS, AECOM proposes installing an additional independent sump pump to increase the pumping capacity and redundancy.

The proposed pump is a closed coupled unit rated at 80 gpm capacity, 3 HP motor, 3 Phase, 60 Hz, 1750 rpm. A 2½" suction pipe will be submerged in the pit and equipped with a foot valve that allows maintaining prime, and an inlet strainer at the bottom. Independently, 2" pump discharge piping will be extended from the other building piping systems outside the structure and water spilled at the sidewalk of west wall, which is allowed under emergency conditions. Conceptual design and the layout are provided in the design drawings.

4.5 Sequence of Operation

This section describes the sequence of operation during the normal operating mode and islanded operating mode.

4.5.1 Blue Sky Operating Mode

The utility (PSE&G) will provide power to the facility for continuous operation. The future 500 kW fuel cell system will parallel with the utility at NPS Substation #1. We will tie in to the two existing spare cabinets (one for each main bus in main-tie-main normally open switchgear). During normal operation, the fuel cells will run at full capacity and provide the baseload for the system. The load profile for NPS shows that the existing load varies from 600 to 1200 kW throughout the day.

4.5.2 Islanded Operating Mode

In the event of a utility failure, the fuel cell generator circuit breaker and the two NPS Substation #1 intertie breakers MPB1 and MPB2 will open to disconnect from the utility. The new emergency power ATS units will sense the loss of utility power in the normal feed and automatically start the new EDG to power the emergency/life safety loads. The EDG will start up and reach full load within 10 seconds to comply with NFPA 110 requirements. The EDG will have 2,500 gallons of fuel oil storage installed. This will satisfy the life safety code requirement for 90 minutes of stored power reserve. The life safety load table steps are described below:

1. Step 1
    a. Activate ATS "EMNPS-1" (NPS Life Safety).

The new system will have a PLC-based load management program that will shed and add load via pre-programmed load tables based on sensed available natural gas engine generator capacity, sensed available fuel cell generator capacity, sensed available EDG capacity, and sensed load demand.

Upon loss of utility power, the PLC system will automatically initiate the "bridge closed" protocol. There will be a pre-programmed "bridge closed" load table with all facility critical loads listed in order of load priority. The PLC system will initially shed load off the board. Once load has been shed, the synchronization controls will start up and

synchronize the two natural gas engine generators and the fuel cell generator. After the generators are synchronized the PLC system will close breakers NPS-1, NPS-2, and BT 3-4 and begin the pre-programmed load steps. Once the loads have been energized and the engine generators have stabilized, the fuel cell will be activated and synchronized to the natural gas engine generators. Once synchronized, Fuel Cell Intertie Breakers IT-1 and IT-2 will close to provide power. The fuel cells will run consistently at 100% capacity with the engines load following and utilizing the load banks to provide load as necessary. The “bridge closed” load table steps are listed below:

1. Step 1
    a. Close breaker XFMR-1 (dwg. E601) for 3000 kVA Boiler House Distribution Transformer.
    b. Close breaker BH-1 (dwg. E601) for Panel PP-1.
    c. Close breaker BH-2 (dwg. E601) for Load Bank 1 (preset engine load boundaries for typical operation).)
    d. Close breaker BH-3 (dwg. E601) for Load Bank 2 (preset engine load boundaries for typical operation).)
2. Step 2
    a. Close breaker SUB2-A (dwg. E601) for NPS Substation #2 Main 1.
        i. Close MCC-A load shed contactor (dwg. E603) for MCC A.
3. Step 3
    a. Close MCC-C load shed contactor (dwg. E603) for MCC C.
4. Step 4
    a. Close breaker SUB2-B (dwg. E601) for NPS Substation #2 Main 2.
        i. Close contactor DP-E (dwg. E603) for Distribution Panel E (freight elevator panel).)
5. Step 5
    a. Close contactor MCC-B (dwg. E603) for MCC B.
6. Step 6
    a. Close breaker SP1P (dwg. E601) for NPS Auxiliary Power Switchgear “SP” Main 1.
    b. Close breaker SP2P (dwg. E601) for NPS Auxiliary Power Switchgear “SP” Main 2.
    c. Close breaker SL1P (dwg. E601) for NPS Auxiliary Lighting Switchgear “SL” Main 1.
    d. Close breaker SL2P (dwg. E601) for NPS Auxiliary Lighting Switchgear “SL” Main 2.
7. Step 7
    a. Close breaker MPB3A or MPB-3B (dwg. E601) for NPS Substation #3.
    b. Close breaker DP1 or DP2 (dwg. E601.) for Dock Tower Switchgear (non-bridge loads only).)
8. Step 8
    a. Transfer ATS “EM-1” (emergency/life safety loads) to Standby Gas Generators.

The startup and load stepping process through step 8 should take approximately 3 to 5 minutes. The fuel cells will take approximately 20 to 30 minutes to ramp to full load. The PLC system logic loop will have built-in contingency for standby generator outages via load shedding and transferring life safety loads back to the EDG.
If the utility power returns at any time, the ATS units will sense the normal power and automatically transfer power to the utility. The PLC system will automatically open the two NPS Substation #1 intertie breakers IT-1 and IT-2 to disconnect from the utility. The synchronization controls will resynchronize the fuel cell system with the utility. After synchronizing, the PLC systems will close breakers IT-1, and IT-2 to provide fuel cell baseload power in parallel with the utility. Refer to the logic diagram and sequence of operations drawings E-610 and E-611 for more information.

The PLC HMI will include a pushbutton to allow a manual override into “bridge open” protocol. Should there be a need during an outage to close any bridge span, the operator will have the ability to automatically shed necessary load to perform the bridge closing operation. There will be a pre-programmed “bridge open” load table with loads listed in order of priority. This load list will allow necessary spinning reserve for the 750 HP bridge MG set inrush.

The PLC system will initially shed load off the board. Once loads have been shed, the synchronization controls will start up and synchronize the two natural gas engine generators. After the generators are synchronized, the PLC system will close breakers NPS-1, NPS-2, and BT 3-4 to begin the pre-programmed load steps. The "bridge open" load table steps are described below.

1. Step 1
    a. Close breaker on 3000 kVA Boiler House Distribution Transformer.
    b. Close breaker BH-1 (dwg. E601) for Panel PP-1.
    c. Close breaker BH-2. (dwg. E601) for Load Bank 1 (preset engine load boundaries for typical operation).)
    d. Close breaker BH-3 (dwg. E601) for Load Bank 2 (preset engine load boundaries for typical operation).)

2. Step 2
    a. The Load Bank PLC systems will be pre-set to create a 1900 kW load demand (the measured inrush of the 750 HP MG set motor). The load banks will be on feedback loops to each generator and will automatically shed load if the demand exceeds a preset load boundary.
    b. Close contactor on "DP1" (Dock Tower Switchgear switchgear).
    c. Close contactor on "DP2" (Dock Tower switchgear).

The startup and load stepping process will take approximately 3 to 5 minutes. Once the engines are prepared for bridge operation, the bridge equipment will be manually operated by Amtrak staff as is the current procedure. Refer to Appendix D for specifics about the bridge operation. We estimate that the bridge closing operation will take approximately 30 minutes.

During the islanded mode, the bridge will stay closed and be considered inoperable until the utility power has been restored. Just for information, the following section provides details about who is necessary for bridge operation. If the bridge is opened during blue sky operation, all of the staff listed below are assumed to already present. It is our recommendation that a procedure be developed by NJ TRANSIT and Amtrak for emergency closure of the bridge. Communication should be maintained between Amtrak and NJ TRANSIT staff during such an occurrence.

To open the bridge, the typical staff on hand are:

- (1) Amtrak Bridge Operator
- (2) Port Authority Path Employees
- (2) Amtrak Electricians
- (2) Amtrak Mechanics
- (2) Amtrak Communications and Signals Experts

Note: The bridge can only be opened if the above listed staff are on hand.

The manual override in the PLC HMI will also allow users to manually change to "bridge closed" protocol if the bridge is stuck or for any other reason. In these situations, the existing EDGs with direct mechanical drive power to the bridge hoist will be used to close the bridge.

5. Design Development Drawings

The following list of drawings is developed and included in the 20% Design Report. CADD files are also included in the report package.

- G-001 Cover Sheet
- G-002 List of Drawings
- DM-201 Demolition Electrical Basement Existing Substation Partial Plan
- DM-202 Demolition Ground Floor Partial Plan
- DE-601 Electrical One Line Diagram (General Arrangement)
- DE-603 Electrical One Line Diagram Substation 2 (General Arrangement)
- A-601 New ATS Room Reflected Ceiling Plan
- E-001 Electrical Notes, Abbreviation and Symbols
- E-201 Electrical Proposed Substation Plan
- E-202 Proposed ATS Room Ground Floor Partial Plan
- E-203 Electrical Boiler House Ground Floor Plan
- E-301 Electrical Proposed Block Diagram of Emergency Generator Feed
- E-601 Proposed Electrical Single Line Diagram
- E-602 Electrical 4.16 kV Single Line Diagram (General Arrangement)
- E-603 Electrical One Line Diagram Substation 2 (General Arrangement)
- E-610 Proposed Electrical Logic Diagram
- E-611 Proposed Electrical Sequence of Operation
- E-612 Proposed Electrical Communication Diagram
- M-101 Mechanical Boiler House Basement Floor Plan
- M-102 Mechanical Boiler House Existing Second Floor Plan
- M-103 Mechanical Boiler House Existing Roof Plan
- M-501 Mechanical Boiler House Elevation
- P-101 Existing Sump Pit and Piping Layout
- P-102 Proposed Emergency Pump Location and New Piping Layout
- S-100 Old Boiler House Foundation Plan
- S-101 Old Boiler House Ground Floor Framing Plan
- S-102 Old Boiler House Second Floor Framing Plan
- S-103 Old Boiler House Roof Framing Plan

6. Project Cost Estimate

The cost estimate was prepared for the scope of work described in each of the energy conservation measures, and proposed DG solution. This estimate is based on the prevailing wage for Essex County, NJ. The estimate includes 10% for general conditions, 21% for overhead and profit, 25% for design contingency, 10% for construction contingency, and 1.5% for payment and performance bond. The following table displays the total project cost estimate by project type, which incorporates all of these assumptions.

Table 6: Total Project Cost Estimate for 20% Design by Project Type

Project Type	Installation Cost in $
OBH Restoration	
OBH Structural	
OBH Fire Protection and Architectural	
Mechanical	
Electrical	
Premium Time Labor Adder	
Total Project Cost	

7. Project Execution Schedule

The following table summarizes the key project milestones and projected schedule.

Table 7: Newark Penn Station Projected Project Schedule

Activity Name	Duration in Months	Start Date	Finish Date
Design-Build Procurement	6	0	6
Advertise for Design-Build Contract	0		
Design-Build RFQ Process	4		
NTP Design-Build Contractor	0		
Design-Build Contract - Award	Milestone	0	0
Design-Build Contractor 20%-100% Design	9	0	9
Submit/Approve Contractor Design Drawings and Specifications	6	10	15
Permitting	12	3	14
Place Equipment Order/Fabricate/Deliver Equipment	9	10	19
Site Preparation/Remediation	4	15	18
Field Construction	15	19	30
Commissioning/Testing	3	31	33
Project Complete	Milestone		

Appendix A. NJT Facility Drawings

Discipline	Pages (Drawing No.)	Title
General	NPS_G2 through NPS_G7	Newark Penn Station Improvement Program, Sept. 1985
Architectural	NPS_2/A1 through NPS_2/A12	Newark Penn Station Improvement Program, Sept. 1985
Electrical	NPS_2/E1 through NPS_2/E32 NPS_1 through NPS_E7 GE_1-E1 through GE_10-E11 NWK E-6 – 1 through NWK E-6 – 2 E2000-1 through E2000-10B	Newark Penn Station Improvement Program, Sept. 1985 Newark Penn Station Improvement Program, Sept. 1985 Gotham Electric, February 1988 Newark Penn Station One Line Diagrams, 2010-2014 NPS Emergency Generator DWG set, Jan. 1999
Plumbing	NPS_4/P1 through NPS_4/P8	Newark Penn Station Improvement Program, Sept. 1985

Drawings are included in the digital submission.

Appendix B. Generator Sizing Report

App B – Generator Sizing Report pdf file is included in the digital submission.

Project Sizing Report

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Prepared By	Andrew Koch	**Altitude**	30.0 Ft. A.S.L

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Dry Weight	0.0 lbs		
Length / Width / Height	0.0in / 0.0in / 0.0in	**Cooling System**	
Methane Number	84.70	**Nox Number**	0
Rating Strategy	EMERGENCY	**ISO Electrical Efficiency**	36.9

Alternator Motor Starting Capability *		Block Load (only) Transient Response *			
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35%	3,780	**100**	22.0167	52.88	12.5

Engine Technical Data at 100% Rated Load

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Displacement	3,158 Cubic Inch / 52 Liter	**Rejection To Jacket Water**	24,056 BTU/min
Speed	1800 RPM	**Rejection To Aftercooler**	0 BTU/min
Fuel Rate	0.0 scfm	**Rejection To Oil Cooler**	4,663 BTU/min
Exhaust Sound Level	0 dBA at 23 ft/7 m	**Rejection To Atmosphere**	8,815 BTU/min
Mechanical Sound Level	0 dBA at 23 ft/7 m	**Rejection To Exhaust**	56,983 BTU/min
Max Combustion Inlet Air Temp	32.0 F	**Exhaust Recoverable**	0 BTU/min
Combustion Airflow^	13,617.0 lb/hr	**Exhaust Stack Temperature**	954 F
Cooling System Ambient Capability	32.0 F	**Exhaust Flow Rate**	14,116.0 lb/hr
Cooling System Airflow **	0 cfm		
Engine Performance Number	EM4566		

Alternator Technical Data

Alternator Arrangement Number	2523954	**Insulation**	H
Alternator Type / Frame Size	SR5 / 1465	**Temperature Rise**	125 C
Alternator Winding Pitch	0.6667	**Rejection To Atmosphere**	3,423.5 BTU/min
Number Of Poles	4	**Peak Amps / Rated Amps**	**** / 179.5
Excitation / Winding Type	PM / FORM	**Short Circuit Ratio**	0.4700

Reactances		per unit	ohms	Generator Time Constants		sec
Subtransient - Direct Axis	X"d	0.1289	1.7244	**Open Circuit Transient - Direct Axis**	T'd0	1.2700
Subtransient - Quadrature Axis	X"q	0.1612	2.1564	**Short Circuit Transient - Quadrature Axis**	T'd	0.1590
Transient - Saturated	X'd	0.2321	3.1044	**Open Circuit Subtransient - Direct Axis**	T"d0	0.0230
Synchronous - Direct Axis	Xd	2.1827	29.1960	**Short Circuit Subtransient - Direct Axis**	T"d	0.0130
Synchronous - Quadrature Axis	Xq	1.3098	17.5200	**Open Circuit Subtransient - Quadrature Axis**	T"q0	0.0830
Negative Sequence	X2	0.1451	1.9404	**Short Circuit Subtransient - Quadtrature Axis**	T"q	0.0120
Zero Sequence	X0	0.0303	0.4056	**Armature Short Circuit**	TA	0.0260

Notes:

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response test results due to a variance in site altitude or ambient conditions.

** Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

*** Based on instantaneous voltage dip as defined per NEMA MG-1.

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

^ Flow is a nominal value with a tolerance of +/- 5%

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

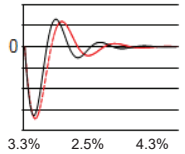
Caterpillar makes no express warranties and disclaims all implied warranties including merchantability and fitness for a particular purpose regarding program. Caterpillar shall have no liability in law or equity for damages consequential or otherwise arising from use of program and related material or any part thereof. The analysis provided from SpecSizer is only for the expected results at the generator terminals. Analysis of transient conditions of any device downstream is the responsibility of the system designer.

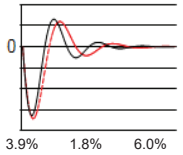
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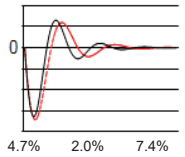
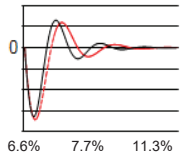
Project Load Report

Modified Date	6-Mar-2019	**Rating Type**	Standby	**Max Ambient Temperature**	77 Deg. F
Customer Name	NJ Transit	**Fuel**	Gaseous Fuel (>	**Altitude**	30.0 Ft. A.S.L
Project Name/Ref #	174086A NPS Solution (3)	**Electricity Supply**	60 Hz 4160/2402 V		
Prepared By	Andrew Koch				

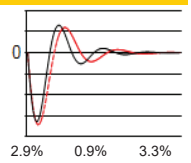
Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step	Load Description		Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 1			**Step Passed**														
1.1	1	3,000.00 kVA - NPS Life Safety Dist XFMR Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	150.0	15.0							
1.2	1	37.25 kW - EM. PANEL Resistive, 3-Phase	30%	30%			37.3	37.3	37.3	37.3							
1.3	1	115.00 kVA - City Subway Em Panel Resistive, 3-Phase	30%	30%			115.0	115.0	115.0	115.0							
1.4	1	30.00 HP - ELEV C-1 - HANDICAPPED NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point	30%	30%			159.0	66.8	14.3	12.3							
1.5	1	30.00 HP - ELEV D-1 - HANDICAPPED NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, 50 Duty Point	30%	30%			159.0	66.8	14.3	12.3							
1.6	1	20.00 HP - RAY BLVD ELEV A NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.7	1	20.00 HP - RAY BLVD ELEV B NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.8	1	20.00 HP - RAY BLVD ELEV C NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							

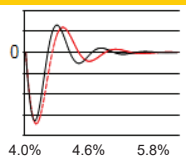


Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
1.9	1	20.00 HP - RAY BLVD ELEV D NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.10	1	20.00 HP - RAY BLVD ELEV E NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
		Step 1 Total	**20%**	**20%**	**3.3%**	**4.3%**	**415.6**	**294.8**	**354.5**	**286.8**							
		Total Through Step 1									**511.0**	**384.6**	**354.5**	**286.8**			
Step 2			**Step Passed**														
																	
2.1	1	1,333.00 kVA - Substation #2 Transformer #2 Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	66.7	6.7							
2.2	1	91.00 Amps - H/W HTR NO. 1 Resistive, 3-Phase	30%	30%			75.7	75.7	75.7	75.7							
2.3	1	7.50 HP - EF-1 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA G	30%	30%			44.6	23.6	5.6	4.6							
2.4	1	115.00 kW - DP-C Resistive, 3-Phase	30%	30%			115.0	115.0	115.0	115.0							
2.5	1	100.00 kW - DP-B Resistive, 3-Phase	30%	30%			100.0	100.0	100.0	100.0							
2.6	1	30.00 kVA - LP-2 Fluorescent Lighting, Distr. 3-Phase	30%	30%			38.0	28.5	30.0	28.5							
		Step 2 Total	**20%**	**20%**	**3.9%**	**6.0%**	**348.5**	**342.8**	**346.0**	**336.8**							
		Total Through Step 2									**680.4**	**629.6**	**686.7**	**623.6**			

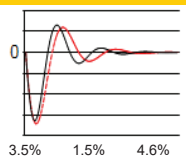
Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 3			**Step Passed**														
																	
															4.7%	2.0%	7.4%
3.1	1	1,333.00 kVA - Substation #2 Transformer #1 Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	66.7	6.7							
3.2	1	125.00 kVA - DP-A Resistive, 3-Phase	30%	30%			125.0	125.0	125.0	125.0							
3.3	1	75.00 kVA - DP-D Resistive, 3-Phase	30%	30%			75.0	75.0	75.0	75.0							
3.4	1	125.00 kVA - DP-F Resistive, 3-Phase	30%	30%			125.0	125.0	125.0	125.0							
3.5	1	30.00 kVA - PP2 Resistive, 3-Phase	30%	30%			30.0	30.0	30.0	30.0							
3.6	1	7.50 HP - EF-1 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, NEMA G	30%	30%			44.6	23.6	8.0	6.5							
		Step 3 Total	**20%**	**20%**	**4.7%**	**7.4%**	**380.5**	**378.6**	**382.1**	**375.4**							
		Total Through Step 3									**1,042.3**	**1,002.2**	**1,061.5**	**999.0**			
Step 4			**Step Passed**														
																	
															6.6%	7.7%	11.3%
4.1	1	75.00 HP - ELEVATOR A - FREIGHT NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, 50 Duty Point	30%	30%			397.5	135.2	33.8	30.1							
4.2	1	60.00 HP - ELEVATOR B - FREIGHT NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point	30%	30%			318.0	114.5	27.6	24.3							

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
4.3	1	26.00 HP - ELEVATOR 2 - FREIGHT NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point	30%	30%			159.0	66.8	12.4	10.7							
4.4	1	60.00 HP - ELEVATOR E-FREIGHT NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point	30%	30%			318.0	114.5	27.6	24.3							
4.5	1	50.00 kVA - AIR CURTAINS Resistive, 3-Phase	30%	30%			50.0	50.0	50.0	50.0							
4.6	1	50.00 kVA - AMTRAK ROOMS Resistive, 3-Phase	30%	30%			50.0	50.0	50.0	50.0							
		Step 4 Total	**20%**	**20%**	**6.6%**	**11.3%**	**1,231.8**	**530.9**	**199.2**	**193.1**							
		Total Through Step 4									**2,107.3**	**1,529.9**	**1,259.9**	**1,192.2**			
Step 5			**Step Passed**														
5.1	1	500.00 kVA - SPT-1 Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	25.0	2.5							
5.2	1	500.00 kVA - SPT-2 Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	25.0	2.5							
5.3	1	15.00 kVA - P115 Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
5.4	1	30.00 kVA - P113 Resistive, 3-Phase	30%	30%			30.0	30.0	30.0	30.0							
5.5	1	30.00 kVA - P110 Resistive, 3-Phase	30%	30%			30.0	30.0	30.0	30.0							
5.6	1	30.00 kVA - P111 Resistive, 3-Phase	30%	30%			30.0	30.0	30.0	30.0							

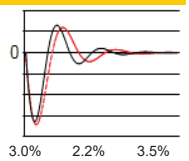


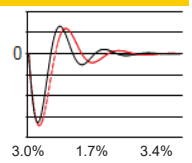
Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
5.7	1	15.00 kVA - P107 Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
5.8	1	15.00 kVA - P103 Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
5.9	1	15.00 kVA - P102 Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
5.10	1	15.00 kVA - P106 Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
5.11	1	15.00 kVA - LP-H Fluorescent Lighting, Distr. 3-Phase	30%	30%			19.0	14.3	15.0	14.3							
		Step 5 Total	**20%**	**20%**	**2.9%**	**3.3%**	**179.7**	**179.2**	**195.6**	**187.8**							
		Total Through Step 5									**1,412.1**	**1,371.4**	**1,455.3**	**1,380.0**			
Step 6			**Step Passed**														
																	
6.1	1	15.00 kVA - PNL A - MCC C Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
6.2	1	7.50 HP - COND. DUAL WATER PUMP (P-6) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point, NEMA G	30%	30%			44.6	23.6	4.0	3.3							
6.3	1	7.50 HP - COND. DUAL WATER PUMP (P-7) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point, NEMA G	30%	30%			44.6	23.6	4.0	3.3							
6.4	1	5.00 HP - DUAL TEMP PUMP (P-10) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point, NEMA H	30%	30%			33.5	19.1	2.8	2.2							
6.5	1	5.00 HP - DUAL TEMP PUMP (P-11) NEMA, 3-Phase Motor, Across the line, Loaded, 50 Duty Point, NEMA H	30%	30%			33.5	19.1	2.8	2.2							

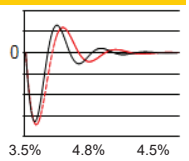
Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
6.6	1	7.50 HP - EF-4 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA G	30%	30%			44.6	23.6	5.6	4.6							
6.7	1	30.00 kW - AHU 9 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point	30%	30%			212.0	82.7	26.5	23.1							
6.8	1	35.00 kW - HVAC 2 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point	30%	30%			265.0	98.1	21.6	19.0							
		Step 6 Total	**20%**	**20%**	**4.0%**	**5.8%**	**681.7**	**304.8**	**82.1**	**74.0**							
		Total Through Step 6									**1,973.5**	**1,684.7**	**1,536.8**	**1,454.0**			
Step 7			**Step Passed**														
7.1	1	1,000.00 kVA - Substation #3 Transformer Steady State Magnetization, 98% Efficiency, 480V Secondary Voltage	-	-			0.0	0.0	50.0	5.0							
7.2	1	10.00 HP - AHU-10-RBC NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA G	30%	30%			59.4	30.3	7.3	6.0							
7.3	1	10.00 HP - AHU-10-RETURN-RBC NEMA, 3-Phase Motor, Across the line, Loaded, 70 Duty Point, NEMA G	30%	30%			59.4	30.3	7.3	6.0							
7.4	1	50.00 kVA - PPA Resistive, 3-Phase	30%	30%			50.0	50.0	50.0	50.0							
7.5	1	15.00 kVA - RPA Resistive, 3-Phase	30%	30%			15.0	15.0	15.0	15.0							
7.6	1	30.00 kVA - LPA Fluorescent Lighting, Distr. 3-Phase	30%	30%			38.0	28.5	30.0	28.5							



Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
7.7	1	75.00 kVA - TENANT PNLS Resistive, 3-Phase	30%	30%			75.0	75.0	75.0	75.0							
		Step 7 Total	**20%**	**20%**	**3.5%**	**4.6%**	**262.1**	**229.1**	**200.9**	**189.1**							
		Total Through Step 7									**1,768.5**	**1,683.0**	**1,737.7**	**1,643.1**			
Step 8			**Step Passed**														
8.1	1	3.00 HP - EF-3 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA J	30%	30%			22.6	13.8	2.5	1.9							
8.2	1	3.00 HP - EF-10 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA J	30%	30%			22.6	13.8	2.5	1.9							
8.3	1	15.00 HP - HW PUMP AHU (P-8) NEMA, 3-Phase Motor, Across the line, Loaded, 50 Duty Point	30%	30%			79.5	38.2	7.6	6.3							
8.4	1	15.00 HP - HW PUMP AHU (P-9) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point	30%	30%			79.5	38.2	7.6	6.3							
8.5	1	3.00 HP - EF-12 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA J	30%	30%			22.6	13.8	2.5	1.9							
8.6	1	1.00 HP - HW PUMP (P-12) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point, NEMA L	30%	30%			9.5	6.7	0.7	0.5							
8.7	1	1.00 HP - HW PUMP (P-13) NEMA, 3-Phase Motor, Across the line, Loaded, 50 Duty Point, NEMA L	30%	30%			9.5	6.7	0.7	0.5							



Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
8.8	1	2.00 HP - HW PUMP DHW (P-14) NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 50 Duty Point, NEMA K	30%	30%			17.0	10.9	1.2	0.9							
8.9	1	2.00 HP - HW PUMP DHW (P-15) NEMA, 3-Phase Motor, Across the line, Loaded, 50 Duty Point, NEMA K	30%	30%			17.0	10.9	1.2	0.9							
8.10	1	5.00 HP - AHU-2 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			0.5	0.5	5.5	4.9							
8.11	1	7.50 HP - AHU-8 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA G	30%	30%			44.6	23.6	5.6	4.6							
		Step 8 Total	**20%**	**20%**	**3.0%**	**3.5%**	**323.6**	**176.9**	**38.1**	**31.3**							
		Total Through Step 8									**1,978.7**	**1,824.8**	**1,774.4**	**1,674.4**			
Step 9			**Step Passed**														
																	
9.1	1	7.50 HP - RF-1 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			0.8	0.7	7.9	7.1							
9.2	1	10.00 HP - RF-2 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			1.0	0.9	10.4	9.3							
9.3	1	5.00 HP - EF-5 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA H	30%	30%			33.5	19.1	3.9	3.1							
9.4	1	7.50 HP - EF-6 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA G	30%	30%			44.6	23.6	5.6	4.6							
9.5	1	30.00 kVA - LPN Incandescent Lighting, Distr. 3-Phase	30%	30%			30.0	30.0	30.0	30.0							

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
9.6	1	30.00 HP - AHU 4 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			3.0	2.7	29.6	26.6							
9.7	1	40.00 HP - AHU-5 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			3.9	3.5	38.5	34.7							
9.8	1	25.00 HP - AHU 6 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			2.5	2.2	25.0	22.5							
9.9	1	7.50 HP - AHU 7 NEMA, 3-Phase Motor, VFD, 110% Current Limit, Single Operating Point, 6 Pulse	20%	20%			0.8	0.7	7.9	7.1							
9.10	1	5.00 HP - EF-11 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA H	30%	30%			33.5	19.1	3.9	3.1							
9.11	1	5.00 HP - EF-9 NEMA, 3-Phase Motor, Across the line, Loaded, Single Operating Point, 70 Duty Point, NEMA H	30%	30%			33.5	19.1	3.9	3.1							
9.12	1	7.50 HP - AIR COMPRESSOR 1 NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, 50 Duty Point, NEMA G	30%	30%			44.6	23.6	4.0	3.3							
9.13	1	7.50 HP - AIR COMPRESSOR 2 NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point, NEMA G	30%	30%			44.6	23.6	4.0	3.3							
		Step 9 Total	**20%**	**20%**	**3.0%**	**3.4%**	**262.6**	**168.8**	**174.8**	**160.8**							
		Total Through Step 9									**2,093.1**	**1,950.4**	**1,948.9**	**1,835.2**			
Intermittent Step			**Step Passed**														
																	
10.1	1	75.00 HP - ELEVATOR A - FREIGHT NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, 50 Duty Point	30%	30%			397.5	135.2	33.8	30.1							

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
10.2	1	60.00 HP - ELEVATOR E-FREIGHT															
		NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point, 50 Duty Point	30%	30%			318.0	114.5	27.6	24.3							
		Step 10 Total	**20%**	**20%**	**3.5%**	**4.8%**	**715.5**	**249.6**	**62.6**	**55.5**							
		Total Through Step 10									**2,377.5**	**1,995.4**	**1,948.9**	**1,835.2**			

Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
1,231.8	530.9	2,377.5	1,995.4	1,948.9	1,835.2

Transient Performance Report

Price List:
U.S.

Modified Date	6-Mar-2019	**Electricity Supply**	60 Hz 4160/2402 V	**Rating Type**	Standby
Customer Name	NJ Transit	**Fuel**	Gaseous Fuel (> 150ekW)		
Project Name/Ref #	174086A NPS Solution (3)	**Max. Ambient Temperature**	77.0 F		
Prepared By	Andrew Koch	**Altitude**	30.0 Ft. A.S.L		

Load Scenario

Step 4

Voltage Dip

Permitted-20.0%

Predicted - 11.3%

Synchronous (Vdip 1) - 7.7%

Frequency-induced (Vdip 2) - 11.3%

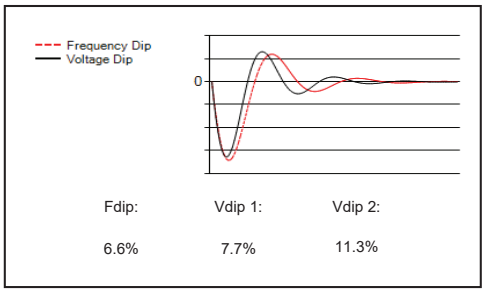
Step 4

Frequency Dip

Permitted-20.0%

Predicted - 6.6%

Step 4



Selected Generator Set

1,035.0 EkW / 1,293.0 kVA 60 Hz Standby, 4160/2402V, G3512 SCAC US EPA Cert, 1465 PM SR5 FORM, 0:1 slope

Block Load (only) Transient Response *

Load Change %	FDip %	VDip %	Recovery Time (sec)
25	5.08835	9.125	2.65
50	10.1667	18.71	5.4
75	12.5167	43.08	6.3
100	22.0167	52.88	12.5

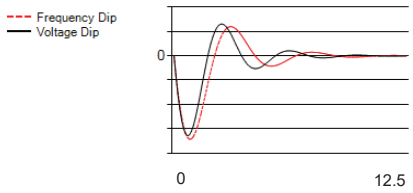
Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response test results due to a variance in site altitude or ambient conditions.

Note: This information is representative of a typical Caterpillar GenSet, but is not guaranteed. This estimate has tolerances, and there are also GenSet-to-GenSet variations.

0 - 100 Load Change %



Project Sizing Report

Price List: U.S.

Modified Date	6-Mar-2019	**Electricity Supply**	60 Hz 480/277 V
Customer Name		**Connection**	STAR
Project Name/Ref #	174086A Diesel	**Max. Ambient Temperature**	77.0 F 30% Humidity
Prepared By	Andrew Koch	**Altitude**	500.0 Ft. A.S.L

Load Analysis Summary

Max Transient Load Step	469.5 SkVA	366.9 SkW	
Peak Transient Load	567.3 SkVA	456.7 SkW	
Final Running Load	370.5 kVA	363.3 kW	0.98 PF
Max Running Non Linear Load	99.8 RkVA		
Maximum Running Load	370.5 kVA	363.3 kW	

Generator Set

Genset Model	(1) of C18	**Nameplate Rating**	600.0 kW / 750.0 kVA 0.8 PF
Voltage Regulator and Slope	EMCP-IVR, 2:1 slope		
Feature Code	C18DE6E	**Site Output**	600 kW / 750 kVA
Fuel	Diesel	**Rating Type**	Standby
Dry Weight	0.0 lbs		
Length / Width / Height	286.1in / 80.9in / 124.1in	**Cooling System**	
		UL Listed	No

Alternator Motor Starting Capability *		Block Load (only) Transient Response *			
Instantaneous Voltage Dip * **	**skVA Capability**	**Load Change %**	**FDip %**	**VDip %**	**Recovery Time (sec)**
10%	517	**0 - 25**	1.9	3.1	< 3
20%	1,163	**0 - 50**	3.8	6.0	< 3
30%	1,993	**0 - 75**	6.1	10.5	< 3
35%	2,504	**0 - 100**	11.0	20.4	< 3

Engine Technical Data at 100% Rated Load

Make/Model	C18	**Emissions/Certifications**	EPA ESE
Aspiration	TA	**Governor**	ELEC
Cylinder Configuration	INLINE - 6	**Aftercooler Type**	ATAAC
Displacement	1,106 Cubic Inch / 18 Liter	**Rejection To Jacket Water**	10,747 BTU/min
Speed	1800 RPM	**Rejection To Aftercooler**	8,700 BTU/min
Fuel Rate	42.7 gph	**Rejection To Oil Cooler**	4,927 BTU/min
Exhaust Sound Level	0 dBA at 23 ft/7 m	**Rejection To Atmosphere**	4,902 BTU/min
Mechanical Sound Level	0 dBA at 23 ft/7 m	**Rejection To Exhaust**	36,053 BTU/min
Max Combustion Inlet Air Temp	120.2 F	**Exhaust Recoverable**	25,532 BTU/min
Combustion Airflow	1,688.0 cfm	**Exhaust Stack Temperature**	994 F
Cooling System Ambient Capability	122.0 F	**Exhaust Flow Rate**	4,784.9 cfm
Cooling System Airflow **	28,393 cfm		
Engine Performance Number	DM8518		

Alternator Technical Data

Alternator Arrangement Number	4183887			**Insulation**	H	
Alternator Type / Frame Size	LC / LC7024J			**Temperature Rise**	105 C	
Alternator Winding Pitch	0.6667			**Rejection To Atmosphere**	2,138.3 BTU/min	
Number Of Poles	4			**Peak Amps / Rated Amps**	**** / 902.1	
Excitation / Winding Type	AREP / RANDOM			**Short Circuit Ratio**	0.3800	
Reactances		**per unit**	**ohms**	**Generator Time Constants**		**sec**
Subtransient - Direct Axis	X"d	0.1234	0.0379	**Open Circuit Transient - Direct Axis**	T'd0	2.0390
Subtransient - Quadrature Axis	X"q	0.1419	0.0436	**Short Circuit Transient - Quadrature Axis**	T'd	0.1000
Transient - Saturated	X'd	0.1546	0.0475	**Open Circuit Subtransient - Direct Axis**	T"d0	0.0130
Synchronous - Direct Axis	Xd	3.1563	0.9696	**Short Circuit Subtransient - Direct Axis**	T"d	0.0100
Synchronous - Quadrature Axis	Xq	1.8945	0.5820	**Open Circuit Subtransient - Quadrature Axis**	T"q0	0.1330
Negative Sequence	X2	0.1328	0.0408	**Short Circuit Subtransient - Quadtrature Axis**	T"q	0.0100
Zero Sequence	X0	0.0091	0.0028	**Armature Short Circuit**	TA	0.0150

Notes:

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response test results due to a variance in site altitude or ambient conditions.

** Based on 1/2 inch water (0.12 kPa) external restriction and 1000 ft (300m) altitude.

*** Based on instantaneous voltage dip as defined per NEMA MG-1.

**** See your Caterpillar dealer and/or Spec Sheet for technical information.

***** Package Power Tolerance: +/- 5%

Overall dimensions and weight not to be used for installation. Contact your Caterpillar dealer for specific dimension drawings.

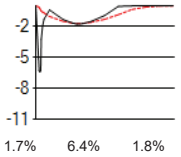
Caterpillar makes no express warranties and disclaims all implied warranties including merchantability and fitness for a particular purpose regarding program. Caterpillar shall have no liability in law or equity for damages consequential or otherwise arising from use of program and related material or any part thereof. The analysis provided from SpecSizer is only for the expected results at the generator terminals. Analysis of transient conditions of any device downstream is the responsibility of the system designer.

Project Load Report

Modified Date	6-Mar-2019	**Rating Type**	Standby	**Max Ambient Temperature**	77 Deg. F
Customer Name		**Fuel**	Diesel	**Altitude**	500.0 Ft. A.S.L
Project Name/Ref #	174086A Diesel	**Electricity Supply**	60 Hz 480/277 V		
Prepared By	Andrew Koch				

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
Step 1			**Step Passed**														
															-1 -4 -7 -10 -13	4.6%	8.1% 7.5%
1.1	1	30.00 HP - NPS ELEV 1 NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point	30%	30%			159.0	66.8	28.6	24.6							
1.2	1	30.00 HP - NPS Elevator 3/4 NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point	30%	30%			159.0	66.8	28.6	24.6							
1.3	1	20.00 HP - Raymond Boulevard Elevator A NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.4	1	20.00 HP - Raymond Boulevard Elevator B NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.5	1	20.00 HP - Raymond Boulevard Elevator C NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.6	1	20.00 HP - Raymond Boulevard Elevator D NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							
1.7	1	20.00 HP - Raymond Boulevard Elevator E NEMA, 3-Phase Motor, VFD, 110% Current Limit, Intermittent, Single Operating Point, 6 Pulse	20%	20%			2.0	1.8	20.0	18.0							

Load Details			Permitted Dip		Predicted Dip		Load Analysis										
Load Step		Load Description	Frequency	Voltage	Frequency	Voltage	Transient Inrush		Running		Resultant Peak		Cumulative Running		Fdip:	Vdip 1:	Vdip 2:
							SkVA	SkW	kVA	kW	SkVA	SkW	kVA	kW			
1.8	1	37.25 kW - Emergency Lighting Panel Main Concourse															
		Incandescent Lighting, Distr. 3-Phase	30%	30%			37.3	37.3	37.3	37.3							
1.9	1	225.00 Amps - CITY SUBWAY EM PANEL															
		Resistive, 3-Phase	30%	30%			187.1	187.1	187.1	187.1							
		Step 1 Total	**20%**	**20%**	**4.6%**	**8.1%**	**469.5**	**366.9**	**370.5**	**363.3**							
		Total Through Step 1									**567.3**	**456.7**	**370.5**	**363.3**			
Intermittent Step			**Step Passed**														
2.1	1	30.00 HP - NPS Elevator 3/4															
		NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point	30%	30%			159.0	66.8	28.6	24.6							
2.2	1	30.00 HP - NPS ELEV 1															
		NEMA, 3-Phase Motor, Across the line, Intermittent, Loaded, Single Operating Point	30%	30%			159.0	66.8	28.6	24.6							
		Step 2 Total	**20%**	**20%**	**1.7%**	**6.4%**	**318.0**	**133.6**	**57.2**	**49.2**							
		Total Through Step 2									**557.4**	**447.7**	**370.5**	**363.3**			



Load Analysis Summary

Maximum Step		Maximum Peak		Final Running	
SkVA	SkW	SkVA	SkW	kVA	kW
469.5	366.9	567.3	456.7	370.5	363.3

Transient Performance Report

Price List:
U.S.

Modified Date	6-Mar-2019	**Electricity Supply**	60 Hz 480/277 V	**Rating Type**	Standby
Customer Name		**Fuel**	Diesel		
Project Name/Ref #	174086A Diesel	**Max. Ambient Temperature**	77.0 F		
Prepared By	Andrew Koch	**Altitude**	500.0 Ft. A.S.L		

Load Scenario

Step 1

Voltage Dip

Permitted-20.0%

Predicted - 8.1%

Synchronous (Vdip 1) - 8.1%

Frequency-induced (Vdip 2) - 7.5%

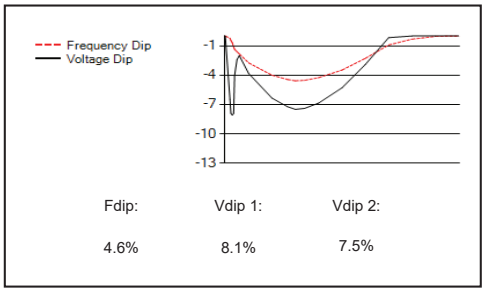
Step 1

Frequency Dip

Permitted-20.0%

Predicted - 4.6%

Step 1



Selected Generator Set

600.0 EkW / 750.0 kVA 60 Hz Standby, 480/277V, C18 ATAAC EPA ESE, LC7024J AREP LC RANDOM, EMCP-IVR 2:1 slope

Block Load (only) Transient Response *

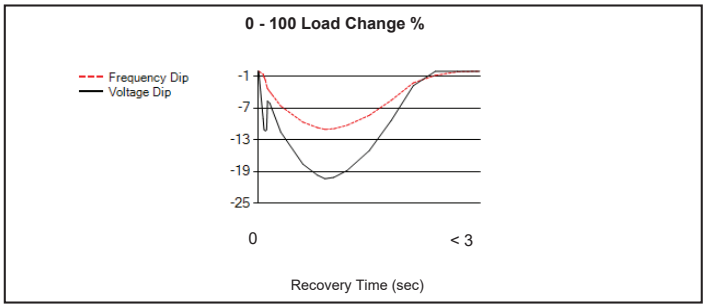
Load Change %	FDip %	VDip %	Recovery Time (sec)
0 - 25	1.9	3.1	< 3
0 - 50	3.8	6.0	< 3
0 - 75	6.1	10.5	< 3
0 - 100	11.0	20.4	< 3

Transient Performance

The selected representative generator set was factory tested in accordance to NFPA 110 block load step capability and acceptable frequency and voltage response on load addition and rejection.

* Block Load (only) Transient Response values are at factory conditions. Genset block load capabilities at site conditions may vary from factory transient response test results due to a variance in site altitude or ambient conditions.

Note: This information is representative of a typical Caterpillar GenSet, but is not guaranteed. This estimate has tolerances, and there are also GenSet-to-GenSet variations.



Appendix C. Specifications for Major Equipment

App C – Specifications for Major Equipment zip file is included in the digital submission.

DIESEL-ENGINE-DRIVEN GENERATOR SET

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. Emergency Standby Power (ESP): Per ISO 8528: The maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturers. The permissible average power output (Ppp) over 24 hours of operation shall not exceed 70 percent of the ESP unless otherwise agreed by the RIC engine manufacturer.

B. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Thermal damage curve for generator.

2. Time-current characteristic curves for generator protective device.

3. Sound test data, based on a free field requirement.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.

2. Wiring Diagrams: Control interconnection, Customer connections.

C. Certifications:

1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location for EPA, stationary emergency application.

1.4 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

1. Certified summary of prototype-unit test report. See requirements in Part 2 "Source Quality Control" Article Part A. Include statement indicating torsional compatibility of components.

2. Certified Test Report: Provide certified test report documenting factory test per the requirements of this specification, as well as certified factory test of generator set sensors per NFPA110 level 1.

3. List of factory tests to be performed on units to be shipped for this Project.

4. Report of exhaust emissions and compliance statement certifying compliance with applicable regulations.

B. Warranty:

1. Submit manufacturer's warranty statement to be provided for this Project.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 50 of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

D. Comply with NFPA 37 (Standard For the Installation and Use of Stationary Combustion Engines and Gas Turbines).

E. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).

F. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.

G. Comply with UL 2200.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: 0.0 deg C (32.0 deg F) to 25.0 deg C (77.0 deg F).

2. Relative Humidity: 0 to 95 percent.

3. Altitude: Sea level to 361.0 feet (152.0 m).

1.7 WARRANTY

A. Base Warranty: Manufacturer shall provide base warranty coverage on the material and workmanship of the generator set for a minimum of twenty-four (24) months for Standby product and twelve (12) months for Prime/Continuous product from registered commissioning and start-up.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: The basis for this specification is Cummins Power Generation equipment, approved equals may be considered if equipment performance is shown to meet the requirements herein.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

1. Rigging Information: Indicate location of each lifting attachment, generator-set center of gravity, and total package weight in submittal drawings.

C. Capacities and Characteristics:

1. Power Output Ratings: Electrical output power rating for Standby operation of not less than 600.0kW, at 80 percent lagging power factor, 277/480, Series Wye, Three phase, 4 -wire, 60 hertz.

2. Alternator shall be capable of accepting maximum 2429.0 kVA in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.

3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component. The engine-generator nameplate shall include information of the power output rating of the equipment.

D. Generator-Set Performance:

1. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load.

2. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 4 seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.

3. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.

4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

5. Transient Frequency Performance: Not more than 3 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within 2 seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.

6. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.

7. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 8 seconds without damage to generator system components. For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.

8. Start Time: Comply with NFPA 110, Level 1, Type 10, system requirements.

9. Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.

10. Load Sharing: Engine generator shall share real and reactive load proportionally within plus or minus 3 percent with all other engine generators in the system.

2.3 ENGINE

A. Fuel: ASTM D975 #2 Diesel Fuel

B. Rated Engine Speed: 1800RPM.

C. Lubrication System: The following items are mounted on engine or skid:

1. Lube oil pump: shall be positive displacement, mechanical, full pressure pump.

2. Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.

3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

D. Engine Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instructions

E. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance.

1. Designed for operation on a single 120 VAC, Single phase, 60Hz power connection. Heater voltage shall be shown on the project drawings.

2. Installed with isolation valves to isolate the heater for replacement of the element without draining the engine cooling system or significant coolant loss.

3. Provided with a 24VDC thermostat, installed at the engine thermostat housing

G. Governor: Adjustable isochronous, with speed sensing. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate as appropriate to the state of the engine generator. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed, and operating in various isochronous states.

H. Cooling System: Closed loop, liquid cooled

1. The generator set manufacturer shall provide prototype test data for the specific hardware proposed demonstrating that the machine will operate at rated standby load in an outdoor ambient condition of 40 deg C.

2. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.

3. Size of Radiator overflow tank: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.

4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.

5. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

6. Duct Flange: Generator sets installed indoors shall be provided with a flexible radiator duct adapter flange.

I. Muffler/Silencer: A critical grade silencer must be selected to meet sound requirements of the application, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

J. Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.

K. Starting System: 12 or 24V, as recommended by the engine manufacturer; electric, with negative ground.

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.

2. Cranking Cycle: As required by NFPA 110 for level 1 systems.

3. Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.

4. Battery Compartment: Factory fabricated of metal with acid-resistant finish.

5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.

6. Battery Chargers: Unit shall comply with UL 1236, provide fully regulated, constant voltage, current limited, battery charger for each battery bank. It will include the following features:

a. Operation: Equalizing-charging rate based on generator set manufacturer's recommendations shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.

b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 20 deg C to plus 40 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.

c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.

d. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

e. Provide LED indication of general charger condition, including charging, faults, and modes. Provide a LCD display to indicate charge rate and battery voltage. Charger shall provide relay contacts for fault conditions as required by NFPA110.

f. Enclosure and Mounting: NEMA, Type 1, wall-mounted cabinet.

2.4 FUEL OIL STORAGE

A. Comply with NFPA 30.

B. Sub Base-Mounted Fuel Oil Tank: Provide a double wall secondary containment type sub base fuel storage tank. The tank shall be constructed of corrosion resistant steel and shall be UL 142 listed and labeled. The fuel tank shall include the following features:

1. Capacity: Fuel for 12 Hour(s) continuous operation at 100 percent rated power output.
2. Tank rails and lifting eyes shall be rated for the full dry weight of the tank, genset, and enclosure.
3. Electrical stub up(s)
4. Normal & emergency vents
5. Lockable fuel fill
6. Mechanical fuel level gauge
7. High and low level switches to indicate fuel level
8. Leak detector switch
9. Sub base tank shall include a welded steel containment basin, sized at a minimum of 110% of the tank capacity to prevent escape of fuel into the environment in the event of a tank rupture.
10. Fill port with overfill prevention valve (OFPV)
11. 5 gallon fill/spill dam or bucket
12. Tank design shall meet the regional requirements for the Project location

2.5 CONTROL AND MONITORING

A. Engine generator control shall be microprocessor based and provide automatic starting, monitoring, protection and control functions for the unit.

B. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. (Switches with different configurations but equal functions are acceptable.) When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.

C. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.

D. Configuration: Operating and safety indications, protective devices, system controls, engine gages and associated equipment shall be grouped in a common control and monitoring panel. Mounting method shall isolate the control panel from generator-set vibration. AC output power circuit breakers and other output power equipment shall not be mounted in the control enclosure.

E. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

1. AC voltmeter (3-phase, line to line and line to neutral values).
2. AC ammeter (3-phases).
3. AC frequency meter.
4. AC kW output (total and for each phase). Display shall indicate power flow direction.
5. AC kVA output (total and for each phase). Display shall indicate power flow direction.
6. AC Power factor (total and for each phase). Display shall indicate leading or lagging condition.
7. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases.
8. Emergency Stop Switch: Switch shall be a red "mushroom head" pushbutton device complete with lock-out/tag-out provisions. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
9. Fault Reset Switch: Supply a dedicated control switch to reset/clear fault conditions.
10. DC voltmeter (alternator battery charging).
11. Engine-coolant temperature gauge.
12. Engine lubricating-oil pressure gauge.
13. Running-time meter.
14. Generator-voltage and frequency digital raise/lower switches. Rheostats for these functions are not acceptable. The control shall adjustment of these parameters in a range of plus or minus 5% of the voltage and frequency operating set point (not nominal voltage and frequency values.)
15. Fuel tank derangement alarm.
16. Fuel tank high-level shutdown of fuel supply alarm.
17. AC Protective Equipment: The control system shall include over/under voltage, reverse kVAR, reverse kW, over load (kW) short circuit, over current, loss of voltage reference, and over excitation shut down protection. There shall be a ground fault

alarm for generator sets rated over 1000 amps, overload warning, and overcurrent warning alarm.

18. Status LED indicating lamps to indicate remote start signal present at the control, existing shutdown condition, existing alarm condition, not in auto, and generator set running.

19. A graphical display panel with appropriate navigation devices shall be provided to view all information noted above, as well as all engine status and alarm/shutdown conditions (including those from an integrated engine emission control system). The display shall also include integrated provisions for adjustment of the gain and stability settings for the governing and voltage regulation systems.

20. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted.

21. Data Logging: The control system shall log the latest 20 different alarm and shut down conditions, the total number of times each alarm or shutdown has occurred, and the date and time the latest of these shutdown and fault conditions occurred.

22. DC control Power Monitoring: The control system shall continuously monitor DC power supply to the control, and annunciate low or high voltage conditions. It shall also provide an alarm indicating imminent failure of the battery bank based on degraded voltage recover on loading (engine cranking).

F. Remote Alarm Annunciator: Comply with NFPA 110. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition.

2.6 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Overcurrent Protection: The generator set shall be provided with a UL Listed/CSA Certified protective device that is coordinated with the alternator provided to prevent damage to the generator set on any possible overload or overcurrent condition external to the machine. The protective device shall be listed as a utility grade protective device under UL category NRGU. The control system shall be subject to UL follow-up service at the manufacturing location to verify that the protective system is fully operational as manufactured. Protector shall perform the following functions:

1. Initiates a generator kW overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.

2. Under single phase or multiple phase fault conditions, or on overload conditions, indicates an alarm conditions when the current flow is in excess of 110% of rated current for more than 10 seconds.

3. Under single phase or multiple phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.

4. The operator panel shall indicate the nature of the fault condition as either a short circuit or an overload.

5. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120% of nominal voltage.

6. The protective system provided shall not include an instantaneous trip function.

2.7 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H

D. Temperature Rise: 105 / Class F environment.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, over speed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Permanent Magnet Generator (PMG) shall provide excitation power for optimum motor starting and short circuit performance.

G. Enclosure: Drip-proof.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, 3-phase true RMS sensing, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.

I. The alternator shall be provided with anti-condensation heater(s) in all applications where the generator set is provided in an outdoor enclosure, or when the generator set is installed in a coastal or tropical environment.

J. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

K. Subtransient Reactance: 12 percent maximum, based on the rating of the engine generator set.

2.8 DUCT MOUNTED RESISTIVE LOADBANK

A. Ratings: The load bank shall be capable of 225 KW at a 1.0 Power Factor, at a voltage of 480 VAC, 3 Phase, 60 Hz, 3-wire. The Load steps shall be 25KW. The load bank shall be a completely self-contained unit for mounting in the radiator air stream. The load bank shall include all resistive load elements, load control devices and protective devices. The engine radiator will the air to cool the load bank. The load bank shall have a static pressure drop of approximately 0.1" H_20 at design velocity (850 ft/min.). The controls shall be housed in the contactor enclosure attached to the side of the load bank, facing the rear of the generator enclosure. The load bank/control enclosure combination shall be of uniform thickness. The total load shall terminate to a single, 3-phase distribution block. The load bank shall have an overtemperature sensor mounted in the top of the core. Load step fusing is available, as

an option. The resistive load elements shall be U.L. listed, labeled or recognized and made of corrosion resistant wire. Resistive elements shall be continuously supported on a ceramic insulated stainless steel rod. Elements shall be designed out of a corrosion resistant chromium alloy material and must operate at only 1/3 of the alloys maximum temperature rating. Sealed wire type elements in which the internal resistance wire is totally enclosed and which prevent internal cooling of wire shall not be used. The use of any magnesium oxide packing material in these elements can leak and short circuit to outer sheath shall not be permitted. Toggle switches for each load step shall be provided.

B. To permit application of a preset block load, a master control switch shall be provided. Operational switches shall be provided including control power ON/OFF switch with indication light, and overtemperature light.

C. The Manufacturer's Quality System shall be ISO9001 Certified.

D. Loadbank shall be manufactured by Avtron or Simplex.

2.9 CIRCUIT BREAKER

A. Provide a generator mounted 100% circuit breaker, molded case, 800 Amp trip, 4 pole, NEMA1/IP22. Breaker shall utilize a solid-state trip unit. The breaker shall be UL/CSA listed and connected to engine/generator safety shutdowns. Breaker shall be housed in an extension terminal box which is isolated from vibrations induced by the generator set. Mechanical type lugs, sized for the circuit breaker feeders shown on drawings, shall be supplied on the load side of the breaker.

2.10 VIBRATION ISOLATION DEVICES

A. Vibration Isolation: Generators installed on grade shall be provided with elastomeric isolator pads integral to the generator, unless the engine manufacturer requires use of spring isolation.

2.11 FINISHES

A. Components: Powder-coated and baked over corrosion-resistant pretreatment and compatible primer. Manufacturer′s standard color or as directed on the drawings.

2.12 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Steady-state governing.
6. Single-step load pickup.
7. Simulated safety shutdowns.
8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation, application, and alignment instructions and with NFPA 110.

B. Equipment shall be installed by the contractor in accordance with final submittals and contract documents. Installation shall comply with applicable state and local codes as required by the authority having jurisdiction. Install equipment in accordance with manufacturer's instructions and instructions included in the listing or labeling of UL listed products.

C. Installation of equipment shall include furnishing and installing all interconnecting wiring between all major equipment provided for the on-site power system. The contractor shall also perform interconnecting wiring between equipment sections (when required), under the supervision of the equipment supplier.

D. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer’s instructions and seismic requirements of the site.

E. Equipment shall be initially started and operated by representatives of the manufacturer. All protective settings shall be adjusted as instructed by the consulting engineer.

F. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to initial operation and final testing of the system.

G. On completion of the installation by the electrical contractor, the generator set supplier shall conduct a site evaluation to verify that the equipment is installed per manufacturer’s recommended practice.

3.2 ON-SITE ACCEPTANCE TEST

A. The complete installation shall be tested to verify compliance with the performance requirements of this specification following completion of all site work. Testing shall be conducted by representatives of the manufacturer, with required fuel supplied by Contractor. The Engineer shall be notified in advance and shall have the option to witness the tests. The generator set manufacturer shall provide a site test specification covering the entire system. Tests shall include:

B. Prior to start of active testing, all field connections for wiring, power conductors, and bus bar connections shall be checked for proper tightening torque.

C. Installation acceptance tests to be conducted on site shall include a "cold start" test, a two hour full load (resistive) test, and a one-step rated load pickup test in accordance with NFPA 110. Provide a resistive load bank and make temporary connections for full load test, if necessary.

D. Perform a power failure test on the entire installed system. This test shall be conducted by opening the power supply from the utility service, and observing proper operation of the system for at least 2 hours. Coordinate timing and obtain approval for start of test with site personnel.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

3.4 SERVICE AND SUPPORT

A. The generator set supplier shall maintain service parts inventory for the entire power system at a central location which is accessible to the service location 24 hours per day, 365 days per year. The inventory shall have a commercial value of $3 million or more. The manufacturer of the generator set shall maintain a central parts inventory to support the supplier, covering all the major components of the power system, including engines, alternators, control systems, paralleling electronics, and power transfer equipment.

B. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical power system replacement parts in the local service location. Service vehicles shall be stocked with critical replacement parts. The service organization shall be on call 24 hours per day, 365 days per year. The service organization shall be physically located within 50 of the site.

C. The manufacturer shall maintain model and serial number records of each generator set provided for at least 20 years.

END OF SECTION

SECTION 26 32 13.16
GAS-ENGINE-DRIVEN GENERATOR SET

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Two (2) factory-packaged generator set for emergency standby electrical power production with the following components:
   1. Natural gas engine and engine accessories.
      a. Includes factory-supplied gas train.
      b. Includes factory-installed, package-mounted cooling radiators and fan.
   2. Generator (main alternator), generator accessories, and generator protective devices.
      a. Includes voltage regulator.
   3. Controls and monitoring systems for: engine, generator, and generator set.
   4. Generator set base frame and mounting system.
      a. Includes vibration isolators.

1.02 RELATED REQUIREMENTS

A. The list of related requirements is for informational purposes only. The purpose is to help identify by cross-reference the location of certain requirements that are not specified in this section.

B. Division 23 – Heating, Ventilating, and Air Conditioning (HVAC).
   1. Section 23 05 53 – Identification for HVAC Piping and Equipment.
   2. Section 23 07 19 – HVAC Piping Insulation.
   3. Section 23 11 23 – Facility Natural Gas Piping.
   4. Section 23 21 13 – Hydronic Piping.
   5. Section 23 21 16 – Hydronic Piping Specialties.
   6. Section 23 24 16 – Internal-Combustion Engine Exhaust Piping.
   7. Section 23 31 13 – Metal Ducts.

C. Division 26 – Electrical.
   1. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables.
   2. Section 26 05 23 – Control-Voltage Electrical Power Cables.
   3. Section 26 05 26 – Grounding and Bonding for Electrical Systems.
   4. Section 26 05 29 – Hangers and Supports for Electrical Systems.
   5. Section 26 05 53 – Identification for Electrical Systems.
   6. Section 26 05 73 – Power System Studies.
   7. Section 26 09 13 – Electrical Power Monitoring and Control.
   8. Section 26 23 13 – Paralleling Low-Voltage Switchgear.

9. Section 26 32 36 – Resistive Load Banks.
10. Section 26 36 23 – Automatic Transfer Switches.

1.03 ABBREVIATIONS AND ACRONYMS

1. Acronyms for names of standard-setting organizations are listed under the article *Reference Standards*.
2. AHJ: Authority having jurisdiction.
3. bhp: Brake horse power
4. CFR: U.S. Code of Federal Regulations.
5. DN: Diameter nominal.
6. DVR: Digital voltage regulator.
7. ECM: Engine Control Module
8. EPA: U.S. Environmental Protection Agency.
9. EPS: Emergency power supply (see article 'Definitions' below).
10. EPSS: Emergency power supply system (see article 'Definitions' below).
11. Genset: Generator set, packaged generator set, engine generator
12. HVAC: Heating, ventilation, and air conditioning
13. LCD: Liquid-crystal display
14. NETA: InterNational Electrical Testing Association
15. NG: Natural gas
16. NRTL: Nationally Recognized Testing Laboratory
17. NSPS: New Source Performance Standards (40 CFR Part 60)
18. OSHA: Occupational Safety & Health Administration, U.S. Department of Labor
19. p.f. Power factor.
20. PME: Permanent magnet excitation
21. PMG: Permanent magnet generator
22. RTD: Resistance temperature detector
23. SCAC: Separate circuit aftercooler (aftercooler second stage cooling)
24. UPS: Uninterruptible power supply

1.04 DEFINITIONS

A. Definitions Related to NFPA 110
   1. Emergency Power Supply (EPS): This section utilizes the definition provided by NFPA 110 as follows: 'Emergency Power Supply (EPS). The source of electric power of the required capacity and quality for an emergency power supply system (EPSS)'. For purposes of this section, the EPS is the packaged generator set that is being specified here.
   2. Emergency Power Supply System (EPSS): This section utilizes the definition provided by NFPA 110 as follows: 'Emergency Power Supply System (EPSS). A complete functioning EPS system coupled to a system of conductors, disconnecting means and overcurrent protective devices, transfer switches, and all control, supervisory, and support devices up to and including the load terminals

of the transfer equipment needed for the system to operate as a safe and reliable source of electric power.' For purposes of this section, the complete EPSS is not specified here.

3. EPPS Level 1: This section utilizes the definition provided by NFPA 110 as follows: 'Level 1 systems shall be installed where failure of the equipment to perform could result in loss of human life or serious injuries'. Also, 'For new Level 1 installations, the EPSS shall not be considered as meeting this standard until the acceptance tests have been conducted and test requirements met'.
4. EPPS Type: This section utilizes the definition provided by NFPA 110 as follows: 'The type defines the maximum time, in seconds, that the EPSS will permit the load terminals of the transfer switch to be without acceptable electrical power'
5. Prime mover: engine

B. Other Definitions
1. Hot Engine: An engine that has been previously loaded or fully heat soaked.
2. Cold Engine: An engine that has not been loaded recently. Typical for the initial loading of an engine in a standby/emergency application. Jacket water heater is typically continuously on for an emergency genset.
3. Genset: A generator set, a packaged engine generator, engine generator, energy converter
4. Generator: Main rotating piece of equipment attached to the engine and responsible for the conversion of rotational mechanical energy into electrical energy. Sometimes referred also as 'Main Generator', 'Main Alternator', or 'Alternator'.

1.05 REFERENCE STANDARDS

A. The following codes and standards are referenced throughout this section. Specific items of required compliance are listed within each article.

B. American Society of Mechanical Engineers
1. ASME B16.5 - Pipe Flanges and Flanged Fittings NPS 1/2 through 24 Metric/Inch Standard, 2013.

C. American National Standards Institute (ANSI).
1. ANSI B11.19 – Performance Requirements for Safeguarding, 2010.
2. ANSI B16.5. See ASME B16.5.

D. Environmental Protection Agency (EPA).
1. New Source Performance Standards - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines (same as 40 CFR Part 60, Subpart JJJJ). Factory Certification required. Field certification not acceptable.

E. Federal Communications Commission (FCC).
1. FCC Part 15 Subpart B – Unintentional radiators (same as 47 CFR Part 15, Subpart B)

F. International Electrotechnical Commission (IEC).
1. IEC 60529 – Degrees of Protection Provided by Enclosures (IP Code), 2013.
2. IEC 60034 – Rotating electrical machines.

a. Part 1: Rating and performance
b. Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification, 2006

G. The Institute of Electrical and Electronics Engineers (IEEE).
1. IEEE 43 – Recommended Practice for Testing Insulation Resistance of Rotating Machinery, 2013
2. IEEE 115 – Test Procedures for Synchronous Machines, 2009.

H. International Organization for Standardization (ISO).
1. ISO 3046 - Reciprocating Internal Combustion Engines -- Performance
a. ISO 3046/1 – Reciprocating Internal Combustion Engines -- Performance -- Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods --Additional requirements for engines for general use, 2002
2. ISO 3747 – Acoustics -- Determination of Sound Power Levels and Sound Energy Levels of Noise Sources Using Sound Pressure -- Engineering/Survey Methods for Use in Situ in a Reverberant Environment, 2010
3. ISO 6798 – Reciprocating Internal Combustion Engines -- Measurement of Emitted Airborne Noise -- Engineering Method and Survey Method, 1995
4. ISO 8178 – Reciprocating Internal Combustion Engines -- Exhaust Emission Measurement, various dates
5. ISO 8528 – Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets, various dates
6. ISO 9001 – Quality Management Systems – Requirements, 2015

I. National Electrical Contractors Association (NECA).
1. NECA 1 – Good Workmanship in Electrical Construction, 2010.
2. NECA 404 - Standard for Installing Generator Sets, 2014.

J. National Electrical Manufacturers Association (NEMA).
1. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum), 2014.
2. NEMA ICS6 – Industrial Control and Systems Enclosures (1993, revised 2006).
3. NEMA MG1 – Motors and Generators, 2014.

K. National Fire Protection Association (NFPA).
1. NFPA 37 – Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, 2015.
2. NFPA 54 – National Fuel Gas Code, 2015.
3. NFPA 70 – National Electrical Code.
4. NFPA 99 – Health Care Facilities Code.
5. NFPA 110 – Standard for Emergency and Standby Power Systems, 2016.
6. NFPA 111 – Standard on Stored Electrical Energy Emergency and Standby Power Systems, 2016.

L. Society of Automotive Engineers (SAE).
1. SAE J617_201404 – Engine Flywheel Housing and Mating Transmission Housing Flanges, 2014
2. SAE J824_199506 – Engine Rotation and Cylinder Numbering, 1996.

M. Underwriters Laboratories, Inc. (UL).
   1. UL 489 – Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, 2013.
   2. UL 499 – Electric Heating Appliances, 2014.
   3. UL 508A – Industrial Control Panels, 2013.
   4. UL 891 – Switchboards, 2005
   5. UL 1236 – Battery Chargers for Charging Engine-Starter Batteries, 2015.
   6. UL 1446 – Standard for Systems of Insulating Materials – General, 2007.
   7. UL 2200 – Standard for Stationary Engine Generator Assemblies, 2012.

N. United States Military Standards (MIL-STD).
   1. MIL-STD-461-C – Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference (EMI), 1986.

O. United States Code of Federal Regulations (CFR).
   1. 40 CFR – See under Federal Communications Commission (FCC).
   2. 47 CFR – See under Environmental Protections Agency (EPA).

1.06 ACTION/ SUBMITTALS

A. Product Data
   1. Generator Data (Main Alternator): Submit generator manufacturer's data sheet for the exact generator arrangement included in this scope. Generator data shall include:
      a. Generator specifications.
      b. Kilowatt and KVA ratings, line and phase voltages, and rated current.
      c. Generator efficiency at 25%, 50%, 75%, and 100% of kilowatt rating.
      d. Generator reactances and time constants.
      e. Stator and field resistances.
      f. Short circuit ratio.
      g. Voltage regulation performance.
      h. Excitation voltage and current, at no-load and full-load conditions.
      i. Generator center of gravity XYZ locations.
      j. Generator, rotor and stator weights.
      k. Rotor balance deflection, in mm.
      l. Overspeed capacity, expressed as % of synchronous speed.
      m. Generator torsional data for coupling and fan, rotor, exciter end, and shaft stiffness.
      n. Generator cooling requirements: heat dissipated and air flow.
      o. Stator and rotor temperature rise over 40C ambient.
      p. Insulation class.
      q. Generator thermal limits in kVA for:
         1) Class B, F, and H temperature rises over 40C ambient in continuous duty (BR - base rating): B BR 80/40, F BR 105/40, H BR 125/40.
         2) Class F and H temperature rises over 40C ambient in standby duty (PR - peak rating): F PR 130/40, H PR 150/40.
         3) Class H temperature rise over 27C ambient in standby duty (PR - peak rating): H PR27.
      r. Motor starting capability chart at 0.4 p.f. (Percent voltage dip v. SKVA).

s. Instantaneous fault currents (3-phase, line-line, and line-neutral).
t. Current decrement data curve (instantaneous 3-phase fault current v. E time cycle).
u. Generator output characteristic curves
    1) Open circuit curve (line-line voltage v. field current).
    2) Short circuit curve (armature current v. field current).
    3) Zero power factor curve (line-line voltage v. field current).
    4) Air gap curve (line-line voltage v. field current)
    5) Reactive capability curve

2. Generator Set Data:
    a. At-Site Ratings Data: submit engine manufacturer's data sheet for the exact altitude over sea level and maximum inlet air temperature at site of operation, as defined in article 'Site Conditions'. If the exact site conditions are not provided, use Standard Reference Conditions of 77 F (25 C) temperature and 500 ft (152 m) site altitude. Site-specific engine data shall include the following:
        1) Ratings at maximum inlet air temperature for 100%, 75%, and 50% loads: Power and efficiencies, genset fuel consumption, combustion air and fuel flow requirements, exhaust temperature and exhaust gas flow, maximum inlet and exhaust restrictions, emissions data, and thermal energy balance (heat rejection) data.
        2) Maximum temperature capability: Include a graph of engine power output v. inlet air temperature, starting at 77F (25C) and increasing until the maximum air temperature that the engine will withstand without shutdown.
        3) Include a table listing the percent gas contents for the fuel gas composition used in the site ratings data sheet. Include the following calculated fuel properties: Engine Manufacturer's Methane Number, Lower Heating Value (LHV), Higher Heating Value (HHV).
    b. Generator set sound level test data, including mechanical and exhaust noise.
    c. Generator Set Transient Performance Data:
        1) Transient Performance Class Data:
            a) Cold Engine: Submit the engine manufacturer's ISO 8528/5 transient performance classification for a cold engine subjected to load steps of 10, 20, and 30 percent of the standby rated load.
            b) Hot Engine: Submit the engine manufacturer's ISO 8528/5 transient performance classification for a hot engine subjected to load steps of 10, 20, 30, 40, and 50 percent of the standby rated load.
        2) Transient Load Acceptance Data:
            a) Cold Engine: Submit cold engine load acceptance data from the engine manufacturer for load step applications of 10, 20, 30, 40, 50, 75, and 100 percent of the engine's full rated load. All transient data definitions and tests shall be in accordance with ISO 8528/5.
                (a) Plus and minus frequency deviation percent.
                (b) Plus and minus voltage deviation percent.
                (c) Recovery time in seconds.
            b) Hot Engine: Submit hot engine load acceptance data from the engine manufacturer for load step applications of 10, 20, 30, 40, 50, 75, and 100 percent

of the engine's full rated load. All transient data definitions and tests shall be in accordance with ISO 8528/5.

(a) Plus and minus frequency deviation percent.
(b) Plus and minus voltage deviation percent.
(c) Recovery time in seconds.

3) Transient Load Removal Data:
   a) Submit transient data for a breaker open condition resulting on a sudden engine unloading from 100 percent to 0 percent of the standby rated load. Data shall include voltage plus and minus deviation percent, frequency plus and minus deviation percent and recovery time in seconds. All transient data definitions and tests shall be in accordance with ISO 8528/5.

B. Shop Drawings
   1. Include top, rear, front and side views with dimensions. Drawings shall indicate:
      a. Location and dimensions of customer mounting holes, lifting eyes, electrical stub-up areas, control panels, electrical boxes, air cleaners, emergency stop button, filters, drains, gages, and terminal strip connections.
      b. Location and dimension details of all inlet and outlet field connections for water, exhaust, fumes, air, and fuel. A separate drawing shall indicate connecting flange details.
      c. Separate drawing shall be provided for any shipped loose items such as fuel gas train, electrical control panels, and air cleaner structures.
   2. Include system interconnection schematic diagrams, showing all electrical components and required field connections.

C. Certificates
D. Delegated Design Submittals
E. Test and Evaluation Reports
F. Manufacturers' Instructions
G. Source Quality Control Submittals
H. Field [OR] Site Quality Control Submittals
I. Manufacturer Reports
J. Sustainable Design Submittals
K. Special Procedure Submittals
L. Qualification Statements

1.07 INFORMATIONAL SUBMITTALS

A. Certificates
   1. Standard Manufacturer Warranty Certificates
      a. Submit engine manufacturer's end-user warranty certificate. engine Warranty

B. Source Quality-Control Reports

C. Qualifications Statements:
   1. Manufacturer
   2. Manufacturer's authorized representative
   3. Installer

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Contract

B. Operations and Maintenance Data

C. Warranty Documentation: Submit final executed warranty document specific to the serial number of the engine, generator, and packaged generator set.

D. Software

1.09 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts

B. Extra Stock Materials

C. Tools

1.10 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals

B. Qualifications
   1. Manufacturer
   2. Manufacturer's authorized dealer
      a. Dealer must be located within one hour or 50 miles of site.
      b. Dealer shall provide 24/7 service and be on site within 4 hours.
      c. Dealer shall maintain parts in stock, and be able to provide 98% of parts within 48 hours.
   3. Fabricators
   4. Installers / Applicators / Erectors
   5. Testing Agencies
   6. Licensed Professionals

C. Certifications

D. Sustainability Standards Certifications

1.11 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements

B. Storage and Handling Requirements
   1. Products manufactured more than three months before delivery date to installation site shall have been stored and preserved according to the written engine manufacturer's guidelines

C. Packaging Waste Management

1.12 SITE CONDITIONS

A. Ambient Conditions:
   1. Site altitude
   2. Maximum inlet air temperature at site

B. Existing Conditions
   1. Natural gas analysis– composition of pipeline natural gas at site

1.13 MANUFACTURER WARRANTY

A. Special Warranty – 5 year, 2500 hour, no deductible for all non-wear and tear items. Warranty shall include supply and transportation of a rental generator and cabling of same nameplate rating if issue is not repaired and equipment is not fully operational within 48 hours from time of first customer call.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Caterpillar G3512 1,000 kW standby generator set with factory-installed radiator, EPA-Certified and UL2200-listed.

B. Substitution Limitations:
   1. Mechanical, electrical, structural and civil design based upon basis of design equipment. Other equipment must be submitted 10 days prior to bid for approval, and all additional costs of installation shall be paid by supplier.
   2. Required power shall be delivered by one (1) generator set operating independently. Substitution for a group of smaller generator sets operating in parallel is not permitted.

C. Product Options

2.02 GENERATOR SET DESCRIPTION

A. Nominal rating: 1,000 kWe at 0.8 p.f.

B. Frequency: 60 Hz.

C. Voltage and Generator Connection: 4160 V, Y-connection, 3-phase.

D. Emissions Certification: EPA NSPS Stationary Factory Certification.

E. UL Listing: UL 2200 Listed

F. NFPA 110:
   1. Generator set shall comply with all NFPA 110 requirements that apply specifically to the generator set (EPS), prime mover (engine), generator (main alternator), generator set controls, and generator set componentry.
   2. Generator set shall be compatible with a complete power systems (EPSS) that meets NFPA 110 Level 1 Type 10 requirements. Generator set shall be optimized for fast starting to facilitate the EPSS compliance with Type 60 requirement.

2.03 GENERATOR SET PERFORMANCE CHARACTERISTICS

A. Transient Performance Classification per ISO 8528/5:
   1. Hot Engine: Class G2 with a 40 percent load step, and class G1 with a 50 percent load step.
   2. Cold Start Engine: Class G2 with a 30 percent load step.

B. Block Load Acceptance:
   1. Testing of block load acceptance shall conform to ISO 8528/5
   2. Cold Engine: Generator set accepts the sudden application of 100 percent of the rated standby load in one step when the engine is cold.

C. Block Load Removal (Breaker Open Condition):
   1. Generator set shall accept the sudden removal of 100 percent of the rated standby load in one step, without the help of any external inputs or external devices. When 100 percent of the rated standby load is removed in one step, the engine shall not over speed and shall automatically switch to running unloaded at the rated synchronous speed.
   2. Frequency deviation percent when breaker opens shall not exceed 15%.

2.04 ENGINE

A. Manufacturer: Engine and packaged generator set shall be manufactured by the same manufacturer.

B. Engine Description:
   1. RPM: 1800

C. Air Inlet System
   1. Air Filters: One or more single-stage air filters, dry type, mounted on the engine, factory-supplied. Same brand as the engine manufacturer for compatibility with original design of the engine air inlet system. Filtration efficiency: Minimum 99.6%.
   2. Air Filter Service Indicators: One mechanical indicator of filter restriction for each air filter. The service indicator shall indicate airflow resistance even when the engine is not running.
   3. Electronic Measurement of Air Inlet Restriction: When the engine is running, the engine control module shall provide an electronic measurement of the differential pressure drop across the air inlet filter. Measured values shall be available for engine diagnostics to authorized engine service technicians via an engine service tool.
   4. Electronic Air Inlet Restriction Protection: The engine controls shall automatically generate a warning condition and/or shutdown the engine when the differential air filter restriction exceeds manufacturer's specifications. A LED light indication of the warning/shutdown on the annunciator or control panel shall be programmable.
   5. Air Filter Restriction Capability: The engine shall start and perform normally, without power derate from site rating, for air filter restrictions up to 2.5 kPa (10 inches of H2O).

D. Cooling System
   1. Description: Engine components shall be cooled down by two separate cooling circuits. A high temperature cooling circuit shall include engine jacket water, first stage aftercooler and lube oil cooler. A second cooling circuit shall be dedicated to cool down the turbo aftercooler second stage.
      a. Jacket water outlet temperature: 99 C.
      b. Aftercooler water temperature (1^{st} stage/2^{nd} stage): 99C / 54 C
   2. Cooling Pumps: Two engine-driven water pumps for jacket water circuit and separate circuit aftercooler.
   3. Thermostats: Two thermostats, one installed on jacket water circuit, and one on separate circuit aftercooler.
   4. Radiator: Packaged mounted, 47 sq. ft. , 0.52 drive ratio, Serpentine core, split system, engine-mounted fan.
      a. Installation: engine mounted, factory-installed
      b. Max dimensions: 90”W x 100”H
      c. Ambient temp capability at 985 ft above sea level: 113 °F
      d. Air flow restriction: 0.75” water column
      e. Max cooling and combustion air flow: 68,000 cfm

E. Exhaust System
   1. Dry interior exhaust manifold.
   2. Flange faced outlet on turbocharger.
   3. Temperature sensors for each exhaust port and for turbocharger outlet.
   4. High temperature alarms and shutdowns provided by engine control module.

F. Fuel System
   1. Sized for 800 to 1200 btu/cu ft dry pipeline natural gas
   2. Fuel Control Valve: Electronic, engine-installed.
   3. Throttle Plate: 24V DC actuator electronically controlled by Engine Control Module.
   4. Gas Fuel Train:
      a. Factory-standard package. Designed, sourced and shipped by genset manufacturer along with the genset. Designed for installation just upstream of engine fuel inlet.
      b. Shall be capable to handle gas supply pressures from 4.9 to 18.9 kPa (0.65 to 2.6 psi) at the gas train inlet. Maximum pressure drop across gas train at full rated flow, with a new filter: 1.03 kPa (0.15 psi). Inlet Connection Size: DN125.
      c. Minimum Gas Train Outlet Pressure: 0.5 psi.
      d. Gas train shall include the following components:
         1) Manual gas shutoff valve
         2) Electronic Gas Shutoff Valve: 24V DC, energized-to-run, double solenoid with visual position indicators.
         3) Fuel filter: 96 % efficiency at 1 micron particle size, shall include differential pressure gauges.
         4) Gas pressure regulator
         5) Connection to Engine Fuel Inlet: Flexible, braided hose.
         6) Outlet Connection: ASME/ANSI B16.5 Class 150, type (3-)
         7) Gas train pressure sensors, 4-20 mA, 0-100 kPag, installed in the gas train with ½" NPT conduit connectors.
            a) Two sensors installed to provide differential filter pressure.
            b) One sensor installed to provide post regulator engine fuel inlet pressure.

G. Governing System:
   1. Digital speed governor built into engine control module, speed input 4 to 20 ma (0V to 5V).
   2. Dual speed sensing system.
   3. Engine over speed protection.

H. Ignition System:
   1. Electronic ignition system controlled by engine control module.
   2. Electronic anti-knock protection: system able to adjust timing individually on each cylinder.

I. Lubrication System

1. Engine oil pump: Gear-type with three gears, mounted on engine, driven by engine front gear train. Screen on suction area to strain engine oil. Equipped with a pressure relief valve to limit the maximum pressure of the engine oil from the engine oil pump.
2. Engine oil cooler: Factory supplied, mounted on engine, installed on jacket water cooling circuit. Equipped with bypass protection valve that opens if oil cooler becomes restricted.
3. Engine oil filter: Filter elements shall be located inside a protective filter housing. A filter bypass valve located on the oil filter housing shall allow unrestricted flow of lubrication oil to the engine parts if the oil filter elements becomes plugged.
4. Piston cooling jets: Located in the engine block below each piston. Each piston cooling jet shall have two tubes. One tube shall deliver oil for cooling behind the ring band of the piston. The second tube shall direct oil to the center of the piston for lubricating the piston pin and cooling the piston undercrown. Sequence check valves shall prevent oil from reaching the piston cooling jets unless there is enough pressure in the main oil gallery.
5. Filler and dipstick.
6. Oil drain lines and valve.
7. Oil level regulator.
8. Electrical prelubrication pump, 115/230 VAC, 50/60 Hz.
9. Crankcase breather.
10. Positive crankcase ventilation system returns crankcase fumes to air intake and oil to sump, 208-230/460 AC, 60 Hz.
11. Crankcase explosion relief valve.

J. Starting & Charging System:
   1. Two electric starting motors, factory-mounted, 24V.
   2. Barring Device.
   3. Battery disconnect switch.
   4. Jacket water heater:
      a. Pump: 208/240 VAC, single phase, 10 GPM, 60 Hz, 97W.
      b. Heater element: 208 or 240 VAC, single phase, 9 kW.
   5. Charging system alternator 45 A, 24V.
   6. Batteries (set of four): 12V, 2800 CCA, 380 A-h. Type: Dry, low maintenance, high output. Environmental capability: -30 C to -12 C (-22 F to 10 F).
   7. Battery racks and cables.
   8. Battery charger:
      a. 24 VDC output for use with lead acid or NiCad batteries. Type: current limiting
      b. Type: 20 A, 4-rate charger with automatic switching from equalize to float.
         1) Includes high voltage, low voltage and AC failure alarm outputs, DC Ammeter and Voltmeter, NEMA 1 enclosure, 110 -120/208 -240 VAC, 50/60 Hz Input, regulated.
         2) Meets alarm requirements of NFPA 99 and NFPA 110. C-UL listed, CE marked, CSA compliant, IBC seismic certified.

2.05 GENERATOR AND PROTECTIVE DEVICES

A. Generator (Main Alternator)
   1. Random wound, series star connection (Y-Y), 0.8 p.f., Permanent Magnet Excitation, 3-phase brushless, 4-pole, salient pole design, 1800 rpm, 6-leads, 4 wires per lead, 2/3 pitch, NEMA standard hole pattern. Bearings: one.
      a. Voltage Regulation Performance:
         1) Voltage level adjustment: +/- 5.0%
         2) Voltage regulation, steady state: +/- 0.5%
         3) Voltage regulation with 3% speed change: +/- 0.5%
         4) Waveform deviation line-line, no load: less than 2.0%
         5) Telephone Influence Factor (TIF): less than 50.
      b. Insulation : Class H per NEMA MG1.
      c. Generator temperature rise over 40C ambient: 105C
      d. Overspeed capacity: 125% of synchronous speed.
   2. IEC Platinum Stator RTDs, temperature coefficient 0.00385.
   3. Generator rear bearing RTD.
   4. Winding and rear bearing temperature detector module.
   5. Anti-Condensation space heaters.
   6. Limiter and exciter diode monitor.
   7. Generator space heater

B. Digital Voltage Regulator:
   1. Reactive droop capability.
   2. 3-phase voltage sensing.
   3. KVAR and power factor modes.
   4. RFI suppression.
   5. Min/max exciter.

C. Neutral ground connection

2.06 CONTROLS AND MONITORING SYSTEMS
A. Electronic Controls Features
   1. Electronic air/fuel ratio control.
   2. Start/stop logic.
   3. Gas purge cycle to relieve gas trapped in pipes after engine shutdown.
   4. Staged shutdown cycle.
   5. Electronic timing adjustment to prevent cylinder knock.
   6. High exhaust temperature shutdown
   7. Electronic governor.
   8. Transient richening and turbo bypass control
   9. Electronic ignition

B. Generator Set Controller
   1. Rear mounted controller with customer interface, 24 -volt DC operation, environmental sealed front face, text alarm/event descriptions, kilowatt transducer output.
   2. Controls:
      a. Speed adjust
      b. Voltage adjust
      c. Auto/start/stop control
      d. Alarm acknowledge
      e. Emergency stop pushbutton
      f. Customer Warning/Shutdown Lamp test
      g. True RMS AC metering, 3-phase, + /-2% accuracy
      h. Remote monitoring and Control capability
   3. Warning/shutdown with common LED indication of shutdown with indicating lights for:
      a. Low oil pressure
      b. High/Low coolant temperature
      c. High engine oil temp
      d. Low, High and weak battery voltage
      e. Over speed
      f. Failure to start (Over crank)
      g. Emergency stop
      h. Loss of sensing
      i. Air filter restriction
      j. Impending shutdown
   4. Digital indication for:
      a. RPM
      b. DC volts
      c. Operating hours
      d. Oil pressure (psi, kPa or bar)
      e. Voltage (L-L & L-N)
      f. Frequency (Hz)
      g. Current (per phase & average)
      h. Two (2) dedicated digital inputs
      i. Twelve (12) Programmable digital inputs
      j. Two (2) dedicated digital outputs
      k. Sixteen (16) programmable digital outputs
   5. Environmental capability:
      a. Control module operating temperature: -40 C to 70 C
      b. Display operating temperature: - 20 C to 70 C
      c. Humidity: 100 % condensing 30 C to 60 C
      d. Storage temperature: -40 C to 85 C
      e. Vibration: Random profile, 24 -1000 Hz, 6.0 G rms
   6. Generator protections:

a. Generator phase sequence
b. Over/Under voltage
c. Over/ Under frequency
d. Reverse power(kW)
e. Reverse reactive power (kVar)
f. Over current
g. Current balance
h. Over/Loss of Excitation
i. Generator temperature detectors

2.07 GENERATOR SET BASE FRAME AND MOUNTING SYSTEM

A. Steel base rails to support engine, generator, and radiator mounting.
B. Flywheel SAE No.21, flywheel housing SAE No. 00, SAE standard rotation
C. Vibration isolators: Seismic, rated 1.5G.

2.08 SOURCE QUALITY CONTROL

A. Tests and Inspections
1. Factory test report for the same model and rating being offered.

PART 3 EXECUTION

3.01 FIELD [OR] SITE QUALITY CONTROL

A. Field [OR] Site Tests and Inspections
1. Manufacturers recommended startup and testing
2. NFPA 110 load test

3.02 SYSTEM STARTUP

A. 5 man days for startup and testing. Two man days for training.

3.03 CLOSEOUT ACTIVITIES

A. Submit operations and maintenance manuals, as-built diagrams and maintenance schedules as required in Part 1, Closeout Submittals.
B. Demonstration

END OF SECTION

SECTION 261326
MAIN STANDBY POWER DISTRIBUTION SWITCHGEAR (MSPD) – MEDIUM VOLTAGE

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install, where indicated on the drawings, a complete standby power generation and load management power distribution and control system.

B. The Emergency Power System consists of the following as applicable:
   1. Generator sets
   2. Generator Control Switchgear (with associated monitoring and distribution equipment)
   3. Automatic Transfer Switches
   4. Uninterruptible Power Supply Systems
   5. Load Banks
   6. Battery Systems

C. The Emergency Power System Supplier (EPSS) shall be an authorized service provider for all components of the Emergency Power System (EPS). In order to assure maximum equipment uptime and best service response to the owner, the Emergency Power System Supplier shall be an factory-authorized dealer with complete EPS parts and service available on a 24 hour emergency basis within a 50 mile radius of the project site.

D. The Generator Control Switchgear specified in this section shall be a medium voltage metal-clad construction. The Generator Control Switchgear shall be by the same manufacturer as the generator sets and furnished with the generator sets by the (EPSS) as a total system. The switchgear and circuit breakers utilized in the Generator Control Switchgear shall be products of the same manufacturer as the circuit breakers provided in the assemblies for the normal and emergency distribution as specified under other sections of the specifications.

1.02 RELATED SECTIONS

A. Section 263600 – Automatic Transfer Switches

B. Section 260913 – Power Monitoring and Control System

C. Section 263353– Uninterruptible Power Supply System

D. Section 263213 – Generators

E. Section 263323 - Battery Systems

F. Section 260572 – Short Circuit Study

G. Section 260573 –Coordination Study

H. Section 260574 – Arc Flash Study

1.03 REFERENCES

A. The metal-clad switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA SG-4 and SG-5, and but not limited to, ANSI/IEEE 37.20.2.

B. The Emergency Power System shall meet or exceed the applicable requirements for the following standards as required:
   1. UL
   2. IEEE
   3. ANSI
   4. NFPA 70
   5. NFPA 99
   6. NFPA 110
   7. CSA
   8. IEC

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:
   1. Master drawing index
   2. Front view elevation
   3. Floor plan
   4. Top view
   5. Single line diagram
   6. Controls One-Line diagram
   7. Nameplate schedule
   8. Component list
   9. Conduit entry/exit locations
   10. Assembly ratings including:
      a. Short-circuit rating
      b. Voltage
      c. Continuous current
      d. Basic impulse level for equipment over 600 volts
   11. Major component ratings including:
      a. Voltage
      b. Continuous current
      c. Interrupting ratings
   12. Breaker Schedule
      a. Cable terminal sizes
   13. Product data sheets
   14. Sequence of operation description

B. Where applicable the following additional information shall be submitted to the Engineer:
   1. Busway connection
   2. Connection details between close-coupled assemblies
   3. Composite front view and plan view of close-coupled assemblies
   4. Key interlock scheme drawing and sequence of operations

5. Mimic bus size and color.

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in paragraph 1.04, and shall incorporate all changes made during the manufacturing process.
   2. Wiring diagrams
   3. Certified production test reports
   4. Installation information including equipment anchorage provisions
   5. Seismic certification as specified

B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. Provide Seismic tested equipment as follows:
   1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the latest International Building Code (IBC).
   2. The Project Structural Engineer will provide site specific ground motion criteria for use by the manufacturer to establish SDS values required.
   3. The IP rating of the equipment shall be 1.5
   4. The Structural Engineer for the Site will evaluate the SDS values published on the Manufacturer’s website to ascertain that they are "equal to" or "greater than" those required for the Project Site.
   5. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.
      a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
      b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
      c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.07 REGULATORY REQUIREMENTS

1.08 DELIVERY, STORAGE AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

B. Each switchgear assembly shall be split into shipping groups for handling as determined during the shop drawing phase jointly with the installing contractor. Shipping groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids, and covered with tarps for protection from weather. Breakers and accessories shall be packaged and shipped separately.

C. Switchgear shall be equipped to be handled by crane. Where cranes are not available, switchgear shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.

D. Switchgear being stored prior to installation shall be stored so as to maintain the equipment in a clean and dry condition. If stored outdoors, indoor gear shall be covered and heated, and outdoor gear shall be heated.

1.09 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Caterpillar

B. Eaton Electrical Inc; Cutler-Hammer Business Unit

C. Siemens Energy & Automation, Inc.

D. Square D; a brand of Schneider Electric

E. General Electric Company; GE Consumer & Industrial – Electrical Distribution

F. ABB; Control Products

G. Rockwell Automation, Inc; Allen-Bradley Brand

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 RATINGS

A. The switchgear described in this specification shall be designed for operation on a 4.16 kV, three-phase, three wire, impedance grounded, 60-hertz utility system.

B. Each circuit breaker shall have the following ratings:

Maximum Voltage	· 4.76	kV
BIL Rated	· 60	kV Peak
Continuous Current (5 kV)	· 1200	Amperes
Short-Circuit Current at rated Maximum kV	· 25kA	RMS SYM
Rated Voltage Range Factor K	· 1	
Closing and Latching Capability	· 97kA	peak
Maximum symmetrical Interrupting and Three Second Rating	· 25kA	RMS SYM
Rated Interrupting Time	3 cycles	

2.03 CONSTRUCTION

A. The switchgear assembly shall consist of individual vertical sections housing various combinations of circuit breakers and auxiliaries, bolted to form a rigid metal-clad switchgear assembly. Metal side sheets shall provide grounded barriers between adjacent structures and solid removable metal barriers shall isolate the major primary sections of each circuit. [Two rear covers shall be furnished for each vertical section for circuit isolation and ease of handling.] [Hinged rear doors, complete with provisions for padlocking, shall be provided.]

B. The stationary primary contacts shall be silver-plated and recessed within insulating tubes. A steel shutter shall automatically cover the stationary primary disconnecting contacts when the breaker is in the disconnected position or out of the cell. Provide rails to allow withdrawal of each circuit breaker for inspection and maintenance without the use of a separate lifting device.

2.04 BUS

A. The main bus shall be copper and have fluidized bed epoxy flame-retardant and track-resistant insulation. The bus supports between units shall be flame-retardant, track-resistant, glass polyester. The switchgear shall be constructed so that all buses, bus supports and connections shall withstand stresses that would be produced by currents equal to the momentary ratings of the circuit breakers. Main bus shall be rated 1200 amperes. Insulated copper main bus shall be provided and have provisions for future extension. All bus joints shall be plated, bolted and insulated with easily installed boots. The bus shall be braced to withstand fault currents equal to the close and latch rating of the breakers. The temperature rise of the bus and connections shall be in accordance with ANSI standards and documented by design tests.

B. A copper ground bus shall extend the entire length of the switchgear.

2.05 WIRING/TERMINATIONS

A. The switchgear manufacturer shall provide suitable terminal blocks for secondary wire terminations and a minimum of 10% spare terminals shall be provided. One control circuit cutout device shall be provided in each circuit breaker housing. Switchgear secondary wire shall be #14 AWG, type SIS rated 600 volt, 90 degrees C, furnished with wire markers at each termination. Wires shall terminate on terminal blocks with marker strips numbered in agreement with detailed connection diagrams.

B. Incoming line and feeder cable lugs of the type and size indicated elsewhere shall be furnished.

C. Where individual conductors cross switchgear shipping splits they shall be fitted with plug-together connectors for reliable field assembly.

2.06 CIRCUIT BREAKERS

A. The circuit breakers shall be horizontal drawout type, capable of being rolled directly onto the floor. The breakers shall be operated by a motor-charged stored energy spring mechanism, charged normally by a universal electric motor and in an emergency by a manual handle. The primary disconnecting contacts shall be silver-plated copper.

B. Each circuit breaker shall contain three vacuum interrupters separately mounted in a self-contained, removable self-aligning pole unit. The vacuum interrupter pole unit shall be mounted on glass polyester supports. A contact wear gap indicator for each vacuum interrupter, which requires no tools to indicate available contact life, shall be easily visible when the breaker is removed from its compartment. The current transfer from the vacuum interrupter moving stem to the breaker main conductor shall be a non-sliding design. The breaker front panel shall be removable when the breaker is withdrawn for ease of inspection and maintenance.

C. The secondary contacts shall be silver-plated and shall automatically engage in the breaker operating position, which can be manually engaged in the breaker test position.

D. Interlocks shall be provided to prevent closing of a breaker between operating and test positions, to trip breakers upon insertion or removal from housing and to discharge stored energy mechanisms upon insertion or removal from the housing. The breaker shall be secured positively in the housing between and including the operating and test positions.

E. The breakers and protective relays shall be electrically operated by the following control voltages:

1. 125 volt DC charge/close/trip.
2. Each breaker shall be complete with control switch and red and green indicating lights to indicate breaker contact position.

F. DC control voltage shall be supplied with the Generator Control Switchgear including batteries, charger, and battery rack.

G. Each circuit breaker compartment shall be provided with an integral motorized racking device accessory, equal to Eaton VCP-W MR2, with the following features:

1. Allow moving the breaker between the connect and disconnect positions from a distance of up to 30 feet via a hand held pendant, with the breaker compartment door closed.
2. Breaker position shall be indicated on the pendant by three LED lights. A blinking light indicates that the circuit breaker is in the motion through the selected position. A solid (non-blinking) light indicates that the circuit breaker has reached and stopped in the selected position. In case normal operation fails, the appropriate error code is displayed on the pendant in a separate 2 character LED display window.
3. The system shall be designed such that it allows manual racking of the circuit breaker using the levering crank accessory. Manual racking operation shall disable the motorized racking accessory.
4. It shall be possible to enable/disable operation of the motorized racking accessory via Purchaser’s external interlocking/permissive contacts.
5. 120 V AC power for the motorized racking accessory shall be derived from a control power transformer mounted in the switchgear.

6. Provide a discrete I/O interface module mounted in each circuit breaker control compartment, daisy chained, for control of the motorized racking accessory via the HMI using a Modbus interface. Whenever the hand held pendant is in use, the pendant becomes the master and will override the Modbus interface.

2.07 AUXILIARY DEVICES

A. Ring type current transformers shall be furnished as indicated on the contract drawings. The thermal and mechanical ratings of the current transformers shall be coordinated with the circuit breakers. Their accuracy rating shall be equal to or higher than ANSI standard requirements. The standard location for the current transformers on the bus side and line side of the breaker units shall be front accessible to permit adding or changing current transformers without removing high-voltage insulation connections. Shorting terminal blocks shall be furnished on the secondary of all the current transformers.

B. Voltage and control power transformers of the quantity and ratings indicated in the detail specification shall be supplied. Voltage transformers shall be mounted in drawout drawers contained in an enclosed auxiliary compartment. Control power transformers up to 15 kVA, single-phase shall be mounted in drawout drawers. Rails shall be provided as applicable for each drawer to permit easy inspection, testing and fuse replacement. Shutters shall isolate primary bus stabs when drawers are withdrawn.

C. A mechanical interlock shall be provided to require the secondary breaker to be open before the CPT drawer or CPT primary fuse drawer can be withdrawn.

D. Provide surge protection as shown on the drawings.

2.08 ENCLOSURES

A. The switchgear described in these specifications shall be indoor construction, with devices arranged as shown on contract drawings.

B. Each vertical section of switchgear shall be provided with space heaters. Tubular type heaters operated at half voltage for long life shall be supplied. 500-volt or 250-volt rated heaters shall be used at 240 or 120 volts, respectively. Power for space heaters shall be furnished from a control power transformer mounted in the switchgear.

C. Heaters shall be wired to provide temporary heating during storage.

2.09 NAMEPLATES

A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background. Characters shall be 3/16-inch high, minimum.

B. Furnish master nameplate giving switchgear designation, voltage ampere rating, short-circuit rating, and manufacturer’s name.

C. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer’s wiring diagrams.

2.10 FINISH

A. The finish shall consist of a coat of gray (ANSI-61), thermosetting, polyester powder paint applied electrostatically to pre-cleaned and phosphatized steel and aluminum for internal

and external parts. The coating shall have corrosion resistance of 600 hours to 5% salt spray.

2.11 ACCESSORIES

A. The switchgear manufacturer shall furnish accessories for test, inspection, maintenance, and operation, including:

1. One – Maintenance tool for manually charging the breaker closing spring and manually opening the shutter
2. One – Levering crank for moving the breaker between test and connected positions
3. One – Test jumper for electrically operating the breaker while out of its compartment
4. One – Breaker lifting yoke used for attachment to breaker for lifting breaker on or off compartment rails, when applicable
5. One – Set of rail extensions and rail clamps, when applicable
6. One – Portable lifting device for lifting the breaker on or off the rails
7. One – Ramp for rolling breaker mounted in lower compartment directly onto the floor
8. One – Test cabinet for testing electrically operated breakers outside housing
9. One – “Dockable” transport dolly for moving breaker about outside its compartment
10. One – Manual Ground and Test device, 1200/2000 A
11. One – Electrical Ground and Test device with upper terminals, 1200/2000 A
12. One – Electrical Ground and Test device with lower terminals, 1200/2000 A

2.12 CORONA FREE DESIGN

A. The switchgear shall be corona free by design and shall be tested for partial discharges in accordance with EEMAC standard G11-1. The corona discharges measured during the tests shall be less than 100 picocoulombs.

2.13 PARTIAL DISCHARGE SENSING EQUIPMENT

A. The switchgear shall be equipped with factory installed partial discharge sensors and relay for continuous monitoring of the partial discharges under normal operation. The purpose of partial discharge sensing is to identify potential insulation problems (insulation degradation) by trending of PD data over time so that corrective actions can be planned and implemented before permanent insulation deterioration develops.

B. The PD sensing and monitoring system shall consist of sensors and relay specifically developed for such applications, such as Eaton’s RFCT sensor and InsulGard relay, or equivalent. One RFCT sensor shall be installed over floating stress shields of specially designed bus or line side primary bushings, at every two vertical section for detection of partial discharges within the switchgear compartments. An RFCT sensor shall also be provided for installation around ground shields of the incoming or outgoing power cable termination for detection of PD activity in the cables up to 100 feet from the switchgear. Output signals from each RFCT shall be factory wired to PD monitoring relay for continuous monitoring.

2.14 EMERGENCY POWER SYSTEM (EPS) AUTOMATION & CONTROLS

A. The automation and control system shall facilitate overall EPS operation including automatic standby operation, monitoring and control of the generator sets including start/stop, alarm/fault monitoring, synchronizing, generator kW load sharing, generator kVAR load sharing, generator loading/unloading, load shed/add, generator demand priority, power factor control when in Utility paralleling operation, and protective relaying.

B. The EPS automation and controls shall utilize true redundant, distributed processing technology to maximize system reliability and fault tolerance. The distributed processing system shall include a separate controller for each power source, and a separate processor dedicated to each touchscreen Human/Machine Interface (HMI) operation.

C. The EPS automation and controls shall be by the same manufacturer as the switchgear and generator sets. It shall be furnished with the generator sets by the Emergency Power System Supplier as a total coordinated and integrated system.

2.15 HMI – HUMAN/MACHINE INTERFACE

A. EPS system interface shall be via a touchscreen with the following characteristics:
   1. Color, 19 inch (diagonal) TFT LCD industrial display capable of displaying both text and graphics.
   2. The touch screen shall be pure glass, with light transmission of 95% or better, furnished with a Surface Acoustic Wave touch interface.
   3. The display shall support a minimum resolution of 1280 x 1024 pixels and 16 million displayable colors.
   4. The EPS touch screen processor shall contain no moving parts.

2.16 HMI SCREEN LISTING

A. The EPS automation shall provide the following screens. The screens shall provide all of the information, metering, control, annunciations, settings and indications listed below:
   1. Main Menu Screen with a complete listing of major screens.
   2. System Overview Screen with animated graphic display of the electrical one line.
   3. System Control, Metering, and Setting Screens
   4. Generator Control, Metering, and Setting Screens
   5. Tie Control, Metering, and Setting Screens
   6. Generator demand priority control and status screen
   7. Load shed control and status screen
   8. Engine monitoring screens for each generator that shall contain a graphical representation of all of the engine gauges and data specified
   9. Alarm and Event Annunciation screen that shall be time/date stamped
   10. Report Menu Screen
      a. System settings report
      b. Generator settings report
      c. Plant test report
   11. Password entry screen that shall contain a numeric keypad for password entry
   12. System and Generator real time trending screens
   13. Historical trending package.

14. Downloadable alarm log to local media
15. NFPA compliant JCAHO report
16. Remote Notification - The system shall be capable of providing several types of remote notification. Notification shall be triggered by user specified events and/or alarms

2.17 UNIT DISPLAY

A. A unit display shall be furnished for each generator set shall be mounted on the door of the switchgear section containing the associated generator set controls. The unit display shall have as a minimum a 12” TFT LCD display, and shall be capable of monitoring and controlling its associated generator set.

2.18 REMOTE POWER MONITORING SYSTEM

A. A PC based remote power monitoring and control system shall be provided to monitor breaker status, alarms, metering and other operating parameters. All control functions, displays metering and other information described in these specifications shall be available to the operator of the Remote System.

B. The remote system shall be designed such that its operation shall not in any way impede the selected automatic operation of the system control. Any failure of the remote system shall have no impact to the automatic operation of the system control.

C. The remote system shall provide the identical screens and resolution at the remote screen as seen at the Switchgear HMI as noted above.

D. The remote system shall communicate with the system control via high speed network.

E. A PC desktop workstation shall be provided.

2.19 DATA TABLE INTERFACE (DTI)

A. The system shall allow interface from the user’s building management system.

B. The DTI shall be designed such that the building management system or external user interface shall in no way compromise the integrity or interfere with the critical operations of the EPS control system. Interface to the user’s building management system shall be via Ethernet communications, utilizing Modbus/TCP Protocol.

2.20 EMERGENCY POWER SYSTEM (EPS) FEATURES

A. The EPS automation and controls shall consist of the hardware and software required for the control of the engine-generator plant and associated utilities, tie, and distribution circuit breakers. The system shall include all automation controllers, HMI (Human / Machine Interface) touchscreens, power transducers, supervisory networks and all ancillary control equipment necessary to automatically execute the specified functional sequence of operations.

B. The EPS automation and controls shall be provided with an HMI consisting of a touchscreen display.

1. The HMI shall provide all metering, status, monitoring, and control information to the operator.
2. The HMI shall serve only as an operator interface. The EPS must continue to function normally with a complete HMI failure.

C. The EPS automation and controls shall be designed to eliminate single points of failure.
   1. For redundancy, multiple automation controllers shall be utilized.
   2. At a minimum, the EPS Controls shall utilize a separate controller for each power source.
   3. Control systems utilizing a single automation controller are not acceptable.

D. The EPS automation and controls shall be capable of surviving a fault of one or more of its automation controllers. The failure of any generator controller shall only cause loss of automatic operation of a single generator.

E. Operator/System Safety Provisions
   1. Circuit Breaker Control Switch (CBCS) - A separate circuit breaker control switch (CBCS) shall be provided for each source and tie circuit breaker controlled by EPS automation. CBCS functionality shall be manual and separate from EPS automation. Each CBCS will include a “Pull to Lock” function in the trip position. A CBCS locked in the trip position shall override all EPS automation functionality.
   2. A separate hardware synchronization check relay (ANSI Device 25) shall be furnished in addition to the sync check functions provided by the EPS system for each paralleling circuit breaker.

F. Master Control Functions
   1. Master control functions shall include:
      a. Automatic start of the generator plant
      b. First-up, dead-bus functions
      c. Generator demand priority
      d. Load Shed / Add
   2. Master I/O shall include horn, horn silence, instant auto selector, load shed on/off, and load shed relays

G. Generator Set Control Functions
   1. For safety and availability, all generator set control functions shall be executed autonomously from each generator set controller.
   2. No master control coordination or intervention shall be required to affect the generator set control functions.
   3. Generator set control functions shall include:
      a. Operation of generator set circuit breaker
      b. Generator set run command
      c. Generator set protective and annunciator functions
      d. Active synchronization
      e. Synchronization check function (ANSI Device 25)
      f. Load and VAR sharing calculations
      g. Generator set load control
      h. Generator set VAR control
      i. Generator set metering functions

H. Distribution Control Functions
   1. Distribution control functions shall be monitored and controlled via the supervisory network.

2. Distribution circuit breaker I/O shall include:
   a. Circuit breaker auxiliary contact monitoring
   b. Circuit breaker bell alarm contact monitoring
   c. Close circuit breaker output
   d. Open circuit breaker output

I. Supervisory Network
1. The supervisory network shall consist of a non-proprietary topology and utilize open source protocols.
2. Supervisory network topology shall be EMI and RFI noise tolerant.
3. All critical plant control data communication shall be Ethernet Modbus TCP/IP.
4. The supervisory network shall be a fully dedicated network, providing high speed communication for the following:
   a. Communications of control data between distributed controllers
   b. Distribution of master control data
   c. Communications to and from the system HMI(s)
   d. Communications to and from the customer building management / Data Table Interface (DTI).
   e. Communication to and from 3rd party balance of plant PLCs (as specified)

J. EPS automation control power system shall be protected against single point of failure by the utilization of a 24Vdc, best source DC system strategy. The control power system shall include the following features:
1. The best source DC bus shall accept 24vdc power, through an isolation diode and circuit breaker, from each generator set battery.
2. An additional station battery and battery charger shall be provided to maintain system control power in the event that all generator set batteries and their associated chargers should fail.
3. All EPS automation and controls shall be powered directly from this best source DC bus.
4. For protective redundancy, all utility grade protective relays shall be powered from the 125vdc circuit breaker control bus.

K. The EPS automation and controls shall be provided with an “Instant Auto” Selector Switch that will shift the EPS to the fully automatic mode.

L. Each generator, utility, and paralleling tie circuit breaker controller shall be furnished with integral power sensing capabilities. Controller inputs shall include 3 phase voltage on both source and bus sides of the associated circuit breaker and 3 phase current inputs.

M. The EPS automation shall log all events and alarms with device, condition, and time/date stamp.

N. Full manual backup control shall be provided for generator set voltage and frequency.

2.21 EPS AUTOMATION & CONTROLS ENVIRONMENTAL SPECIFICATIONS

A. The EPS automation and control system components shall meet or exceed the following environmental requirements:
1. Control Power: 16 to 40 Vdc continuous (24 Vdc nominal)
2. Operating Temperature: 0 to 50° C

3. Humidity: 5 to 95% non-condensing

2.22 EPS METERING

A. All metering functions shall be 1% accuracy or better.
   1. The following metering shall be provided for the system bus, each individual utility, tie, and generator:
      a. Volts with 4-position selector switch to select three phases of voltage
      b. Amps with 4-position selector switch
      c. Kilowatts
      d. Kilovars
      e. Frequency
      f. Power Factor
      g. Synchroscope

B. All engine parameter data available on the generator set shall be accessible on the HMI.

2.23 PROTECTIVE RELAYS

A. The switchgear manufacturer shall furnish and install the quantity, type and rating of protection relays as indicated on the drawings and described hereafter in this specification.

B. Protective Relaying shall be microprocessor, high reliability, as specified below.

C. Generator Protective Relaying
   1. As a minimum, the following protective functions shall be provided for each Generator:
      a. Instantaneous/Time Overcurrent (50/51)
      b. Under/Over Voltage (27/59)
      c. Over/Under Frequency (81 O/U)
      d. Reverse Power (32)
      e. Loss of Field (Reverse VAR, 40)
      f. Microprocessor Engine Governor Load Sharing and Soft Loading Control (65).
      g. Differential Phase Fault (87G)
      h. Automatic Synchronizer (15/25)
      i. Sync Check Relay (25).
      j. Var/Power Factor Controller (90 PF).
   2. The utility grade, multi-function protective relay shall be an ABB REG615 relay.
   3. Lock-out (86) Relay (Utility Grade), manual reset.
   4. Provide a Neutral Grounding Resistor for the protection of Generator windings. This Neutral Grounding Resistor shall have the following features:
      a. Rated at 200 amps for 10 seconds.
      b. Ground Overcurrent trip protection (51G).

D. Tie Protective Relaying
   1. As a minimum, the following protective function shall be provided for each Tie Circuit Breaker:
      a. Instantaneous/Time Overcurrent (50/51)
      b. Sync Check Relay (25).

2. The utility grade, multi-function protective relay shall be a ABB REF615 Relay
3. Lock-out (86) Relay (Utility Grade), manual reset.

E. Distribution Protective Relaying
1. As a minimum, the following protective function shall be provided for each Distribution Circuit Breaker:
a. Instantaneous/Time Overcurrent
2. The utility grade, multi-function protective relay shall be an ABB REF615 Relay
3. Lock-out (86) Relay (Utility Grade), manual reset.

F. All utility grade protective relays shall be draw-out construction or test switches shall be utilized to allow for testing.

2.24 EPS ANNUNCIATION SYSTEM

A. The EPS shall be provided with local annunciation to monitor and display critical generator set, utility, and system status, fault, and shutdown information.

B. Annunciation shall comply with NFPA 110 requirements.

C. The annunciation system shall be equipped with a fast pulse horn (rated 80-95 dbA at two feet), a horn silence push-button and an acknowledge push-button. Any generator pre-alarm, generator shutdown alarm, or EPS alarm shall cause the alarm horn to sound until the horn silence button is depressed. Any subsequent alarms shall re-sound the horn. The display shall operate such that any alarm point shall “flash” until acknowledged.

D. The annunciation system shall be provided with five (5) distinct types of annunciation points:
1. Status Points – These annunciation points shall show the status of critical system or generator set components. Status annunciation points shall not sound the annunciation system horn. They shall not require acknowledgement.
2. Generator Set Pre-Alarm Points – These annunciation points shall show fault conditions that could jeopardize the ability of the EPS to function properly without immediate attention. Generator set pre-alarm annunciation points shall sound the annunciation system horn. They shall require acknowledgement. Generator set pre-alarm annunciation points shall reset automatically as the alarm condition is cleared.
3. Generator Set Shutdown Alarm Points - These annunciation points shall show fault conditions that have caused the shutdown of one (1) or more generator sets. Generator set shutdown annunciation points shall sound the annunciation system horn. They shall require acknowledgement. Generator set shutdown annunciation points shall cause the generator set to shutdown and the generator main to trip open. The generator main is then locked out until the cause of the shutdown is corrected, the engine control switch is placed in Off/Reset, and then placed back in Auto or Manual position.
4. Utility Alarm Points – These annunciation points will indicate utility related fault conditions. Utility annunciation points shall sound the annunciation system horn. They shall require acknowledgement.
5. EPS Alarm Points – These annunciation points will indicate system wide fault conditions. EPS annunciation points shall sound the annunciation system horn. They shall require acknowledgement.

2.25 EPS SECURITY

A. EPS setting changes and adjustments shall be password protected.

B. A minimum of two (2) password protected security levels shall be provided.

2.26 FUNCTIONAL SEQUENCES OF OPERATION

A. The EPS Automation shall be provided with the following modes of operation:
   1. Automatic/Standby Mode
      a. The automatic transfer switches are in the normal position serving utility power to the loads.
      b. The generator set main breakers are open.
      c. The automation is standing by to act in response to a run request from associated automatic transfer switches.
   2. No Load Test Mode
      a. Entrance into No Load Test Mode
         1. The no load test switch is placed in the “on” position.
         2. All available generators are started.
         3. The first generator up to voltage and frequency is closed to the bus.
         4. The remaining generators are synchronized and paralleled to the bus as they come up to voltage and frequency.
         5. The system is now in No Load Test Mode.
      b. Exit from No Load Test Mode
         1. The no load test switch is placed in the “off” position.
         2. All generator breakers are opened.
         3. The generators are allowed to run for their programmed cool down period and shut down.
         4. The system is returned to automatic/standby mode.
   3. Utility Fail Test Mode
      a. Entrance into Utility Fail Test Mode
         1. The utility fail test switch is placed in the “on” position.
         2. A contact output signals each automatic transfer switch to enter utility failure test mode.
         3. The system enters into emergency mode as described in the “Emergency Mode” sequence above.
      b. Exit from Utility Fail Test Mode
         1. The utility fail test switch is placed in the “off” position.
         2. A contact output signals each automatic transfer switch to exit utility failure test mode.
         3. The system exits into emergency mode as described in the “Exit from Emergency Mode” sequence above.

B. The EPS automation shall support two (2) sub-modes: Load Shed/Load Add, and Generator Demand Priority.
   1. Load Shed
      a. Conditional Load Shed: Upon entrance into emergency mode of operation, the load shed control shall open all sheddable circuit breakers. As generator sets come to the bus, essential priority level loads shall be added conditionally based on the

number of generator sets on line. When the first generator set comes to the bus, priority level 1 loads shall be added; second generator set, priority 2, etc. After a time delay that allows all operational generator sets to come to the bus, the system shall shift to load sensitive mode.

b. Load Sensitive Load Shed: The system shall compare generator on-line capacity (in kW) to system load. If surplus generator capacity exists, load shed priority level(s) are added. If system load exceeds generator on-line capacity, load shed priority level(s) are shed. The load shed control, in its automatic shedding and adding of loads, shall not override any manual load shed/add operation.

c. Bus Underfrequency: Should the load bus frequency fall below the bus underfrequency setpoint, all priority level loads shall be shed. Load addition shall not resume until manually reset. The bus underfrequency protection shall override any manual load add operation.

2. Generator Demand Priority Control

a. Upon entrance into emergency mode, all generator sets shall be started and paralleled to the bus. After a load stabilization delay, generator sets are automatically added to or removed from the bus according to system load demand.

b. Generator Demand Priority Control shall have two modes of operation

1. Engine Hour base Generator Demand – Engines are automatically reassigned priority levels each time the generators are started in order to maintain them within a user settable amount of hours.
2. Operator manual selection of Generator Demand – An operator can disable Engine House based Generator Demand and manually set the priority level for each generator.

2.27 FUNCTIONAL SEQUENCE OF OPERATIONS

A. The EPS automation shall be provided with the following modes of operation:

1. Automatic/Standby Mode

a. The utility main breaker is closed serving utility power to the load bus.

b. The generator set main breakers are open.

c. The automation is standing by to act in response to a utility failure.

2. Emergency Mode

a. Utility Failure

1. Utility protective relaying senses utility voltage or frequency out of tolerance.
2. The utility main breaker is opened.
3. The automatic transfer switch(es) transfer power to the standby power source
4. Load shed sequence is executed.
5. A run request is sent to the generator plant.
6. The first generator set up to voltage and frequency is closed to the bus.
7. The remaining generator(s) set is closed to the bus as it comes up to voltage and frequency.
8. The remaining generator sets are synchronized and paralleled to the bus as they come up to voltage and frequency.
9. The generator bus tie breaker is closed.
10. The system is now in emergency mode.

b. Utility Restoration and Exit from Emergency Mode

1. Utility protective relaying senses utility voltage and frequency within tolerance.
2. Following an adjustable time delay to assure that the utility power source is stable, the automatic transfer switch(es) are toggled to transfer load to the utility power source.
3. As each automatic transfer switch transfers back to utility power, it removes a run request from the generator plant.
4. When the last automatic transfer switch has retransferred to the utility and all run requests have been removed from the generator plant, all generator set main circuit breakers shall be opened.
5. The generator sets are allowed to run for their programmed cool down period and shut down.
6. The system is returned to automatic/standby mode.

3. Transfer to Demand Response Mode
   a. Entry
      1. The demand response pushbutton on the HMI is placed in the “ON” position.
      2. A run request is sent to the generator plant in accordance with the user settable generator priority selector.
      3. The first generator set up to voltage and frequency is closed to the bus.
      4. The remaining generator(s) set is closed to the bus as it comes up to voltage and frequency.
      5. The generator bus tie breaker is closed.
      6. A dry contact is sent to the ATS, which triggers a closed transition from the utility source to the generator(s).
      7. The utility breakers are opened.
      8. The system is now running in emergency mode.
   b. Exit from Demand Response Mode
      1. The demand response pushbutton on the HMI is placed in the “OFF” position.
      2. A dry contact is removed from the ATS, which triggers a closed transition from the generator(s) to the utility source.
      3. All generator breakers are opened
      4. The generators are allowed to run for their programmed cool down period and shut down.
      5. The system is returned to the automatic/standby mode.
4. No Load Test Mode
   a. Entrance into No Load Test Mode
      1. No load test is initiated by the operator.
      2. All available generator sets are started and come up to voltage and frequency.
      3. The generator sets are synchronized and paralleled to the bus at no load.
      4. The system is now in no load test mode.
   b. Exit from No Load Test Mode
      1. No load test is terminated by the operator.
      2. The generator main breakers are opened.
      3. The generator sets are allowed to run for their programmed cool down period and shut down.
      4. The system is returned to the Automatic/Standby mode.

5. Utility Fail Test Mode
   a. Entrance into Utility Fail Test Mode
      1. Utility fail test is initiated by the operator.
      2. Voltage sensing at the utility protective relay is opened, which simulates a loss of utility.
      3. The system enters into emergency mode as described in the emergency mode sequence above.
   b. Exit from Utility Fail Test Mode
      1. Utility fail test is terminated by the operator.
      2. Voltage sensing at the utility protective relay is restored, which simulates the return of utility power.
      3. The system exits from emergency mode as described in the emergency mode sequence above.

B. The EPS automation shall support two (2) sub-modes: Load Shed/Load Add, and Generator Demand Priority.
   1. Load Shed
      a. Conditional Load Shed: Upon entrance into emergency mode of operation, the load shed control shall open all sheddable circuit breakers. As generator sets come to the bus, essential priority level loads shall be added conditionally based on the number of generator sets on line. When the first generator set comes to the bus, priority level 1 loads shall be added; second generator set, priority 2, etc. After a time delay that allows all operational generator sets to come to the bus, the system shall shift to load sensitive mode.
      b. Load Sensitive Load Shed: The system shall compare generator on-line capacity (in kW) to system load. If surplus generator capacity exists, load shed priority level(s) are added. If system load exceeds generator on-line capacity, load shed priority level(s) are shed. The load shed control, in its automatic shedding and adding of loads, shall not override any manual load shed/add operation.
      c. Bus Underfrequency: Should the load bus frequency fall below the bus underfrequency setpoint, all priority level loads shall be shed. Load addition shall not resume until manually reset. The bus underfrequency protection shall override any manual load add operation.
   2. Generator Demand Priority Control
      a. Upon entrance into emergency or load management modes, all generator sets shall be started and paralleled to the bus. After a load stabilization delay, generator sets are automatically added to or removed from the bus according to system load demand.
      b. Generator Demand Priority Control shall have two modes of operation
         1. Engine Hour base Generator Demand – Engines are automatically reassigned priority levels each time the generators are started in order to maintain them within a user settable amount of hours.
         2. Operator manual selection of Generator Demand – An operator can disable Engine House based Generator Demand and manually set the priority level for each generator.

2.28 SPARE PARTS

A. The EPS Supplier shall have factory trained technicians that maintain a stock of spare parts and programming tools.

B. Provide a complete listing of available spares parts with O&M Documents.

C. At a minimum, provide the following components as included in the Emergency Power System:
   1. PLC's (1 of each type)
   2. PLC I/O (1 of each type)
   3. Control relays (5 of each type and size)
   4. Control fuses (5 of each type and size)
   5. HMI touchscreen (1 of each type)
   6. HMI touch screen processor (1 of each type)
   7. Ethernet switch (1 of each type)

PART 3 EXECUTION

3.01 FACTORY TESTING

A. The switchgear shall be completely and functionally tested in the manufacturer's facility prior to shipment. For systems shipped in multiple sections, the switchgear shall be quality tested utilizing the plug-together wiring system which shall be unplugged prior to shipment and plugged together again when the equipment is installed in order to maintain the integrity of the manufacturer's quality assurance testing.

B. The following standard factory tests shall be performed on the circuit breaker element provided under this section. All tests shall be in accordance with the latest version of ANSI standards.
   1. Alignment test with master cell to verify all interfaces and interchangeability
   2. Circuit breakers operated over the range of minimum to maximum control voltage
   3. Factory setting of contact gap
   4. One-minute dielectric test per ANSI standards
   5. Final inspections and quality checks

C. The following production test shall be performed on each breaker housing:
   1. Alignment test with master breaker to verify interfaces
   2. One-minute dielectric test per ANSI standards on primary and secondary circuits
   3. Operation of wiring, relays and other devices verified by an operational sequence test
   4. Final inspection and quality check.

D. A certified test report of all standard production tests shall be shipped with each assembly.

E. The owner's representative(s) shall attend factory witness testing:
   1. The manufacturer shall provide a test plan to at least four (2) weeks prior to scheduled witness testing.
   2. The manufacturer shall notify the owner two (2) weeks prior to the date the tests are to be performed.

3.02 INSTALLATION (BY CONTRACTOR)

A. Store equipment in a clean, dry place as per manufacturer's instructions. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

B. The Contractors shall install all equipment per the manufacturer's instructions, contract drawings and National Electrical Code.

C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations. This shall include but not limited to:

1. Checking to ensure that the pad location is level to within 0.125 inches per three foot of distance in any direction.
2. Checking to ensure that all bus bars are torqued to the manufacturer's recommendations.
3. Assembling all shipping sections, removing all shipping braces and connecting all shipping split mechanical and electrical connections.
4. Securing assemblies to foundation or floor channels.
5. Measuring and recording Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (four wire systems only).
6. Inspecting and installing all circuit breakers in their proper compartments.

D. The protective devices shall be set in the field by the Contractor in accordance with settings designated in a coordination study of the system as required elsewhere in the contract documents.

3.03 FIELD QUALITY CONTROL AND STARTUP

A. Provide the services of a qualified factory-trained manufacturer's representative for start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction to the contractor in general installation of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

B. The manufacturer's representative shall provide inspection of the final installation, perform functional testing, and start-up the EPS.

C. Functional Testing shall include testing of the following as a minimum:

1. Pre-startup inspection of the generator, dc system, control wiring, power cables, and switchboard/switchgear.
2. Crank and run engine/generators at the local engine control panel.
3. Crank and run engine/generators from the HMI touchscreen.
4. Verify engine/generator alarms and shutdowns to HMI.
5. Verify protective relay/breaker trip units are set to coordination study if applicable.
6. Test all modes of operation.
7. Verify and test all system alarms to HMI.
8. Test with EPS with Load.

3.04 TRAINING

A. The manufacturer’s representative shall provide an eight (8) hour "hands-on" training course for the customer's operating personnel which shall cover the following topics:
   1. Overall system description and theory of operation.
   2. Automatic operation.
   3. Manual operation.
   4. Safeties and protective relaying.
   5. Recommended system check lists and log sheets.
   6. Recommended preventive maintenance.
   7. Instruction on the operation of the assembly, circuit breakers, and major components within the assembly.

SECTION 263625

Medium Voltage AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SCOPE

A. Provide 5 kV Bypass/Isolation automatic transfer switches; three (3) poles, 1200 amperage. Each automatic transfer shall consist of Medium voltage 5 KV freestanding metal-clad switchgear with vacuum circuit breakers and a microprocessor controller to provide automatic operation. All transfer switches and controllers shall be the products of the same manufacturer.

1.2 RELATED SECTIONS

A. Section 260913 – Power Monitoring and Control System

C. Section 263353– Uninterruptible Power Supply System

D. Section 263213 – Generators

E. Section 263323 - Battery Systems

F. Section 260572 – Short Circuit Study

G. Section 260573 –Coordination Study

H. Section 260574 – Arc Flash Study

1.3 CODES AND STANDARDS

The automatic transfer switches and controls shall conform to the requirements of:

A. UL 1008A – Standard for Medium Voltage Transfer Switches, 1st Edition, for transfer switches rated greater than 750 volts up to 46 kV.

B. ANSI/IEEE C37.20.2 – Standard for Metal-Clad Switchgear.

C. ANSI/IEEE C37.04 – Standard Rating Structure for AC High-Voltage Circuit Breakers.

D. ANSI/IEEE C37.06 – Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical

Current Basis – Preferred Ratings and Related Required Capabilities for Voltages Above 1000V.

E. ANSI/IEEE C37.11 – Standard Requirements for electrical control for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis or a total current basis.

F. ANSI/IEEE C37.09 – Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

G. ANSI Z55.1 – Gray Finishes for Industrial Apparatus and Equipment.

H. ANSI/IEEE C57.13 – Standard Requirements for Instrument Transformers.

I. NEMA SG4 – Alternating Current High Voltage Circuit Breakers.

J. NEMA SG5 – Power Switchgear Assemblies.

1.4 ACCEPTABLE MANUFACTURERS

A. ABB/Zenith

B. Schneider Electric/ASCO

C. Russelectric

D. The metal-clad switchgear and circuit breaker shall be manufactured by Square D, Siemens, Eaton, ABB, or an approved equal.

1.5 WARRANTY

Manufacturer shall be warranted to be free of defects in material and workmanship for a period of eighteen (18) months.

1.6 EXTRA MATERIALS/ACCESSORIES

A. Submit one (1) racking handle per Medium Voltage ATS line-up. Charging handle to be furnished on each breaker mechanism.

B. Provide one (1) circuit breaker lifting device.

PART 2 - PRODUCTS

2.1 METAL-CLAD SWITCHGEAR ASSEMBLY

A. The metal-clad switchgear shall consist of a Type 1 Indoor enclosure containing circuit breakers and the necessary accessory components all factory assembled. The assembly shall be a self-supporting and floor mounted on a level concrete pad. The integrated switchgear assembly shall withstand the effects of closing, carrying and interrupting currents up to the assigned maximum short circuit rating.

B. System Voltage: 4.16 kV nominal, three-phase solidly grounded 60 Hz.

C. Maximum Design Voltage: 4.76 kV.

D. Impulse Withstand (Basic Impulse Level): 60 kV.

E. Power Frequency Withstand: 19 kV, 1 minute test.

F. Main Bus Ampacity: 1200 amps, continuous.

G. Momentary Current Ratings: Equal to the circuit breaker close and latch rating, 40 kAIC @ 5 kV.

2.2 COMPONENTS

A. Stationary Structure

1. The switchgear shall comprise a minimum of two (2) sections. Section #1 compartment with two (2) 1200A breakers and Section #2 auxiliary compartment with controls for Normal and Emergency sources to form a rigid self-supporting completely enclosed structures providing steel barriers between sections.

2. The frame should consist of hem bent galvanized steel to increase durability and reduce arc-propagation by introduction of an air gap between frames. Hem bends shall also be used to eliminate sharp edges which may cause damage to personnel or wiring.

B. Circuit Breaker Compartment

1. Each circuit breaker compartment shall be designed to house a horizontal drawout metal-clad vacuum circuit breaker. The stationary primary disconnecting contacts are to be silver-plated copper and mounted within glass polyester support bushings. The movable contacts and springs shall be mounted on the circuit breaker element for ease of inspection/maintenance.

2. Entrance to the stationary primary disconnecting contacts shall be automatically covered by metal shutters when the circuit breaker is withdrawn from the connected position to the test or disconnected position or removed from the circuit breaker compartment. Extend a ground bus into the circuit breaker compartment to automatically ground the breaker frame with high-current spring type grounding contacts located on the breaker chassis when in the test and connected positions. Guide rails for positioning the circuit breaker and all other necessary hardware are to be an integral part of the circuit breaker compartment. Blocking devices shall interlock breaker frame sizes to prevent installation of a lower ampere rating or interrupting capacity element into a compartment designed for one of a higher rating. It shall be possible with indoor switchgear to install a circuit breaker into a bottom compartment without use of a transport truck or lift device.

C. Ground Bus

1. A ¼ inch x 2 inch copper ground bus shall extend through the entire length of the transfer switch.

D. Main Bus Compartment

1. The main bus is to be rated 1200 amps and be fully insulated for its entire length with an epoxy coating by the fluidized bed process. The conductors are to be silver-plated copper and be of a bolted design. Access to this compartment is gained from the front or rear of the structure by removing a steel barrier.

E. Doors and Panels

1. Relays, control switches, etc., shall be mounted on a formed front-hinged panel for each circuit breaker compartment. Front doors shall include features to facilitate quick and complete removal or reinstallation of entire front door assembly. Door hinges shall have tamper-resistant type. Where allowable, all control circuits (except, for example, current transformers and grounding) shall be wired via lugs/receptacles prior to termination.

F. Circuit Breakers

1. The circuit breakers shall be rated 5 kV nominal volts, maximum volts, 60 Hz, with a continuous current rating of 1200 amps and a maximum symmetrical interrupting rating of 40kA. Furnish vacuum circuit breakers with one vacuum interrupter per phase. The circuit breaker shall be operated by means of a stored energy mechanism which is normally charged by a universal motor but can also be charged by the manual handle supplied on each breaker for manual emergency closing or testing. The closing speed of the moving contacts is to be independent of both the control voltage and the operator. Provide

a full front shield on the breaker. Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the circuit breaker is racked into the connected position. Provision shall be made for secondary control plug to be manually connected in test position. A minimum of 8 auxiliary contacts (4a 4b), shall be provided for external use.

The racking mechanism to move the breaker between positions shall be operable with the front door closed and position indication shall be visible with door closed.

2. An interlocking system shall be provided to prevent racking a closed circuit breaker to or from any position. An additional interlock shall automatically discharge the stored energy operating mechanism springs upon removal of the breaker out of the compartment.

3. The circuit breaker control voltage shall be: 125 volts DC.

G. Instrument Transformers

1. Voltage transformers are drawout mounted with primary current-limiting fuses and shall have ratio as indicated. The transformers shall have mechanical rating equal to the momentary rating of the circuit breakers and shall have metering accuracy per ANSI Standards.

2. Current transformers: The current transformer assembly shall be insulated for the full voltage rating of the switchgear. The current transformers wiring shall be Type SIS #14 AWG minimum. Relaying and metering accuracy shall conform to ANSI Standards.

H. Control Wiring

1. The switchgear shall be wired with Type SIS #14 AWG minimum. The control wiring shall be UL listed and have VW-1 flame retardant rating. Wires shall terminate on terminal blocks with marker strips numbered in agreement with detailed connection diagrams.

2.3 FABRICATION

A. Construction: Each equipment bay shall be a separately constructed cubicle assembled to form a rigid freestanding unit with sufficient bracing to minimize distortion. Adjacent bays shall be securely bolted together to form an integrated rigid structure. The rear covers shall be removable to assist installation and maintenance of bus and cables.

B. The metal-clad switchgear shall be fully assembled, inspected and tested at the factory prior to shipment. Large line-ups shall be split to permit normal shipping and handling as well as for ease of rejoining at the job site.

C. Switchgear sections shall be furnished with four (4) lifting lugs.

2.4 FACTORY FINISHING

A. All steel parts, shall be cleaned and an iron phosphate pre-treatment applied prior to paint application.

B. Paint color shall be ANSI-61 [light grey].

2.5 MICROPROCESSOR CONTROLLER

A. The controller's sensing and logic shall be provided by a redundant built-in microprocessor for maximum reliability, minimum maintenance, and the ability to communicate serially through an optional serial communication module.

B. The controller shall be connected to the transfer switch by an interconnecting wiring harness. The harness shall include a keyed disconnect plug to enable the controller to be disconnected from the transfer switch for routine maintenance. Sensing and control logic shall be provided on multi-layer printed circuit boards. Interfacing relays shall be industrial grade plug-in type with dust covers. The panel shall be enclosed with a protective cover and be mounted separately from the transfer switch unit for safety and ease of maintenance. The protective cover shall include a built-in pocket for storage of the operator’s manuals.

C. All customer connections shall be wired to a common terminal block to simplify field-wiring connections.

2.6 ENCLOSURE

A. All standard and optional door-mounted switches and pilot lights shall be 16-mm industrial grade type or equivalent for easy viewing & replacement.

2.7 MODES OF OPERATION

The modes of operation for the MV/BP-ATS, described below, shall include controls discussed in subsequent sections.

A. Automatic Mode

1. In automatic mode, all 4 breakers should be racked in; the designated transfer switch breaker pair must be racked in. As the bypass breakers are not utilized for this mode, the operator should have the option of temporarily racking out one or both designated bypass breakers for service or maintenance while remaining in automatic mode.

B. Bypass Mode

1. In bypass mode, only the specific bypass breaker must be racked in; other breakers may be racked out. The operator closes the particular bypass breaker according to the transfer switch. For example, if the ATS-N breaker is closed, then the operator turns the Bypass Switch to the “Normal” position. The “Normal” indicator light on the Bypass Switch should illuminate. If the operator should turn the Bypass Switch to the “Emergency” position even though the ATS-N breaker is closed, nothing should happen.

2. Once the Bypass Switch is appropriately manipulated, the BP breaker should match the ATS breaker. If ATS-N is closed, then BP-N should close. If ATS-E is closed, then BP-E should close.

C. Test/Isolation Mode

1. Once the appropriate bypass breaker is closed and the system is not in automatic mode, the operator may open and rack out one or both transfer switch breakers.

D. Returning to Automatic Mode

1. Rack in transfer switch breaker(s).

2. Turn t the operator turns the Transfer Control switch to the wrong position, interlocks should prevent the incorrect transfer switch breaker from closing.

3. Turn the Bypass Switch to the “Open” position. Interlocks should prevent the bypass switch from opening if the transfer switch is not set correctly.

4. The “Not in Automatic” indicator should no longer illuminate.

E. Each breaker includes individual electrical controls (open/close). Interlocks should prevent electrical controls from inappropriate closure. However, operators can open the front door, manually charge the breaker and possibly close on a live bus. Additionally, operators can remove rear covers (or open the rear door) and possibly access a live bus. This equipment contains no protective means to prevent these actions.

F. Due to the nature of bypass isolation technology, note that this operation does not require the mode control switch to be in the manual position.

2.8 CONTROLLER DISPLAY AND KEYPAD

A. A four line, 20 character LCD display and keypad shall be an integral part of the controller for viewing all available data and setting desired operational parameters. Operational parameters shall also be available for viewing and limited control through the serial communications input port. The following parameters shall be adjustable on the controller:

1. Nominal line voltage and frequency

2. Single or three phase sensing

3. Operating parameter protection

4. Transfer operating mode configuration (Open transition)

2.9 VOLTAGE, FREQUENCY AND PHASE ROTATION SENSING

A. Voltage and frequency on both the normal and emergency sources shall be continuously monitored, with the following pickup, dropout, and trip setting capabilities (values shown as % of nominal unless otherwise specified):

Parameter Sources Dropout / Trip Pickup / Reset

Undervoltage N&E, 70 to 98% 85 to 100%

Overvoltage N&E 102 to 115% 2% below trip

Underfrequency N&E 85 to 98% 90 to 100%

Overfrequency N&E 102 to 110% 2% below trip

Voltage unbalance N&E 5 to 20% 1% below dropout

B. Voltage and frequency settings shall be field adjustable in 1% increments either locally with the display and keypad or remotely via serial communications port access.

C. The controller shall be capable (when activated by the keypad or through the serial port) of sensing the phase rotation of both the normal and emergency sources. The source shall be considered unacceptable if the phase rotation is not the preferred rotation selected (ABC or CBA).

D. Source status screens shall be provided for both normal & emergency to pro-vide digital readout of voltage on all 3 phases, frequency, and phase rotation.

2.10 AUTOMATIC AND USER SUPERVISED NON-AUTOMATIC CONTROL

A. Open, Closed, and Delayed Transition Switching Solutions shall provide complete automatic control of the transfer switch. Transfer Switches shall be constructed as Metal-Clad Switchgear, they shall also include full function Non-Automatic Control to permit safe, electrically interlocked user supervised operation.

B. A Transfer Switch Automatic-Manual selector switch shall allow the user to place the transfer switch in a fully manual mode of operation. The Normal and Emergency Source Circuit Breakers shall then be operated using the circuit breaker control switches on the front of each circuit breaker compartment. This shall provide electrically interlocked operation to ensure that both circuit breakers cannot be closed simultaneously. Additionally, the Normal or Emergency Source Circuit Breakers may be tripped open by the circuit breaker control switches at any time during Automatic or Manual operation.

2.11 TIME DELAYS

A. An adjustable time delay of 0 to 6 seconds shall be provided to override momentary normal source outages and delay all transfer and engine starting signals.

B. A time delay shall be provided on transfer to emergency, adjustable from 0 to 60 minutes, for controlled timing of transfer of loads to emergency.

C. Two time delay modes (which are independently adjustable) shall be provided on re-transfer to normal. One time delay shall be for actual normal power failures and the other for the test mode function. The time delays shall be adjustable from 0 to 10 hours. Time delay shall be automatically bypassed if the emergency source fails and the normal source is acceptable.

D. A time delay shall be provided on shut down of engine generator for cool down, adjustable from 0 to 60 minutes.

E. A time delay activated output signal shall also be provided to drive an external relay(s) for selective load disconnect control. The controller shall have the ability to activate an adjustable 0 to 5 minute time delay in any of the following modes:

1. Prior to transfer only.

2. Prior to and after transfer.

3. Normal to emergency only.

4. Emergency to normal only.

5. Normal to emergency and emergency to normal.

6. All transfer conditions or only when both sources are available.

F. All time delays shall be adjustable in 1 second increments, except the extended parallel time, which shall be adjustable in .01 second increments.

G. All time delays shall be adjustable by using the LCD display and keypad or with a remote device connected to the serial communications port.

2.12 ADDITIONAL FEATURES

A. A three position momentary-type test switch shall be provided for the test / automatic / reset modes. The test position will simulate a normal source failure. The reset position shall bypass the time delays on either transfer to emergency or retransfer to normal.

B. A SPDT contact, rated 5 amps at 30 VDC, shall be provided for a low-voltage engine start signal. The start signal shall prevent dry cranking of the engine by requiring the generator set to reach proper output, and run for the duration of the cool down setting, regardless of whether the normal source restores before the load is transferred.

C. Auxiliary contacts, rated 10 amps, 250 VAC shall be provided consisting of one contact, closed when the ATS is connected to the normal source and one contact closed, when the ATS is connected to the emergency source.

D. LED indicating lights (16 mm industrial grade, type 12) shall be provided; one to indicate when the ATS is connected to the normal source (green) and one to indicate when the ATS is connected to the emergency source (red).

E. LED indicating lights (16 mm industrial grade, type 12) shall be provided and energized by controller outputs. The lights shall provide true source availability of the normal and emergency sources, as determined by the voltage sensing trip and reset settings for each source.

F. System Status - The controller LCD display shall include a “System Status” screen which shall be readily accessible from any point in the menu by depressing the “ESC” key a maximum of two times. This screen shall display a clear description of the active operating sequence and switch position. For example,

1. Normal Failed

2. Load on Normal

3. TD Normal to Emerg

4. 2min15s

G. Communications - the ATS controller should be able to communicate with other devices in the electrical distribution system via Modbus RTU or TCP/IP. It shall allow for the seamless integration of existing or new communication transfer devices.

PART 3 - EXECUTION

3.1 GENERAL

A. Install the automatic transfer switch as shown on the drawings and as per manufacturer's instructions and as required for a neat workmanlike and fully operational system.

3.2 Provide the following in conjunction with each and every automatic transfer switch:

A. 2# 12-1/2"C form engine start contact on transfer switch to emergency generator control panel.

B. Wiring as necessary from transfer switch to remote annunciator panels and engine control panel for transfer switch position indicator lights.

C. Provide wiring for ATS status (on normal or on emergency) to power monitoring system.

3.3 FACTORY ACCEPTANCE TESTING

A. The complete MV/BP-ATS shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure that the operating transfer time, voltage, frequency and time delay settings are in compliance with the specification requirements.

B. The MV/BP-ATS manufacturer shall be certified to ISO 9001: 2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001.

C. Manufacturer is to submit the factory test procedures to the CA for approval one month prior to performing any tests.

3.4 SITE ACCEPTANCE TESTING

A. Startup and testing of the MV/BP-ATS is to be performed by a factory certified representative and witnessed by the CA, as specified, and shall include, but no limited to, the following:

1. Verify MV/BP-ATS is clean of all debris and all connections have been torque

2. Perform and record the contact resistance measurements on the normal, normal bypass, emergency and emergency bypass contacts.

3. All time delay settings associated with the MV/BP-ATS as per manufacturer's startup sheet.

4. Manually operate MV/BP-ATS through all modes, normal, normal bypass, emergency, emergency bypass, disconnected then reconnect. ATS's shall be infrared scanned in all positions with 100% of rated load applied.

5. During the load bank testing of the generator and or UPS systems perform infrared scanning on all power contacts and cable terminations of the transfer switch.

6. Manufacturer to submit their site start up procedures to CA for approval 1 month prior to startup.

3.5 TRAINING

A. Provide customer with 12 hours of classroom and hands on training on the operation and maintenance of the transfer switches.

B. Provide all training hand outs and O&M manuals to the customer prior to any training for review.

3.6 SPARE PARTS

A. Provide customer with the recommended spare parts list with pricing as an option.

B. manufacturer’s warranty period.

3.7 COMPLIANCE OF ANSI STANDARDS

A. All tests shall comply with applicable ANSI standards.

1. Dielectric Test: ANSI C37.20 Para. 5.3.1, latest revision.

2. Mechanical Test: ANSI C37.20 Para. 5.3.2, latest revision.

3. Grounding of Instrument Transformer Case Test: ANSI C37.20 Para. 5.3.3, latest revision.

4. Electrical Operation & Control Wiring Test: ANSI C37.20 Para. 5.3.3, latest revision.

5. Polarity Test: ANSI C37.20 Para. 5.3.4.3, latest revision.

6. Sequence Test: ANSI C37.20 Para. 5.3.4.4, latest revision.

3.8 SERVICE REPRESENTATION

A. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

B. The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

SECTION 262313
MAIN STANDBY POWER DISTRIBUTION SWITCHGEAR (MSPD) – LOW VOLTAGE

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish and install, where indicated on the drawings, a complete standby power generation and load management power distribution and control system.

B. The Emergency Power System consists of the following as applicable:
   1. Generator sets
   2. Generator Control Switchgear (with associated monitoring and distribution equipment)
   3. Automatic Transfer Switches
   4. Uninterruptible Power Supply Systems
   5. Load Banks
   6. Battery Systems

C. The Emergency Power System Supplier (EPSS) shall be an authorized service provider for all components of the Emergency Power System (EPS). In order to assure maximum equipment uptime and best service response to the owner, the Emergency Power System Supplier shall be an factory-authorized dealer with complete EPS parts and service available on a 24 hour emergency basis within a 50 mile radius of the project site.

D. The Generator Control Switchgear specified in this section shall be a dead front type, low voltage metal-enclosed switchgear. The Generator Control Switchgear shall be by the same manufacturer as the generator sets and furnished with the generator sets by the (EPSS) as a total system. The switchgear and circuit breakers utilized in the Generator Control Switchgear shall be products of the same manufacturer as the circuit breakers provided in the assemblies for the normal and emergency distribution as specified under other sections of the specifications.

1.02 RELATED SECTIONS

A. Section 263600 – Automatic Transfer Switches

B. Section 260913 – Power Monitoring and Control System

C. Section 263353– Uninterruptible Power Supply System

D. Section 263213 – Generators

E. Section 263323 - Battery Systems

F. Section 260572 – Short Circuit Study

G. Section 260573 –Coordination Study

H. Section 260574 – Arc Flash Study

1.03 REFERENCES

A. The low voltage metal-enclosed switchgear assembly and all components shall be designed, manufactured, and tested in accordance with the following latest applicable standards:
   1. ANSI-C37.20 – Switchgear assemblies
   2. ANSI-C37.13 – Low voltage power circuit breakers
   3. ANSI-C37.17 – Trip devices
   4. NEMA SG-5 – Switchgear assemblies
   5. NEMA SG-3 – Low voltage power circuit breakers
   6. UL 1558.

B. The Emergency Power System shall meet or exceed the applicable requirements for the following standards as required:
   1. UL
   2. IEEE
   3. ANSI
   4. NFPA 70
   5. NFPA 99
   6. NFPA 110
   7. CSA
   8. IEC

1.04 SUBMITTALS – FOR REVIEW/APPROVAL

A. The following information shall be submitted to the Engineer:
   1. Master drawing index
   2. Front view elevation
   3. Floor plan
   4. Top view
   5. Single line diagram
   6. Controls One-Line diagram
   7. Nameplate schedule
   8. Component list
   9. Conduit entry/exit locations
   10. Assembly ratings including:
      a. Short-circuit rating
      b. Voltage
      c. Continuous current
   11. Major component ratings including:
      a. Voltage
      b. Continuous current
      c. Interrupting ratings
   12. Breaker Schedule

a. Cable terminal sizes

13. Product data sheets
14. Sequence of operation description

B. Where applicable, the following additional information shall be submitted to the Engineer:
   1. Busway connection
   2. Connection details between close-coupled assemblies
   3. Composite front view and plan view of close-coupled assemblies
   4. Key interlock scheme drawing and sequence of operations
   5. Mimic bus size and color.

1.05 SUBMITTALS – FOR CONSTRUCTION

A. The following information shall be submitted for record purposes:
   1. Final as-built drawings and information for items listed in paragraph 1.04
   2. Wiring diagrams
   3. Certified production test reports
   4. Installation information
   5. Seismic certification as specified

B. The final (as-built) drawings shall include the same drawings as the construction drawings and shall incorporate all changes made during the manufacturing process.

1.06 QUALIFICATIONS

A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.

C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

D. Provide Seismic tested equipment as follows:
   1. The equipment and major components shall be suitable for and certified by actual seismic testing to meet all applicable seismic requirements of the [latest International Building Code (IBC)] [latest California Building Code (CBC) with OSHPD Amendments]. [The equipment shall have OSHPD Special Seismic Certification (OSP) Pre-Approval.]
   2. The Project Structural Engineer will provide site specific ground motion criteria for use by the manufacturer to establish SDS values required.
   3. The IP rating of the equipment shall be 1.5
   4. The Structural Engineer for the Site will evaluate the SDS values published on the [Manufacturer’s] [OSHPD] website to ascertain that they are "equal to" or "greater than" those required for the Project Site.
   5. The following minimum mounting and installation guidelines shall be met, unless specifically modified by the above referenced standards.

a. The Contractor shall provide equipment anchorage details, coordinated with the equipment mounting provision, prepared and stamped by a licensed civil engineer in the state. Mounting recommendations shall be provided by the manufacturer based upon the above criteria to verify the seismic design of the equipment.
b. The equipment manufacturer shall certify that the equipment can withstand, that is, function following the seismic event, including both vertical and lateral required response spectra as specified in above codes.
c. The equipment manufacturer shall document the requirements necessary for proper seismic mounting of the equipment. Seismic qualification shall be considered achieved when the capability of the equipment, meets or exceeds the specified response spectra.

1.07 REGULATORY REQUIREMENTS

A. The switchgear shall bear a UL 1558 label.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at time of shipment.

B. Each switchgear assembly shall be split into shipping groups for handling as determined during the shop drawing phase jointly with the installing contractor. Shipping groups shall be designed to be shipped by truck, rail or ship. Shipping groups shall be bolted to skids, and covered with tarps for protection from weather. Accessories shall be packaged separately.

1.09 OPERATION AND MAINTENANCE MANUALS

A. Equipment operation and maintenance manuals shall be provided with each assembly shipped, and shall include instruction leaflets and instruction bulletins for the complete assembly and each major component.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Caterpillar

B. Eaton Electrical Inc; Cutler-Hammer Business Unit

C. Siemens Energy & Automation, Inc.

D. Square D; a brand of Schneider Electric

E. General Electric Company; GE Consumer & Industrial – Electrical Distribution

F. ABB; Control Products

G. Rockwell Automation, Inc; Allen-Bradley Brand

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

2.02 RATINGS

A. Voltage rating shall be as indicated on the drawings. The entire assembly shall be suitable for 600 volts maximum AC service.

B. The assembly shall be rated to withstand mechanical forces exerted during short-circuit conditions when connected directly to a power source having available fault current 100,000 amperes symmetrical at rated voltage.

C. The bus system shall have a minimum ANSI short-circuit withstand rating of 100,000 amperes symmetrical tested in accordance with ANSI C37.20.1 and UL1558.

D. All circuit breakers shall have a minimum symmetrical interrupting capacity of 100,00 amperes. To ensure a fully selective system, all circuit breakers shall have 30 cycle short-time withstand ratings equal to their symmetrical interrupting ratings through 85,000 amperes, regardless of whether equipped with instantaneous trip protection or not.

E. All ratings shall be tested to the requirements of ANSI C37.20.1, C37.50 and C37.51 and UL witnessed and approved.

2.03 CONSTRUCTION

A. The switchgear shall consist of the required number of vertical sections bolted together to form a rigid assembly. The sides shall be covered with removable bolt-on covers. All edges of front covers or hinged front panels shall be formed. Provide ventilators located on the top of the switchgear over the breaker and bus compartments to ensure adequate ventilation within the enclosure. The rear covers shall be fabricated in two (2) pieces for ease of handling and shall be mounted using captive hardware. Hinged rear doors, complete with provisions for padlocking, shall be provided.

B. The assembly shall be provided with adequate lifting means and shall be capable of being moved into installation position and bolted directly to Contractor supplied floor sills to be set level in concrete per manufacturer’s recommendations. Provisions shall be made for jacking of shipping groups, for removal of skids or insertion of equipment rollers. Base of assembly shall be suitable for rolling directly on pipes without skids. The base shall be equipped with slots in the base frame members to accommodate the use of pry bars for moving the equipment to its final position.

C. Each vertical steel unit forming part of the switchgear line-up shall be a self-contained housing having one or more individual breaker or instrument compartments, a centralized bus compartment and a rear cable compartment. Each individual circuit breaker compartment, or cell, shall be segregated from adjacent compartments and sections by means of steel barriers to the maximum extent possible. It shall be equipped with drawout rails and primary and secondary disconnecting contacts. Removable hinge pins shall be provided on the breaker compartment door hinges.

D. The stationary part of the primary disconnecting devices for each power circuit breaker shall be breaker mounted and consist of a set of contacts extending to the rear through a glass polyester insulating support barrier; corresponding moving finger contacts, suitably spaced, shall be furnished on the power circuit breaker studs which engage in only the connected position. The assembly shall provide multiple silver-to-silver full floating high pressure point contacts with uniform pressure on each finger maintained by springs. Each circuit shall include the necessary three-phase bus connections between the section bus and the breaker line side studs. Load studs shall be equipped with copper load extension buses

terminating in solderless type terminals in the rear cable compartment of each structure. Bus extensions shall be tin-plated where outgoing terminals are attached.

E. The circuit breaker door design shall be such that the following functions may be performed without the need to open the circuit breaker door: lever circuit breaker between positions, operate manual charging system, close and open circuit breaker, examine and adjust trip unit, and read circuit breaker rating nameplate.

F. The secondary disconnecting devices shall consist of floating terminals mounted on the stationary unit and engaging mating contacts at the front of the breaker. The secondary disconnecting devices shall be gold-plated and engagement shall be maintained in the “connected” and “test” positions.

G. The removable power circuit breaker element shall be equipped with disconnecting contacts and interlocks for drawout application. It shall have four positions, “connected,” “test,” “disconnected” and “removed.” The breaker drawout element shall contain a worm gear levering “in” and “out” mechanism with removable lever crank. Levering shall be accomplished via the use of conventional tools. Mechanical interlocking shall be provided so that the breaker is in the tripped position before levering “in” or “out” of the cell. Interlocking that trips the breaker will not be accepted. The breaker shall include an optional provision for key locking open to prevent manual or electric closing. Padlocking shall provide for securing the breaker in the connected, test, or disconnected position by preventing levering.

H. An insulating flash shield shall be mounted above each circuit breaker to prevent flashover from the arc chutes to ground.

I. The switchgear shall be low voltage metal-enclosed switchgear structures as specified herein.

J. Provide a rear compartment barrier between the cable compartment and the main bus to protect against inadvertent contact with main or vertical bus bars.

K. Provide in the cell when the circuit breaker is withdrawn, a safety shutter which automatically covers the line and load stabs and protects against incidental contact.

L. Provide a metal barrier full height and depth between adjacent vertical structures in the cable compartment.

M. Provide a glass polyester full height and depth barrier between adjacent vertical structures in the bus compartment with appropriate slots for main bus.

2.04 BUS

A. All bus bars shall be tin-plated copper. Main horizontal bus bars shall be mounted with all three phases arranged in the same vertical plane. Bus sizing shall be based on ANSI standard temperature rise criteria of 65 degrees C over a 40 degrees C ambient (outside the enclosure).

B. Provide a full capacity neutral bus where a neutral bus is indicated on the drawings.

C. A copper ground bus shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the switchgear. The ground bus short-time withstand rating shall meet that of the largest circuit breaker within the assembly.

D. All hardware used on conductors shall be high-tensile strength and zinc-plated. All bus joints shall be provided with Belleville-type washers.

2.05 WIRING/TERMINATIONS

A. Small wiring, necessary fuse blocks and terminal blocks within the switchgear shall be furnished as required. Control components mounted within the assembly shall be suitably marked for identification corresponding to the appropriate designations on manufacturer's wiring diagrams.

B. Provide a front accessible, isolated vertical wireway for routing of factory and field wiring. Factory provisions shall be made for securing field wiring without the need for adhesive wire anchors.

C. Front access to all circuit breaker secondary connection points shall be provided for ease of troubleshooting and connection to external field connections without the need of removing the circuit breaker for access.

D. All control wire shall be type SIS. Control wiring shall be 16 ga for control circuits and 14 ga for current transformer circuits. Wire bundles shall be secured with nylon ties and anchored to the assembly with the use of pre-punched wire lances or nylon non-adhesive anchors. All current transformer secondary leads shall first be connected to conveniently accessible shorting terminal blocks before connecting to any other device. Shorting screws with provisions for storage shall be provided. All groups of control wires leaving the switchgear shall be provided with terminal blocks with suitable numbering strips and provisions for #10 AWG field connections. Provide wire markers at each end of all control wiring. Plug-in terminal blocks shall be provided for all shipping split wires. Terminal connections to remote devices or sources shall be front accessible via doors above each circuit breaker.

E. Where individual conductors cross switchgear shipping splits they shall be fitted with plug-together connectors for reliable field assembly.

F. NEMA 2-hole mechanical type lugs shall be provided for all line and load terminations suitable for copper or aluminum cable rated for 75 degrees C of the size indicated on the drawings.

G. Lugs shall be provided in the incoming line section for connection of the main grounding conductor. Additional lugs for connection of other grounding conductors shall be provided as indicated on the drawings.

2.06 CIRCUIT BREAKERS

A. All protective devices shall be low voltage power circuit breakers. All breakers shall be UL listed for application in their intended enclosures for 100% of their continuous ampere rating.

B. All power circuit breakers shall be constructed and tested in accordance with ANSI C37.13, C37.16, C37.17, C37.50, UL 1066 and NEMA SG-3 standard. The breaker shall carry a UL label.

C. Breakers shall be provided in drawout configuration. The 800, 1600, 2000 and 3200 ampere frame power circuit breakers shall be provided in the same physical frame size, while 4000, 5000 and 6000 ampere frame power circuit breakers shall be provided in a second physical frame size. Both physical frame sizes shall have a common height and depth.

D. Power circuit breakers shall utilize a two-step stored-energy mechanism to charge the closing springs. The closing of the breaker contacts shall automatically charge the opening springs to ensure quick-break operation.

E. The generator, utility, and tie circuit breakers shall be electrically operated and equipped with auxiliary contacts, bell alarm contacts, and microprocessor based trip units. Distribution

circuit breakers shall be electrically operated and equipped with auxiliary contacts, bell alarm contacts, and microprocessor based trip units.

F. Electrically operated breakers shall be complete with 24 Vdc shunt trips, and 120 Vac motor operators. The charging time of the motor shall not exceed 6 seconds.

G. To facilitate lifting, the power circuit breaker shall have integral handles on the side of the breaker.

H. The power circuit breaker shall have a closing time of not more than 3 cycles.

I. The primary contacts shall have an easily accessible wear indicator to indicate contact erosion.

J. The power circuit breaker shall have three windows in the front cover to clearly indicate any electrical accessories that are mounted in the breaker. The accessory shall have a label that will indicate its function and voltage. The accessories shall be plug and lock type and UL listed for easy field installation. They shall be modular in design and shall be common to all frame sizes and ratings.

K. The breaker control interface shall have color-coded visual indicators to indicate contact open or closed positions as well as mechanism charged and discharged positions. Manual control pushbuttons on the breaker face shall be provided for opening and closing the breaker. The power circuit breaker shall have a “Positive On” feature. The breaker flag will read “Closed” if the contacts are welded and the breaker is tripped or opened.

L. The current sensors shall have a back cover window that will permit viewing the sensor rating on the back of the breaker. A rating plug will offer indication of the rating on the front of the trip unit.

M. A position indicator shall be located on the faceplate of the breaker. This indicator shall provide color indication of the breaker position in the cell. These positions shall be Connect (Red), Test (Yellow), and Disconnect (Green). The levering door shall be interlocked so that when the breaker is in the closed position, the breaker levering-in door shall not open.

N. Each power circuit breaker shall offer sixty (60) front mounted dedicated secondary wiring points. Each wiring point shall have finger safe contacts, which will accommodate #10 AWG maximum field connections with ring tongue or spade terminals or bare wire.

2.07 TRIP UNITS

A. Each low voltage power circuit breaker shall be equipped with a solid-state tripping system consisting of three current sensors, microprocessor-based trip device and flux-transfer shunt trip. Current sensors shall provide operation and signal function. The trip unit shall use microprocessor-based technology to provide the basic adjustable time-current protection functions. True rms sensing circuit protection shall be achieved by analyzing the secondary current signals received from the circuit breaker current sensors and initiating trip signals to the circuit breaker trip actuators when predetermined trip levels and time delay settings are reached. Interchangeable current sensors with their associated rating plug shall establish the continuous trip rating of each circuit breaker. The trip unit shall be Cutler-Hammer type Digitrip RMS 1150+.

B. The trip unit shall have an information system that utilizes battery backup LEDs to indicate mode of trip following an automatic trip operation. The indication of the mode of trip shall be retained after an automatic trip. A reset button shall be provided to turn off the LED

indication after an automatic trip. A test pushbutton shall energize a LED to indicate the battery status.

C. The trip unit shall be provided with a display panel, including a representation of the time/current curve that will indicate the protection functions. The unit shall be continuously self-checking and provide a visual indication that the internal circuitry is being monitored and is fully operational.

D. The trip unit shall be provided with a making-current release circuit. The circuit shall be armed for approximately two cycles after breaker closing and shall operate for all peak fault levels above 25 times the ampere value of the rating plug.

E. Trip unit shall have selectable powered and unpowered thermal memory for enhanced circuit protection.

F. Complete system selective coordination shall be provided by the addition of the following individually adjustable time/current curve shaping solid-state elements:

1. All circuit breakers shall have adjustments for long delay pickup and time.
2. All circuit breakers shall have individual adjustments for short delay pickup and time, and include I^2t settings.
3. All circuit breakers shall have an adjustable instantaneous pickup.
4. All circuit breakers, shall have individually adjustable ground fault current pickup and time, and include I^2t settings or ground alarm only.

G. The trip unit shall have provisions for a single test kit to test each of the trip functions.

H. The trip unit shall provide zone interlocking for the short-time delay and ground fault delay trip functions for improved system coordination. The zone interlocking system shall restrain the tripping of an upstream breaker and allow the breaker closest to the fault to trip with no intentional time delay. In the event that the downstream breaker does not trip, the upstream breaker shall trip after the present time delay. Factory shall wire for zone interlocking for the power circuit breakers within the switchgear.

I. All circuit breakers shall have individually adjustable ground fault alarm only.

J. The trip unit shall have a 4-character LCD display showing phase, neutral, and ground current. The accuracy of these readings shall be +/- 2% of full scale.

K. The trip unit shall be equipped to permit communication via a network twisted pair for remote monitoring and control.

L. The trip unit shall include a power/relay module which shall supply control to the readout display. Following an automatic trip operation of the circuit breaker, the trip unit shall maintain the cause of trip history and the mode of trip LED indication as long as its internal power supply is available. An internal relay shall be programmable to provide contacts for remote ground alarm indication.

M. The trip unit shall include a voltage transformer module, suitable for operation up to 600V, 50/60 Hz. The primary of the power relay module shall be connected internally to the line side of the circuit breaker through a dielectric test disconnect plug.

N. The display for the trip units shall be a 24-character LED display.

O. Metering display accuracy of the complete system, including current sensors, auxiliary CTs, and the trip unit, shall be +/- 1% of full scale for current values. Metering display accuracy of the complete system shall be +/- 2% of full scale for power and energy values.

P. The unit shall be capable of monitoring the following data:
   1. Instantaneous value of phase, neutral and ground current
   2. Instantaneous value of line-to-line voltage
   3. Minimum and maximum current values
   4. Watts, VARS, VA, watthours, varhours, and VA hours.

Q. The energy-monitoring parameter values (peak demand, present demand, and energy consumption) shall be indicated in the trip unit's alphanumeric display panel.

R. The trip unit shall display the following power quality values: crest factor, power factor, percent total harmonic distortion, and harmonic values of all phases through the 31st harmonic.

S. An adjustable high load alarm shall be provided, adjustable from 50 to 100% of the long delay pickup setting.

T. The trip unit shall contain an integral test pushbutton. A keypad shall be provided to enable the user to select the values of test currents within a range of available settings. The protection functions shall not be affected during test operations. The breaker may be tested in the TRIP or NO TRIP test mode.

U. Programming may be done via a keypad at the faceplate of the unit or via the communication network.

V. System coordination shall be provided by the following microprocessor-based programmable time-current curve shaping adjustments. The short-time pickup adjustment shall be dependant on the long delay setting.
   1. Programmable long-time setting
   2. Programmable long-time delay with selectable I^2T or I^4T curve shaping
   3. Programmable short-time setting
   4. Programmable short-time delay with selectable flat or I^2T curve shaping, and zone selective interlocking
   5. Programmable instantaneous setting
   6. Programmable ground fault setting trip or ground fault setting alarm
   7. Programmable ground fault delay with selectable flat or I^2T curve shaping and zone selective interlocking.

W. The trip unit shall offer a three-event trip log that will store the trip data, and shall time and date stamp the event.

X. The trip unit shall have the following advanced features integral to the trip unit:
   1. Adjustable under voltage release
   2. Adjustable over voltage release
   3. Reverse load and fault current
   4. Reverse sequence voltage alarm
   5. Under frequency
   6. Over frequency
   7. Voltage phase unbalance and phase loss during current detection.

Y. The trip unit shall offer information on the circuit breaker's health. The data available shall include total number of all Instantaneous and Short Delay trips seen by the circuit breaker, an additional count of all the overloads and ground fault trips seen by the circuit breaker, an operation counter, a time stamp of the last breaker operation, and the maximum temperature seen by the trip unit. All these data points will be stored in non volatile memory and available for remote communications.

2.08 MISCELLANEOUS DEVICES

A. Key interlocks shall be provided as indicated on the drawings. These interlocks shall keep the circuit breakers trip-free when actuated.

B. Each section of the switchgear shall be provided with a space heater thermostatically controlled. Power for the space heaters shall be obtained from a source as indicated on the drawings. Supply voltage shall be 120 volts ac.

2.09 ENCLOSURES

A. NEMA 1 Enclosure

1. The enclosure shall be provided with rear hinged padlockable doors with wind stops for each section. Aisle doors shall be supplied with provisions for padlocking. A steel floor shall be provided in walk-in aisle space. Steel floor plates shall be provided in the rear cable compartment. An anti-skid floor strip shall be provided in the aisle. Ventilating openings shall be provided complete with replaceable fiberglass air filters which are removable from the exterior of the enclosure. Provide necessary space heaters thermostatically controlled for breaker, bus and cable compartments of adequate wattage to prevent the accumulation of moisture within the compartments.
2. Provide panic door hardware on aisle doors at each end of the line-up. External padlocking of the aisle doors shall not prevent operation of the panic hardware from the interior of the enclosure. The construction of the enclosure shall be modular so future sections can be added without affecting NEMA 3R integrity. Provide interior aisle fluorescent lights, 3-way switches and GFI protected receptacles.
3. The enclosure shall be provided with undercoating applied to all members in contact with the foundation surface to retard corrosion.
4. Power for the space heaters, lights and receptacles shall be obtained from a source as indicated on the drawings. Supply voltage shall be 120 volts AC.
5. An overhead circuit breaker lifter shall be provided in the aisle of the enclosure.
6. Each shipping section shall be shipped completely assembled.

2.10 NAMEPLATES

A. Engraved nameplates, mounted on the face of the assembly, shall be furnished for all main and feeder circuits as indicated on the drawings. Nameplates shall be laminated plastic, black characters on white background, and secured with screws. Characters shall be 3/16-inch high, minimum.

B. Furnish master nameplate giving switchgear designation, voltage ampere rating, short-circuit rating, and manufacturer's name.

C. Control components mounted within the assembly, such as fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer's drawings.

2.11 FINISH

A. All exterior and interior steel surfaces of the switchgear shall be properly cleaned and provided with a rust-inhibiting phosphatized coating. Color and finish of the switchgear shall be ANSI 61.

2.12 ACCESSORIES

A. Provide a *[traveling type circuit breaker lifter, rail-mounted on top of switchgear] [floor running portable circuit breaker transfer truck with manual lifting mechanism].

2.13 EMERGENCY POWER SYSTEM (EPS) AUTOMATION & CONTROLS

A. The automation and control system shall facilitate overall EPS operation including automatic standby operation, monitoring and control of the generator sets including start/stop, alarm/fault monitoring, synchronizing, generator kW load sharing, generator kVAR load sharing, generator loading/unloading, load shed/add, generator demand priority, power factor control when in Utility paralleling operation, and protective relaying.

B. The EPS Automation and Controls shall utilize true redundant, distributed processing technology to maximize system reliability and fault tolerance. The distributed processing system shall include a separate controller for each power source, and a separate processor dedicated to each touchscreen Human/Machine Interface (HMI) operation.

C. The EPS Automation and Controls shall be by the same manufacturer as the switchgear and generator sets. It shall be furnished with the generator sets by the Emergency Power System Supplier as a total coordinated and integrated system.

2.14 HMI – HUMAN/MACHINE INTERFACE

A. EPS Automation interface shall be via a touchscreen with the following characteristics:
   1. Color, 22 inch (diagonal) TFT LCD industrial display capable of displaying both text and graphics.
   2. The touch screen shall be pure glass, with light transmission of 95% or better, furnished with a Surface Acoustic Wave touch interface.
   3. The display shall support a minimum resolution of 1280 x 1024 pixels and 16 million displayable colors.
   4. The EPS touch screen processor shall contain no moving parts.

2.15 HMI SCREEN LISTING

A. The EPS Automation shall provide the following screens. The screens shall provide all of the information, metering, control, annunciations settings and indications listed below:
   1. Main Menu Screen with a complete listing of major screens.
   2. System Overview Screen with animated graphic display of the electrical one line.
   3. System Control, Metering, and Setting Screens
   4. Generator Control, Metering, and Setting Screens
   5. Generator demand priority control and status screen
   6. Load shed control and status screen

* Note to Spec. Writer – Select one

7. Engine monitoring screens for each generator that shall contain a graphical representation of all of the engine gauges and data specified
8. Alarm and Event Annunciation screen that shall be time/date stamped
9. Report Menu Screen
   a. System settings report
   b. Generator settings report
   c. Plant test report
10. Password entry screen that shall contain a numeric keypad for password entry
11. System and Generator real time trending screens
12. Historical trending package.
13. Downloadable alarm log to local media
14. Remote Notification - The system shall be capable of providing several types of remote notification. Notification shall be triggered by user specified events and/or alarms

2.16 UNIT DISPLAY

A. A unit display shall be furnished for each generator set shall be mounted on the door of the switchgear section containing the associated generator set controls. The unit display shall have as a minimum a 12” TFT LCD display, and shall be capable of monitoring and controlling its associated generator set.

2.17 REMOTE POWER MONITORING SYSTEM

A. A PC based remote power monitoring and control system shall be provided to monitor breaker status, alarms, metering and other operating parameters. All control functions, displays metering and other information described in these specifications shall be available to the operator of the Remote System.

B. The remote system shall be designed such that its operation shall not in any way impede the selected automatic operation of the system control. Any failure of the remote system shall have no impact to the automatic operation of the system control.

C. The remote system shall provide the identical screens and resolution at the remote screen as seen at the Switchgear HMI as noted above.

D. The remote system shall communicate with the system control via high speed network.

E. A PC desktop workstation shall be provided.

2.18 DATA TABLE INTERFACE (DTI)

A. The system shall allow interface from the user’s building management system.

B. The DTI shall be designed such that the building management system or external user interface shall in no way compromise the integrity or interfere with the critical operations of the EPS control system. Interface to the user’s building management system shall be via Ethernet communications, utilizing Modbus RTU Protocol.

2.19 EMERGENCY POWER SYSTEM (EPS) FEATURES

A. The EPS automation and controls shall consist of the hardware and software required for the control of the engine-generator plant and associated utilities, tie, and distribution circuit breakers. The system shall include all automation controllers, HMI (Human / Machine

Interface) touchscreens, power transducers, supervisory networks and all ancillary control equipment necessary to automatically execute the specified functional sequence of operations.

B. The EPS automation and controls shall be provided with an HMI consisting of a touchscreen display.
   1. The HMI shall provide all metering, status, monitoring, and control information to the operator.
   2. The HMI shall serve only as an operator interface. The EPS must continue to function normally with a complete HMI failure.

C. The EPS automation and controls shall be designed to eliminate single points of failure.
   1. For redundancy, multiple automation controllers shall be utilized.
   2. At a minimum, the EPS Controls shall utilize a separate controller for each power source.
   3. Control systems utilizing a single automation controller are not acceptable.

D. The EPS automation and controls shall be capable of surviving a fault of one or more of its automation controllers. The failure of any generator controller shall only cause loss of automatic operation of a single generator.

The failure of any single master controller or utility controller shall in no way hinder the full automatic operation of the entire EPS automation and control system.

E. Operator/System Safety Provisions
   1. Circuit Breaker Control Switch (CBCS) - A separate circuit breaker control switch (CBCS) shall be provided for each source and tie circuit breaker controlled by EPS automation. CBCS functionality shall be manual and separate from EPS automation. Each CBCS will include a “Pull to Lock” function in the trip position. A CBCS locked in the trip position shall override all EPS automation functionality.
   2. A separate hardware synchronization check relay (ANSI Device 25) shall be furnished in addition to the sync check functions provided by the EPS system for each paralleling circuit breaker.

F. Master Control Functions
   1. Master control functions and and Master IO shall be fully redundant. Any required transfer of master control functions shall be transparent and bumpless.
   2. Master control functions shall include:
      a. Automatic start of the generator plant
      b. First-up, dead-bus functions
      c. Generator demand priority
      d. Load Shed / Add
   3. Master I/O shall include horn, horn silence, instant auto selector, load shed on/off, and load shed relays

G. Generator Set Control Functions
   1. For safety and availability, all generator set control functions shall be executed autonomously from each generator set controller.
   2. No master control coordination or intervention shall be required to affect the generator set control functions.

3. Generator set control functions shall include:
   a. Operation of generator set circuit breaker
   b. Generator set run command
   c. Generator set protective and annunciator functions
   d. Active synchronization
   e. Synchronization check function (ANSI Device 25)
   f. Load and VAR sharing calculations
   g. Generator set load control
   h. Generator set VAR control
   i. Generator set metering functions

H. Distribution Control Functions
   1. Distribution control functions shall be monitored and controlled via the supervisory network.
   2. Distribution circuit breaker I/O shall include:
      a. Circuit breaker auxiliary contact monitoring
      b. Circuit breaker bell alarm contact monitoring
      c. Close circuit breaker output
      d. Open circuit breaker output

I. Supervisory Network
   1. The supervisory network shall consist of a non-proprietary topology and utilize open source protocols.
   2. Supervisory network topology shall be EMI and RFI noise tolerant.
   3. All critical plant control data communication shall be Ethernet Modbus TCP/IP.
   4. The supervisory network shall be a fully dedicated network, providing high speed communication for the following:
      a. Communications of control data between distributed controllers
      b. Distribution of master control data
      c. Communications to and from the system HMI(s)
      d. Communications to and from the customer building management / Data Table Interface (DTI).
      e. Communication to and from 3rd party balance of plant PLCs (as specified)

J. EPS automation control power system shall be protected against single point of failure by the utilization of a 24Vdc, best source DC system strategy. The control power system shall include the following features:
   1. The best source DC bus shall accept 24vdc power, through an isolation diode and circuit breaker, from each generator set battery.
   2. An additional station battery and battery charger shall be provided to maintain system control power in the event that all generator set batteries and their associated chargers should fail.
   3. All EPS automation and controls shall be powered directly from this best source DC bus.

K. The EPS automation and controls shall be provided with an “Instant Auto” Selector Switch that will shift the EPS to the fully automatic mode.

L. Each generator, utility, and paralleling tie circuit breaker controller shall be furnished with integral power sensing capabilities. Controller inputs shall include phase voltage on both source and bus sides of the associated circuit breaker and 3 phase current inputs.

M. The EPS automation shall log all events and alarms with device, condition, and time/date stamp.

N. Full manual backup control shall be provided for generator set voltage and frequency.

2.20 EPS AUTOMATION & CONTROLS ENVIRONMENTAL SPECIFICATIONS

A. The EPS automation and control system components shall meet or exceed the following environmental requirements:

1. Control Power: 16 to 40 Vdc continuous (24 Vdc nominal)
2. Operating Temperature: 0 to 50° C
3. Humidity: 5 to 95% non-condensing

2.21 EPS METERING

A. All metering functions shall be 1% accuracy or better.

1. The following metering shall be provided for the system bus, each individual utility, tie, and generator:
   a. Volts with 4-position selector switch to select three phases of voltage
   b. Amps with 4-position selector switch
   c. Kilowatts
   d. Kilovars
   e. Frequency
   f. Power Factor
   g. Synchroscope

B. All engine parameter data available on the generator set shall be accessible on the HMI.

C. The following metering shall be provided for each distribution breaker:

1. Volts with 4-position selector switch to select three phases of voltage.
2. Amps with 4-position selector switch.
3. Kilowatts
4. Kilovars
5. Frequency
6. Power Factor

2.22 PROTECTIVE RELAYS

A. The switchgear manufacturer shall furnish and install the quantity, type and rating of protection relays as indicated on the drawings and described hereafter in this specification.

B. Protective Relaying shall be microprocessor, high reliability, as specified below.

C. Generator Protective Relaying

1. As a minimum, the following protective functions shall be provided for each Generator:
   a. Under/Over Voltage (27/59)

b. Over/Under Frequency (81 O/U)
c. Reverse Power (32)
d. Loss of Field (Reverse VAR, 40)
e. Microprocessor Engine Governor Load Sharing and Soft Loading Control (65).
f. Automatic Synchronizer (15/25)
g. Sync Check Relay (25).
h. Var/Power Factor Controller (90 PF).
i. Var/Power Factor Controller (90 PF).

D. Distribution Protective Relaying
1. As a minimum, the following protective function shall be provided for each Distribution Circuit Breaker:
a. Instantaneous/Time Overcurrent (50/51)

E. All utility grade protective relays shall be draw-out construction or test switches shall be utilized to allow for testing.

2.23 EPS ANNUNCIATION SYSTEM

A. The EPS shall be provided with local annunciation to monitor and display critical generator set, utility, and system status, fault, and shutdown information.

B. Annunciation shall comply with NFPA 110 requirements.

C. The annunciation system shall be equipped with a fast pulse horn (rated 80-95 dbA at two feet), a horn silence push-button and an acknowledge push-button. Any generator pre-alarm, generator shutdown alarm, or EPS alarm shall cause the alarm horn to sound until the horn silence button is depressed. Any subsequent alarms shall re-sound the horn. The display shall operate such that any alarm point shall “flash” until acknowledged.

D. The annunciation system shall be provided with five (5) distinct types of annunciation points:
1. Status Points – These annunciation points shall show the status of critical system or generator set components. Status annunciation points shall not sound the annunciation system horn. They shall not require acknowledgement.
2. Generator Set Pre-Alarm Points – These annunciation points shall show fault conditions that could jeopardize the ability of the EPS to function properly without immediate attention. Generator set pre-alarm annunciation points shall sound the annunciation system horn. They shall require acknowledgement. Generator set pre-alarm annunciation points shall reset automatically as the alarm condition is cleared.
3. Generator Set Shutdown Alarm Points - These annunciation points shall show fault conditions that have caused the shutdown of one (1) or more generator sets. Generator set shutdown annunciation points shall sound the annunciation system horn. They shall require acknowledgement. Generator set shutdown annunciation points shall cause the generator set to shutdown and the generator main to trip open. The generator main is then locked out until the cause of the shutdown is corrected, the engine control switch is placed in Off/Reset, and then placed back in Auto or Manual position.
4. Utility Alarm Points – These annunciation points will indicate utility related fault conditions. Utility annunciation points shall sound the annunciation system horn. They shall require acknowledgement.

5. EPS Alarm Points – These annunciation points will indicate system wide fault conditions. EPS annunciation points shall sound the annunciation system horn. They shall require acknowledgement.

2.24 EPS SECURITY

A. EPS setting changes and adjustments shall be password protected.

B. A minimum of two (2) password protected security levels shall be provided.

2.25 FUNCTIONAL SEQUENCES OF OPERATION

A. The EPS Automation shall be provided with the following modes of operation:

1. Automatic/Standby Mode
   a. The automatic transfer switches are in the normal position serving utility power to the loads.
   b. The generator set main breakers are open.
   c. The automation is standing by to act in response to a run request from associated automatic transfer switches.
2. Emergency Mode
   a. Automatic Transfer Switch Run Request
      1. Automatic transfer switches send system a run request.
      2. Where applicable, load shed sequence is executed.
      3. All available generators are started.
      4. The first generator up to voltage and frequency is closed to the bus.
      5. Unsheddable loads and load shed priority 1 loads are powered in less than 10 seconds.
      6. The remaining generator sets are synchronized and paralleled to the bus as they come up to voltage and frequency.
      7. As additional generators are paralleled to the emergency bus, Load Shed Priority levels are added, powering their associated loads.
      8. The system is now in emergency mode.
   b. Exit from Emergency Mode
      1. Automatic transfer switches sense the utility source is within acceptable operational tolerances for a time duration set at the automatic transfer switch.
      2. As each automatic transfer switch transfers back to utility power, it removes it’s run request from the generator plant.
      3. When the last automatic transfer switch has retransferred to the utility and all run requests have been removed from the generator plant, all generator set main circuit breakers shall opened.
      4. The generator sets are allowed to run for their programmed cool down period and shut down.
      5. The system is returned to automatic/standby mode.
3. No Load Test Mode
   a. Entrance into No Load Test Mode
      1. The no load test switch is placed in the “on” position.
      2. All available generators are started.
      3. The first generator up to voltage and frequency is closed to the bus.

4. The remaining generators are synchronized and paralleled to the bus as they come up to voltage and frequency.
5. The system is now in No Load Test Mode.

b. Exit from No Load Test Mode

1. The no load test switch is placed in the “off” position.
2. All generator breakers are opened.
3. The generators are allowed to run for their programmed cool down period and shut down.
4. The system is returned to automatic/standby mode.

4. Utility Fail Test Mode

a. Entrance into Utility Fail Test Mode

1. The utility fail test switch is placed in the “on” position.
2. A contact output signals each automatic transfer switch to enter utility failure test mode.
3. The system enters into emergency mode as described in the “Emergency Mode” sequence above.

b. Exit from Utility Fail Test Mode

1. The utility fail test switch is placed in the “off” position.
2. A contact output signals each automatic transfer switch to exit utility failure test mode.
3. The system exits into emergency mode as described in the “Exit from Emergency Mode” sequence above.

B. The EPS automation shall support two (2) sub-modes: Load Shed/Load Add, and Generator Demand Priority.

1. Load Shed

a. Conditional Load Shed: Upon entrance into emergency mode of operation, the load shed control shall open all sheddable circuit breakers. As generator sets come to the bus, essential priority level loads shall be added conditionally based on the number of generator sets on line. When the first generator set comes to the bus, priority level 1 loads shall be added; second generator set, priority 2, etc. After a time delay that allows all operational generator sets to come to the bus, the system shall shift to load sensitive mode.

b. Load Sensitive Load Shed: The system shall compare generator on-line capacity (in kW) to system load. If surplus generator capacity exists, load shed priority level(s) are added. If system load exceeds generator on-line capacity, load shed priority level(s) are shed. The load shed control, in its automatic shedding and adding of loads, shall not override any manual load shed/add operation.

c. Bus Underfrequency: Should the load bus frequency fall below the bus underfrequency setpoint, all priority level loads shall be shed. Load addition shall not resume until manually reset. The bus underfrequency protection shall override any manual load add operation.

2. Generator Demand Priority Control

a. Upon entrance into emergency mode, all generator sets shall be started and paralleled to the bus. After a load stabilization delay, generator sets are automatically added to or removed from the bus according to system load demand.

b. Generator Demand Priority Control shall have two modes of operation

1. Engine Hour base Generator Demand – Engines are automatically reassigned priority levels each time the generators are started in order to maintain them within a user settable amount of hours.
2. Operator manual selection of Generator Demand – An operator can disable Engine House based Generator Demand and manually set the priority level for each generator.

2.26 SPARE PARTS

A. The EPS Supplier shall have factory trained technicians that maintain a stock of spare parts and programming tools.

B. Provide a complete listing of available spares parts with O&M Documents.

C. At a minimum, provide the following components as included in the Emergency Power System:
   1. PLC’s (1 of each type)
   2. PLC I/O (1 of each type)
   3. Control relays (5 of each type and size)
   4. Control fuses (5 of each type and size)
   5. HMI touchscreen (1 of each type)
   6. HMI touch screen processor (1 of each type)
   7. Ethernet switch (1 of each type)

PART 3 EXECUTION

3.01 FACTORY TESTING

A. The switchgear shall be completely and functionally tested in the manufacturer's facility prior to shipment. For systems shipped in multiple sections, the switchgear shall be quality tested utilizing the plug-together wiring system which shall be unplugged prior to shipment and plugged together again when the equipment is installed in order to maintain the integrity of the manufacturer's quality assurance testing.

B. The main bus system shall be given a dielectric test of 2200 volts for one minute between live parts and ground and between opposite polarities.

C. The wiring and control circuits shall be given a dielectric test of 1500 volts for one minute, or 1800 volts for one second, between live parts and ground, in accordance with ANSI C37.20.1.

D. For systems shipped in multiple sections, the switchgear shall be quality tested utilizing the plug-together wiring system which shall be unplugged prior to shipment and plugged together again when the equipment is installed in order to maintain the integrity of the manufacturer's quality assurance testing.

E. A certified test report of all standard production tests shall be shipped with each assembly.

3.02 INSTALLATION (BY CONTRACTOR)

A. Store equipment in a clean, dry place as per manufacturer's instructions. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

B. The Contractors shall install all equipment per the manufacturer's instructions, contract drawings and National Electrical Code.

C. The equipment shall be installed and checked in accordance with the manufacturer's recommendations. This shall include but not limited to:

1. Checking to ensure that the pad location is level to within 0.125 inches per three foot of distance in any direction.
2. Checking to ensure that all bus bars are torqued to the manufacturer's recommendations.
3. Assembling all shipping sections, removing all shipping braces and connecting all shipping split mechanical and electrical connections.
4. Securing assemblies to foundation or floor channels.
5. Measuring and recording Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (four wire systems only).
6. Inspecting and installing all circuit breakers in their proper compartments.

D. The protective devices shall be set in the field by the Contractor in accordance with settings designated in a coordination study of the system as required elsewhere in the contract documents.

3.03 FIELD QUALITY CONTROL AND STARTUP

A. Provide the services of a qualified factory-trained manufacturer's representative for start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction to the contractor in general installation of the equipment, connections and adjustments, and testing of the assembly and components contained therein.

B. The manufacturer's representative shall provide inspection of the final installation, perform functional testing, and start-up the EPS.

C. Functional Testing shall include as a minimum:

1. Pre-startup inspection of the generator set, dc system, control wiring, power cables, and switchboard/switchgear.
2. Crank and run engine-generator sets at the local engine control panel.
3. Crank and run engine-generator sets from the HMI touchscreen.
4. Verify engine-generator set alarms and shutdowns to HMI.
5. Verify protective relay/breaker trip unit settings are set to coordination study if applicable.
6. Test all modes of operation.
7. Verify and test all system alarms.
8. Test EPS with Load.

3.04 TRAINING

A. The manufacturer's representative shall provide an eight (8) hour "hands-on" training course for the customer's operating personnel which shall cover the following topics:

1. Overall system description and theory of operation.

2. Automatic operation.
3. Manual operation.
4. Safeties and protective relaying.
5. Recommended system check lists and log sheets.
6. Recommended preventive maintenance.
7. Instruction on the operation of the assembly, circuit breakers, and major components within the assembly.

Appendix D. Dock Bridge Tower Resiliency Design

App D – Dock Bridge Tower Resiliency Design pdf file is included in the digital submission.

Date: 10-03-17

New Jersey Transit: Newark Penn Station DG Project

Scope Item: Dock Bridge Resiliency

Background: Amtrak's Dock Tower Lift Bridge consists of three spans over the Passaic River. The bridge spans are lifted by DC motors. The motors get power from 2300V Motor-Generator (MG) sets (450 HP, 600 HP, and two 750 HP MG sets) located in the building adjacent to the bridge. The bridge spans are as follows:

- North Bridge: (3) 260 HP DC motors powered by one 750 HP MG set
- Path Bridge: (3) 260 HP DC motors powered by one 600 HP MG set
- South Bridge: (2) 135 HP DC motors powered by one 450 HP MG set

Note: There is one additional redundant 750 HP MG set capable of powering all three sets of bridge span motors.

In order to open the bridge span sections, first the MG sets are activated one by one and stabilized to provide constant DC power. A test was done previously by Amtrak to determine the state of the Motor Generator sets. The attached figures show the measured voltage and current draw when each of the MG sets are activated in succession.

As can be seen in the figures, the largest MG set has an initial inrush of about 748A at 1803V for a period of about 34s. This equates to 2336 KVA in alternating current. The inrush period is necessary to overcome the inertia of these large Motor Generator sets. Once the 750 HP motor is in motion the current and voltage drops down to its idle state which is about 60A at 2300V. This equates to 240 KVA in alternating current.

This presents a design challenge as an internal combustions engine must run at a minimum load of at least 30% of its nameplate and the MG sets idle at about 10% of their initial inrush load. Generators do have an initial staring outrush current (sKVA) that is often used to start large motors. However, the generator outrush will only last 10s and the inrush on these old MG sets last for 34s as can be seen in the figures.

Once all MG sets are running in an idle mode the bridge motors are activated one span section at a time. The bridge works on a counter-weighted hoist system similar to an elevator. This presents an additional design challenge as the bridge requires power input to lift it and move the equilibrium point of the bridge counterweight system. When the bridge is in the open position this energy is stored as potential energy. As the bridge is closing the hoist-driveshaft coupling will actually spin backwards turning the bridge motor into a generator. The power generated should be equivalent to the power required to open the bridge minus some friction losses. In typical elevator systems there are often other building loads that can be served by this reverse power flow out of the elevators. In our case the bridge will be islanded and the generated power will need to be dealt with in another way.

Proposed Option:

Provide new natural gas engine generator(s) that can handle the full inrush of the MG sets in parallel to the NPS power distribution. In this case a transfer switch would need to be installed that transfers the

main power distribution substation (main-tie-main substation #1) loads to the generators during a utility failure. During a utility failure the switchgear SCADA controls system will open the breakers on all the distribution feeds on substation #1 aside from DP1 and DP2 (the two bridge equipment feeds).

(2) 1 MW natural gas standby engines each with its own 1 MW load bank with auto load regulation and regenerative power protection capability via kw sensing will be used to operate the bridge equipment.

The auto load regulation option's main function is to maintain a minimum load on the generator at all times consistent with recommended operating practices for engine generators sets. This is accomplished by maintaining total generator load within a preset bandwidth when external load demands on generator set are present. A PLC controller senses generator load and automatically adds or subtracts load bank steps in order to maintain total generator load at a desired level. The controller senses amperage or wattage. Load banks with the Auto Load Regulation option allow for adjustable minimum and maximum load level and load step addition and subtraction delays.

By providing for minimum generator loading, the load bank ensures that a minimum value of load is always on the generator and hence insures that power direction should never transition through zero to reverse power. Whenever generator load is less than the minimum load set point of the sensors, load will be added to the generator by the load bank.

When load exceeds the maximum set point, the load bank will step-down to remove load. In the event that reverse power is sensed, the load bank will automatically and instantaneously apply additional load to verify that reverse power is not absorbed by the generator

The load banks can be controlled manually to bring the engines up to the requisite 2336 KVA for starting. When the MG sets are started, the load will be stepped off the load bank and transferred over to start the MG sets. When the load drops down from 2336 KVA to 240 KVA after the initial inrush of the MG set, the load will be stepped onto the load bank to give the engine enough load to keep it at a desired level.

Load banks with Regenerative Power sensing, will be on-line whenever the generator runs. It provides a dual function: to maintain a minimum load on the generator at all times consistent with recommended operating practices for engine generators sets and to provide a load sink for regenerative power from inertial loads (such as elevators, ski lifts, cranes, bridges).

As a load sink for regenerative power, the load bank can be active during periods when the facility loads exclusive of the inertial loads are relatively light and therefore unavailable as a sink for regenerative power. When the bridge is lowered the counter-weight system will turn its stored potential energy into electrical energy and produce regenerative current back onto the Dock Tower Bridge Bus. During our islanded "Bridge Open" condition, all loads will have been shed off the bus and the load banks will need to be used to sense the regenerative current and close contactors as necessary to act as a load sink. This will prevent circulating regenerative power from tripping out the Standby Generators during a bridge closure.

Appendix E. Sample Data Point Registry

App E – Sample Data Point Registry pdf file is included in the digital submission.

Cat Switchgear

PLC Data Table Interface Manual

Cat Switchgear Project Number:

40611

Cat Switchgear Project:

Greater Lawrence Sanitary District

DOCUMENTATION

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to contact Intelligent Switchgear Organization, LLC.

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or

Important Definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

ISO, LLC reserves the right to update any portion of this publication at any time.

Intelligent Switchgear Organization, LLC
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Section 1: General Information

The PLC Data Table Interface is designed to provide a third-party automation system with an interface to gather values from the ISO/CAT Switchgear, and in some custom applications, control the system itself.

The PLC Data Table Interface (DTI) provides data over either a RS-485 serial link via ModbusRTU, or an ethernet connection via ModbusTCP.

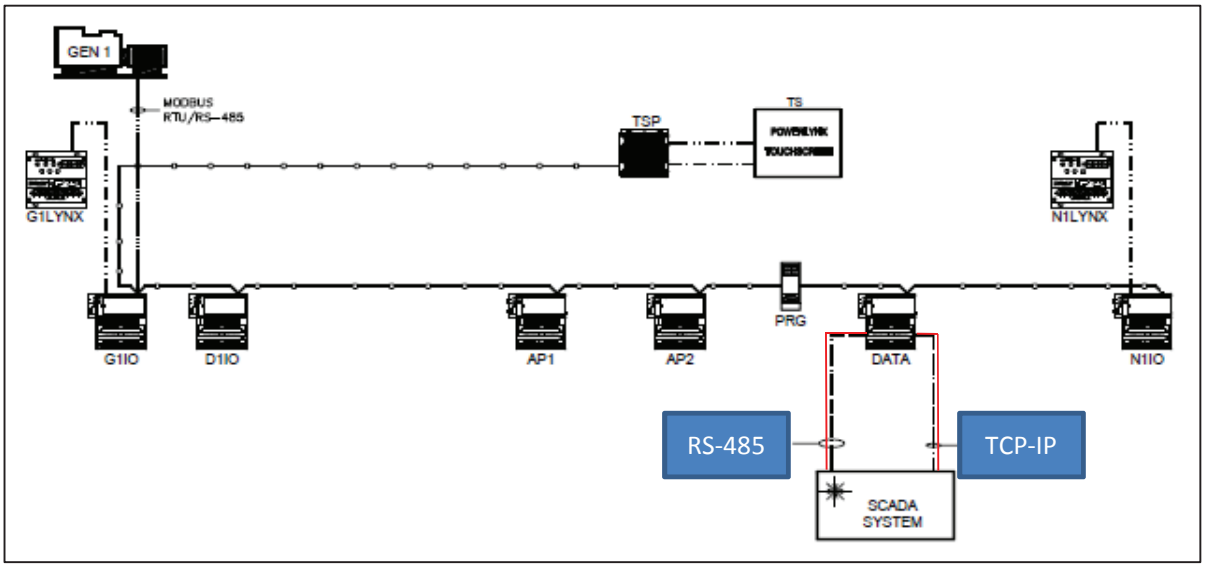


Figure 1-1 Typical PLC Architecture

The hardware PLC that services that DTI is typically labeled "DATA" or "DATA PLC". Use this PLC to interface the switchgear with a Third-Party provided SCADA system.

Section 2: Data Types

TYPE	Description	Bounds
BOOL	Boolean Value	1 = True / 0 = False
BYTE	8 Bit Data Type	0~255
WORD	16 Bit Data Type	0~65535
INT	Signed Integer	-32768~32767
UINT	Unsigned Integer	0~65535
DINT	Double Integer	-2147483648~2147483647
UDINT	Unsigned Double Integer	0~4294967295
REAL	Floating Point Number	###.###

Figure 2-3 Male 9-Pin
D-Shell nnector

Section 4: Data Tables

Generator 1	Page 7
Generator 2	Page 10
Emergency Tie 1	Page 13
Emergency Tie 2	Page 15
Utility 1	Page 15
Utility 2	Page 16
Utility Tie 1	Page 18
Automation Processor 1	Page 19
Distribution 1	Page 20

Address	Description	Notes	Data Type
GENERATOR 1			
400201	Shutdown Faults 1 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Low Coolant Level		
1	Spare		
2	High Coolant Temp		
3	Low Oil Press		
4	Over Crank		
5	Over Speed		
6	Under Frequency		
7	Over Frequency		
8	Under Voltage		
9	Over Voltage		
10	Reverse Power		
11	Loss Of Field		
12	Breaker Tripped		
13	Ground Fault		
14	Spare		
15	High Winding Temp Trip		
400202	Pre-Alarms 1 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	High Cool Temp		
1	Low Cool Temp		
2	Low Oil Press		
3	Low Battery Volts		
4	High Battery Volts		
5	Batt Charger Malfunction		
6	CB Failed To Close		
7	CB Failed To Open		
8	Engine Communication Error		
9	Transducer Fault		
10	Fail to Sync		
11	24VDC UPS Alarm		
12	Sync Switch Not in Auto		
13	Engine ECS Not in Auto		
14	Swgr ECS Not In Auto		
15	Generator Switchgear in Local		
400203	Status & Control Word		WORD
BIT	*BIT DECRIPTION*		
0	Shutdown Fault		
1	Circuit Breaker Closed		
2	GEN Swgr in Local		
3	Spare		
4	Spare		
5	ECS in Off		
6	Spare		
7	OK To Close Breaker		
8	Cooldown		
9	Spare		
10	Circuit Breaker Tripped		
11	Not In Auto		
12	Circuit Breaker Opened		
13	Gen Running		
14	Spare		

Address	Description	Notes	Data Type
15	Gen Not Avail		
400205	Power Factor Rotation		INT
400206	Power Factor		INT
400207	Phase A amps		INT
400208	Phase B amps		INT
400209	Phase C amps		INT
400210	Reference HZ		INT
400211	A-B volts		INT
400212	B-C volts		INT
400213	C-A Volts		INT
400214	Reference Volts		INT
400215	kW		INT
400216	kVAR		INT
400217	kVA		INT
400218	Frequency		INT
400219	Phase Angle Difference		INT
400220	WarmupTimer Countdown		INT
400222	Engine Status (0= Avail, 1= Running, 2 = Cooldown, 3= Standby, 4= Pre-Alarm, 5= Not Avail, 6=Shutdown)		INT
400223	Spare		-
400224	Spare		-
400225	Spare		-
400226	Cool-down Time Remaining		INT
400227	Shutdown Faults 1 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Low Coolant Level		
1	Spare		
2	High Coolant Temp		
3	Low Oil Press		
4	Over Crank		
5	Over Speed		
6	Under Frequency		
7	Over Frequency		
8	Under Voltage		
9	Over Voltage		
10	Reverse Power		
11	Loss Of Field		
12	Breaker Tripped		
13	Ground Fault		
14	Spare		
15	High Winding Temp Trip		
400228	Pre-Alarms 1 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	High Cool Temp		
1	Low Cool Temp		
2	Low Oil Press		
3	Low Battery Volts		
4	High Battery Volts		
5	Batt Charger Malfunction		
6	CB Failed To Close		
7	CB Failed To Open		
8	Engine Communication Error		
9	Transducer Fault		
10	Fail to Sync		
11	24VDC UPS Alarm		

Address	Description	Notes	Data Type
12	Sync Switch Not in Auto		
13	Engine ECS Not in Auto		
14	Swgr ECS Not In Auto		
15	Generator Switchgear in Local		
400229	Shutdown Faults 2 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Over Excitation		
1	SEL-700G Multi-function Relay Fail		
2	SEL-587 Multi-function Relay Fail		
3	Estop at Engine		
4	EMPC Shutdown Fault		
5	Generator Gas Valve Failed to Open		
6	Engine Fail to Start		
7	Failure to reach Rated Speed		
8	Motors Not Started		
9	SCR Failure		
10	Spare		
11	Spare		
12	Spare		
13	Gas Valve Failure		
14	G1 Inlet Press High PAH125A		
15	G1 Inlet Press Low PAL125A		
400230	Pre-alarms 2 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Ground Fault Alarm		
1	Generator in ARM Mode		
2	Generator IO Manager Active		
3	Spare		
4	High Winding Temp Alarm		
5	High Bearing Temp Alarm		
6	Circuit Breaker Removed		
7	Breaker Control Switch in Pull-to-Lock Position		
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400231	Shutdown Faults 2 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Over Excitation		
1	SEL-700G Multi-function Relay Fail		
2	SEL-587 Multi-function Relay Fail		
3	Estop at Engine		
4	EMPC Shutdown Fault		
5	Generator Gas Valve Failed to Open		
6	Engine Fail to Start		
7	Failure to reach Rated Speed		
8	Motors Not Started		
9	SCR Failure		
10	Spare		
11	Spare		

Address	Description	Notes	Data Type
12	Spare		
13	Gas Valve Failure		
14	Gen Inlet Press High PAH125A		
15	Gen Inlet Press Low PAL125A		
400232	Pre-alarms 2 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Ground Fault Alarm		
1	Generator in ARM Mode		
2	Generator IO Manager Active		
3	Spare		
4	High Winding Temp Alarm		
5	High Bearing Temp Alarm		
6	Circuit Breaker Removed		
7	Breaker Control Switch in Pull-to-Lock Position		
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
GENERATOR 2			
400241	Shutdown Faults 1 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Low Coolant Level		
1	Spare		
2	High Coolant Temp		
3	Low Oil Press		
4	Over Crank		
5	Over Speed		
6	Under Frequency		
7	Over Frequency		
8	Under Voltage		
9	Over Voltage		
10	Reverse Power		
11	Loss Of Field		
12	Breaker Tripped		
13	Ground Fault		
14	Spare		
15	High Winding Temp Trip		
400242	Pre-Alarms 1 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	High Cool Temp		
1	Low Cool Temp		
2	Low Oil Press		
3	Low Battery Volts		
4	High Battery Volts		
5	Batt Charger Malfunction		
6	CB Failed To Close		
7	CB Failed To Open		
8	Engine Communication Error		
9	Transducer Fault		
10	Fail to Sync		

Address	Description	Notes	Data Type
11	24VDC UPS Alarm		
12	Sync Switch Not in Auto		
13	Engine ECS Not in Auto		
14	Swgr ECS Not In Auto		
15	Generator Switchgear in Local		
400243	Status & Control Word		WORD
BIT	*BIT DECRIPTION*		
0	Shutdown Fault		
1	Circuit Breaker Closed		
2	GEN Swgr in Local		
3	Spare		
4	Spare		
5	ECS in Off		
6	Spare		
7	OK To Close Breaker		
8	Cooldown		
9	Spare		
10	Circuit Breaker Tripped		
11	Not In Auto		
12	Circuit Breaker Opened		
13	Gen Running		
14	Spare		
15	Gen Not Avail		
400245	Power Factor Rotation		INT
400246	Power Factor		INT
400247	Phase A amps		INT
400248	Phase B amps		INT
400249	Phase C amps		INT
400250	Reference HZ		INT
400251	A-B volts		INT
400252	B-C volts		INT
400253	C-A Volts		INT
400254	Reference Volts		INT
400255	kW		INT
400256	kVAR		INT
400257	kVA		INT
400258	Frequency		INT
400259	Phase Angle Difference		INT
400260	WarmupTimer Countdown		INT
400262	Engine Status (0= Avail, 1= Running, 2 = Cooldown, 3= Standby, 4= Pre-Alarm, 5= Not Avail, 6=Shutdown)		INT
400263	Spare		-
400264	Spare		-
400265	Spare		-
400266	Cool-down Time Remaining		INT
400267	Shutdown Faults 1 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Low Coolant Level		
1	Spare		
2	High Coolant Temp		
3	Low Oil Press		
4	Over Crank		
5	Over Speed		
6	Under Frequency		
7	Over Frequency		

Address	Description	Notes	Data Type
8	Under Voltage		
9	Over Voltage		
10	Reverse Power		
11	Loss Of Field		
12	Breaker Tripped		
13	Ground Fault		
14	Spare		
15	High Winding Temp Trip		
400268	Pre-Alarms 1 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	High Cool Temp		
1	Low Cool Temp		
2	Low Oil Press		
3	Low Battery Volts		
4	High Battery Volts		
5	Batt Charger Malfunction		
6	CB Failed To Close		
7	CB Failed To Open		
8	Engine Communication Error		
9	Transducer Fault		
10	Fail to Sync		
11	24VDC UPS Alarm		
12	Sync Switch Not in Auto		
13	Engine ECS Not in Auto		
14	Swgr ECS Not In Auto		
15	Generator Switchgear in Local		
400269	Shutdown Faults 2 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Over Excitation		
1	SEL-700G Multi-function Relay Fail		
2	SEL-587 Multi-function Relay Fail		
3	Estop at Engine		
4	EMPC Shutdown Fault		
5	Generator Gas Valve Failed to Open		
6	Engine Fail to Start		
7	Failure to reach Rated Speed		
8	Motors Not Started		
9	SCR Failure		
10	Spare		
11	Spare		
12	Spare		
13	Gas Valve Failure		
14	G2_Inlet_Press_High_PAH125A		
15	Gen Inlet Press Low PAL125A		
400270	Pre-alarms 2 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Ground Fault Alarm		
1	Generator in ARM Mode		
2	Generator IO Manager Active		
3	Spare		
4	High Winding Temp Alarm		
5	High Bearing Temp Alarm		
6	Circuit Breaker Removed		
7	Breaker Control Switch in Pull-to-Lock Position		

Address	Description	Notes	Data Type
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400271	Shutdown Faults 2 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Over Excitation		
1	SEL-700G Multi-function Relay Fail		
2	SEL-587 Multi-function Relay Fail		
3	Estop at Engine		
4	EMPC Shutdown Fault		
5	Generator Gas Valve Failed to Open		
6	Engine Fail to Start		
7	Failure to reach Rated Speed		
8	Motors Not Started		
9	SCR Failure		
10	Spare		
11	Spare		
12	Spare		
13	Gas Valve Failure		
14	Gen Inlet Press High PAH125A		
15	Gen Inlet Press Low PAL125A		
400272	Pre-alarms 2 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Ground Fault Alarm		
1	Generator in ARM Mode		
2	Generator IO Manager Active		
3	Spare		
4	High Winding Temp Alarm		
5	High Bearing Temp Alarm		
6	Circuit Breaker Removed		
7	Breaker Control Switch in Pull-to-Lock Position		
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
EMERGENCY TIE 1			
400721	Alarms (Flashing for Annunciator)		Word
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		

Address	Description	Notes	Data Type
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400722	Alarms (Steady for Alarm Summary)		Word
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400725	Tie PF_Rotation		Integer
400726	Tie Power Factor		Integer
400727	Tie Phase A Amps		Integer
400728	Tie Phase B Amps		Integer
400729	Tie Phase C Amps		Integer
400730	Tie Referency Hz		Integer
400731	Tie A-B volts		Integer
400732	Tie B-C volts		Integer
400733	Tie C-A Volts		Integer
400734	Tie Average Volts		Integer
400735	Tie kW		Integer
400736	Tie kVAR		Integer
400737	Spare		Integer
400738	Tie Frequency		Integer
400739	Tie Phase Angle Difference		Integer
400740	Spare		Integer
400741	Spare		Integer
400742	Spare		Integer
400743	Spare		Integer
400744	Spare		Integer
400745	Spare		Integer
400746	Spare		Integer
400747	Spare		Integer
400748	Spare		Integer
400749	Spare		Integer
400750	Spare		Integer
400751	Spare		Integer

Address	Description	Notes	Data Type
400752	Spare		Integer
	EMERGENCY TIE 2		
400761	Alarms (Flashing for Annunciator)		Word
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400762	Alarms (Steady for Alarm Summary)		Word
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
	UTILITY 1		
400881	Alarms (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Reverse Power		
7	Tie in ARM		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Utility Faulted		
10	SEL-351 Multi-function Relay Failure		
11	SEL-587 Multi-function Relay Failure		
12	SEL-547 Multi-function Relay Failure		

Address	Description	Notes	Data Type
13	Reclose Lockout		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400882	Alarms (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Reverse Power		
7	Tie in ARM		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Utility Faulted		
10	SEL-351 Multi-function Relay Failure		
11	SEL-587 Multi-function Relay Failure		
12	SEL-547 Multi-function Relay Failure		
13	Reclose Lockout		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400885	Utility Power Factor Rotation		INT
400886	Utility Power Factor		INT
400887	Utility Phase A Amps		INT
400888	Utility Phase B Amps		INT
400889	Utility Phase C Amps		INT
400890	Utility Reference Frequency		INT
400891	Utility A-B volts		INT
400892	Utility B-C volts		INT
400893	Utility C-A Volts		INT
400894	Utility Reference Volts		INT
400895	Utility kW		INT
400896	Utility kVAR		INT
400897	Spare		-
400898	Utility Frequency		INT
400899	Utility Phase Angle Difference		INT
400900	Spare		INT
400901	Spare		-
400902	Spare		-
400903	Spare		-
400904	Spare		-
400905	Spare		-
400906	Spare		-
400907	Spare		-
400908	Spare		-
400909	Spare		-
400910	Spare		-
400911	Spare		-
400912	Spare		-
UTILITY 2			
400921	Alarms (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		

Address	Description	Notes	Data Type
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Reverse Power		
7	Tie in ARM		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Utility Faulted		
10	SEL-351 Multi-function Relay Failure		
11	SEL-587 Multi-function Relay Failure		
12	SEL-547 Multi-function Relay Failure		
13	Reclose Lockout		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400922	Alarms (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Reverse Power		
7	Tie in ARM		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Utility Faulted		
10	SEL-351 Multi-function Relay Failure		
11	SEL-587 Multi-function Relay Failure		
12	SEL-547 Multi-function Relay Failure		
13	Reclose Lockout		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
400925	Utility Power Factor Rotation		INT
400926	Utility Power Factor		INT
400927	Utility Phase A Amps		INT
400928	Utility Phase B Amps		INT
400929	Utility Phase C Amps		INT
400930	Utility Reference Frequency		INT
400931	Utility A-B volts		INT
400932	Utility B-C volts		INT
400933	Utility C-A Volts		INT
400934	Utility Reference Volts		INT
400935	Utility kW		INT
400936	Utility kVAR		INT
400937	Spare		-
400938	Utility Frequency		INT
400939	Utility Phase Angle Difference		INT
400940	Spare		INT
400941	Spare		-
400942	Spare		-
400943	Spare		-
400944	Spare		-
400945	Spare		-
400946	Spare		-

Address	Description	Notes	Data Type
400947	Spare		-
400948	Spare		-
400949	Spare		-
400950	Spare		-
400951	Spare		-
400952	Spare		-
	UTILITY TIE 1		
401041	Alarms (Flashing for Annunciator)		Integer
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
401042	Alarms (Steady for Alarm Summary)		Integer
BIT	*BIT DECRIPTION*		
0	Breaker Tripped		
1	Breaker Failed to Close		
2	Breaker Failed to Open		
3	Breaker Failed to Sync		
4	Transducer Fault		
5	Tie Controls Not in Auto		
6	Tie in ARM		
7	Breaker Removed		
8	Circuit Breaker Control Switch in Pull-to-Lock		
9	Multi-function Relay Failure		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Breaker Trip Voltage Failure		
15	Breaker Close Voltage Failure		
401045	Pwr Factor Rotation		Integer
401046	Pwr Factor		Integer
401047	Phase A Amps		Integer
401048	Phase B Amps		Integer
401049	Phase C Amps		Integer
401050	Bus Ref Freq		Integer
401051	Phase AB Voltage		Integer
401052	Phase BC Voltage		Integer
401053	Phase CA Voltage		Integer
401054	Bus Ref Voltage		Integer
401055	kW		Integer

Address	Description	Notes	Data Type
401056	kVAR		Integer
401057	Spare		Integer
401058	Frequency		Integer
401059	Angle		Integer
401060	Spare		Integer
401061	Spare		Integer
401062	Spare		Integer
401063	Spare		Integer
401064	Spare		Integer
401065	Spare		Integer
401066	Spare		Integer
401067	Spare		Integer
401068	Spare		Integer
401069	Spare		Integer
401070	Spare		Integer
401071	Spare		Integer
401072	Spare		Integer
AUTOMATION PROCESSOR 1			
401201	System Alarms 1 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Emode Alarm		
1	SYS Not In Auto		
2	Load Shed Override		
3	Gen Bus Under Frequency		
4	Master Shut Down		
5	MDS Switchgear in Local		
6	Any Transducer Fault		
7	24VDC PS 203 Malfunction		
8	24VDC PS 211 Malfunction		
9	125VDC-A Battery Charger Fail		
10	125VDC-B Battery Charger Fail		
11	Load Management Setpoint Failure		
12	PT 953 Post Compressor Low Pressure		
13	LAH120 Digester Level High		
14	LAL120 Digester Level Low		
15	LALL120 Digester Level Low Low		
401202	System Alarms 1 (Steady for Alarm Summary)		WORD
BIT	*BIT DECRIPTION*		
0	Emode Alarm		
1	SYS Not In Auto		
2	Load Shed Override		
3	Gen Bus Under Frequency		
4	Master Shut Down		
5	MDS Switchgear in Local		
6	Any Transducer Fault		
7	24VDC PS 203 Malfunction		
8	24VDC PS 211 Malfunction		
9	125VDC-A Battery Charger Fail		
10	125VDC-B Battery Charger Fail		
11	Load Management Setpoint Failure		
12	PT 953 Post Compressor Low Pressure		
13	LAH120 Digester Level High		
14	LAL120 Digester Level Low		
15	LALL120 Digester Level Low Low		

Address	Description	Notes	Data Type
401203	System Alarms 2 (Flashing for Annunciator)		WORD
BIT	*BIT DECRIPTION*		
0	Any Distribution Breaker Tripped		
1	Any Distribution Fail to Close		
2	Any Distribution Fail to Open		
3	Any Distribution Relay Failure		
4	Any Distribution Ground Fault		
5	Any Distribution Breaker Not in Connect		
6	Any Distribution Breaker in ARM		
7	Any Distribution Trip Voltage Failure		
8	Any Distribution Close Voltage Failure		
9	Bus A 587Z Tripped		
10	Bus B 587Z Tripped		
11	Bus A 587Z Relay Failure		
12	Bus B 587Z Relay Failure		
13	24VDC PS 1A02 Malfunction		
14	Spare		
15	Spare		
401204	System Alarms 2 (Steady for Alarm Summary)		Word
BIT	*BIT DECRIPTION*		
0	Any Distribution Breaker Tripped		
1	Any Distribution Fail to Close		
2	Any Distribution Fail to Open		
3	Any Distribution Relay Failure		
4	Any Distribution Ground Fault		
5	Any Distribution Breaker Not in Connect		
6	Any Distribution Breaker in ARM		
7	Any Distribution Trip Voltage Failure		
8	Any Distribution Close Voltage Failure		
9	Bus A 587Z Tripped		
10	Bus B 587Z Tripped		
11	Bus A 587Z Relay Failure		
12	Bus B 587Z Relay Failure		
13	24VDC PS 1A02 Malfunction		
14	Spare		
15	Spare		
401211	Power Factor Setpoint		INT
401212	System VAR Setpoint		INT
401213	Spare		INT
401214	Spare		INT
401215	System Voltage Setpoint		INT
401216	System Frequency Setpoint		INT
401217	Spare		INT
401218	Spare		INT
401219	Spare		INT
401220	Spare		INT
DISTRIBUTION			
401364	Dist Bkr Status Word 1		WORD
BIT	*BIT DECRIPTION*		
0	D1 Closed		
1	D1 Tripped		
2	D1 Failed to Close		
3	D1 Failed to Open		
4	D1 Multifunction Relay Failed		

Address	Description	Notes	Data Type
5	D2 Closed		
6	D2 Tripped		
7	D2 Failed to Close		
8	D2 Failed to Open		
9	D2 Multifunction Relay Failed		
10	D3 Closed		
11	D3 Tripped		
12	D3 Failed to Close		
13	D3 Failed to Open		
14	D3 Multifunction Relay Failed		
15	Spare		
401365	Dist Bkr Status Word 2		WORD
BIT	*BIT DECRIPTION*		
0	D4 Closed		
1	D4 Tripped		
2	D4 Failed to Close		
3	D4 Failed to Open		
4	D4 Multifunction Relay Failed		
5	D5 Closed		
6	D5 Tripped		
7	D5 Failed to Close		
8	D5 Failed to Open		
9	D5 Multifunction Relay Failed		
10	D6 Closed		
11	D6 Tripped		
12	D6 Failed to Close		
13	D6 Failed to Open		
14	D6 Multifunction Relay Failed		
15	Spare		
401366	Dist Bkr Status Word 3		WORD
BIT	*BIT DECRIPTION*		
0	D7 Closed		
1	D7 Tripped		
2	D7 Failed to Close		
3	D7 Failed to Open		
4	D7 Multifunction Relay Failed		
5	D8 Closed		
6	D8 Tripped		
7	D8 Failed to Close		
8	D8 Failed to Open		
9	D8 Multifunction Relay Failed		
10	D9 Closed		
11	D9 Tripped		
12	D9 Failed to Close		
13	D9 Failed to Open		
14	D9 Multifunction Relay Failed		
15	Spare		
401367	Spare Word 1		WORD
BIT	*BIT DECRIPTION*		
0	D10 Closed		
1	D10 Tripped		
2	D10 Failed to Close		
3	D10 Failed to Open		
4	D10 Multifunction Relay Failed		

Address	Description	Notes	Data Type
5	Spare		
6	Spare		
7	Spare		
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Spare		
15	Spare		
401368	Spare Word 2		WORD
BIT	*BIT DECRIPTION*		
0	Spare		
1	Spare		
2	Spare		
3	Spare		
4	Spare		
5	Spare		
6	Spare		
7	Spare		
8	Spare		
9	Spare		
10	Spare		
11	Spare		
12	Spare		
13	Spare		
14	Spare		
15	Spare		

Address	Description	Notes	Data Type

Intelligent Switchgear Organization, LLC is a Caterpillar Electric Power Business

Intelligent Switchgear Organization, LLC
4955 Marconi Drive
Alpharetta, Georgia 30005

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ADDENDUM NO. 2

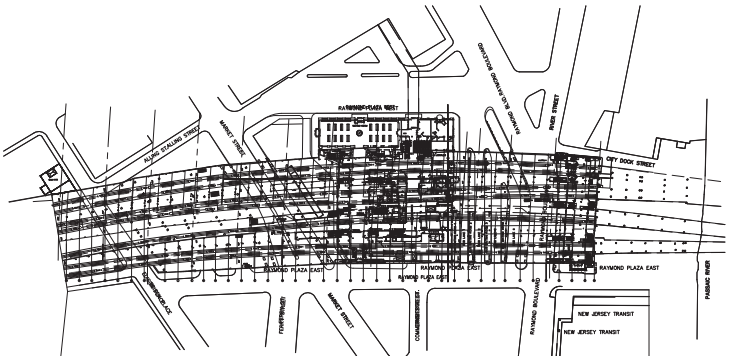
ATTACHMENT C

REQUEST FOR PROPOSAL NO. 21-059

FINAL DESIGN, ENGINEERING AND OTHER TECHNICAL SERVICES FOR THE NEWARK PENN STATION DG PROJECT

20% DRAWINGS
FOR THE NEWARK PENN STATION DG PROJECT

DISTRIBUTED GENERATION
NEWARK PENN STATION
NEW JERSEY TRANSIT
20% DESIGN SUBMISSION



NEWARK PENN STATION
1 RAYMOND PLAZA WEST & MARKET STREET
NEWARK, NJ 07102



Location Plan

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP
				Chkd.Dwn. AD

Date 03/15/19

Engineer of Record
_____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

AECOM
125 BROAD STREET
NEW YORK, NY 10004

CONSULTANT
WSP USA
One Penn Plaza, New York, NY 10119

NEW JERSEY TRANSIT
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NEWARK PENN STATION
COVER SHEET

Scale: NTS
Contract No.: 16-001
Drawing: G-001
Sheet: 1 of 31

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LIST OF DRAWINGS

SHT NO.	DWG NO.	TITLE
GENERAL		
1.	G–001	COVER SHEET
2.	G–002	LIST OF DRAWINGS
DEMOLITON		
3.	DM–201	DEMOLITION ELECTRICAL BASEMENT EXISTING SUBSTATION PARTIAL PLAN
4.	DM–202	DEMOLITION GROUND FLOOR PARTIAL PLAN
5.	DE–601	DEMOLITION ELECTRICAL SINGLE LINE DIAGRAM – GENERAL ARRANGEMENT
6.	DE–602	DEMOLITION ELECTRICAL SINGLE LINE DIAGRAM – SUBSTATION 2
ARCHITECTURAL		
7.	A–601	ARCHITECTURAL NEW ATS ROOM REFLECTED CEILING PLAN
ELECTRICAL		
8.	E–001	ELECTRICAL NOTES, ABBREVIATIONS, & SYMBOLS
9.	E–201	ELECTRICAL NEWARK PENN STATION SUBSTATION PLAN
10.	E–202	ELECTRICAL ATS ROOM GROUND FLOOR PARTIAL PLAN
11.	E–203	ELECTRICAL BOILER HOUSE GROUND FLOOR PLAN
12.	E–301	ELECTRICAL BLOCK DIAGRAM OF DG PLANT FEEDS
13.	E–601	ELECTRICAL SINGLE LINE DIAGRAM – GENERAL ARRANGEMENT
14.	E–602	ELECTRICAL SINGLE LINE DIAGRAM – DOCK TOWER SWITCHGEAR
15.	E–603	ELECTRICAL SINGLE LINE DIAGRAM – SUBSTATION 2
16.	E–610	ELECTRICAL LOGIC DIAGRAM
17.	E–611	ELECTRICAL SEQUENCE OF OPERATION 1 OF 2
18.	E–612	ELECTRICAL SEQUENCE OF OPERATION 2 OF 2
19.	E–613	ELECTRICAL COMMUNICATION DIAGRAM
20.	E801	ELECTRICAL SCHEDULES 1 OF 2
21.	E802	ELECTRICAL SCHEDULES 2 OF 2
MECHANICAL		
22.	M–101	MECHANICAL BOILER HOUSE BASEMENT FLOOR PLAN
23.	M–102	MECHANICAL BOILER HOUSE SECOND FLOOR PLAN
24.	M–103	MECHANICAL BOILER HOUSE ROOF PLAN
25.	M–501	MECHANICAL BOILER HOUSE ELEVATION
PLUMBING		
26.	P–101	PLUMBING EXISTING SUMP PIT AND PIPING LAYOUT
27.	P–102	PLUMBING PROPOSED EMERGENCY PUMP LOCATION AND NEW PIPING LAYOUT
STRUCTURAL		
28.	S–100	STRUCTURAL OLD BOILER HOUSE FOUNDATION PLAN
29.	S–101	STRUCTURAL OLD BOILER HOUSE GROUND FLOOR FRAMING PLAN
30.	S–102	STRUCTURAL OLD BOILER HOUSE SECOND FLOOR FRAMING PLAN
31.	S–103	STRUCTURAL OLD BOILER HOUSE ROOF FRAMING PLAN

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
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Date 03/15/19 | Des. AK | Dwn. | Chkd.

Engineer of Record _____ P.E.
Professional Engineer
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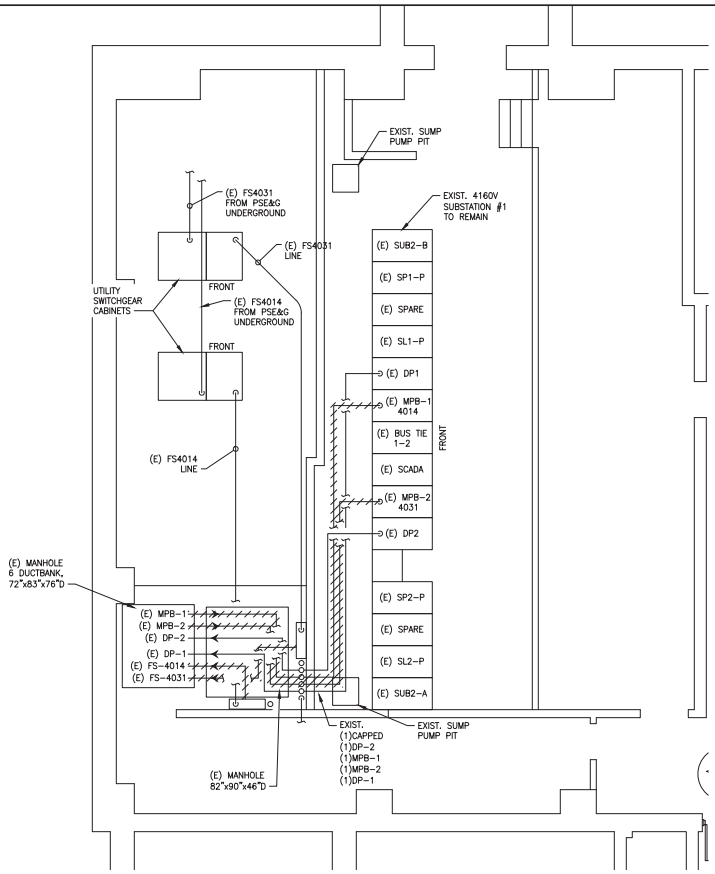
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
LIST OF DRAWINGS

Scale: NTS
Contract No.: 16-001
Drawing: G-002
Sheet: 2 of 31

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BASEMENT EXISTING SUBSTATION PARTIAL PLAN

SCALE: 1/4"=1'-0"

SCALE IN FEET

NOTE:

1. DEMOLISH UTILITY FEEDERS FS4014 & FS4031 FEEDERS WITHIN MANHOLE. CAP AT UNDERGROUND MANHOLE EXIT. DEMOLISH UP TO JUNCTION BOX ABOVE MANHOLE.
2. DEMOLISH SUBSTATION #1 MAIN FEEDERS MPB-1 AND MPB-2 FROM SUBSTATION #1 CABINETS THRU MANHOLE. CAP AT UNDERGROUND MANHOLE EXIT. MPB-1 & MPB-2 CIRCUIT BREAKERS TO REMAIN.



BASEMENT KEY PLAN

N.T.S.

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19 | Des. AK | Dwn. | Chkd.

Engineer of Record

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Date:

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ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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125 BROAD STREET
NEW YORK, NY 10004

CONSULTANT
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One Penn Plaza, New York, NY 10119

NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

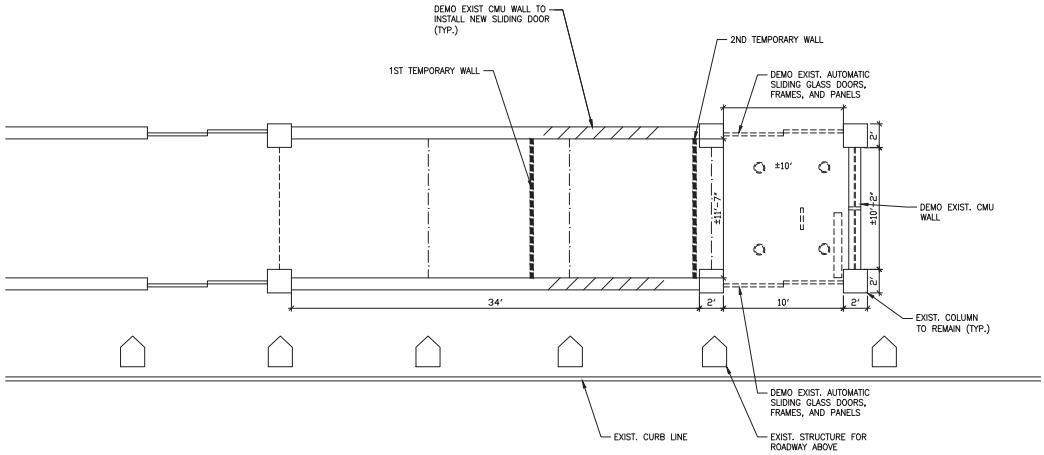
NEWARK PENN STATION
DEMOLITION ELECTRICAL
BASEMENT EXISTING
SUBSTATION PARTIAL PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing DM-201
Sheet 3 of 31

INFO - X:\174GB\AJ\F_AECOM\Esc\174GBA_DM201.dwg[DM201] March 15, 2019 - 2:38pm kcha

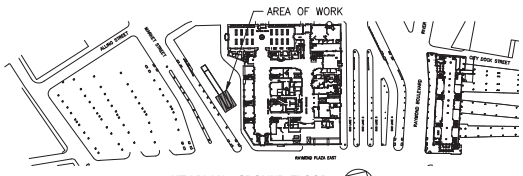
NOTE:

1. THIS AREA IS AN AVTIVE BUS PASSENGER WAITING ROOM
2. INSTALL 1ST TEMPORARY WALL PRIOR TO REMOVING CMU FOR NEW SLIDING DOOR
3. UPON COMPLETEION REMOVE 1ST TEMPORARY WALL AND INSTALL 2ND TEMPORARY WALL.
4. RESTORE ALL DAMAGED SURFACES TO EXISTING CONDITION.



GROUND FLOOR DEMOLITION PARTIAL PLAN

SCALE: 1/4"=1'-0"



KEY PLAN - GROUND FLOOR

N.T.S.

0 4 8

SCALE IN FEET

No.	Date	Eng.	Revision Notes		
				Date	03/15/19
C	03/15/19	–	20% DESIGN SUBMISSION	Des.	AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd.	AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn.	GP
				Chkd.Dwn.	AD

Engineer of Record

_____ P.E.

Professional Engineer

N.J. LIC.

_____

Date: _____

NJ TRANSIT

RAIL OPERATIONS

ONE PENN PLAZA EAST

NEWARK, NJ 07105-2246

AECOM

125 BROAD STREET

NEW YORK, NY 10004

CONSULTANT

WSP USA

One Penn Plaza, New York, NY 10119

NEW JERSEY TRANSIT

DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION

DEMOLITION

GROUND FLOOR PARTIAL PLAN

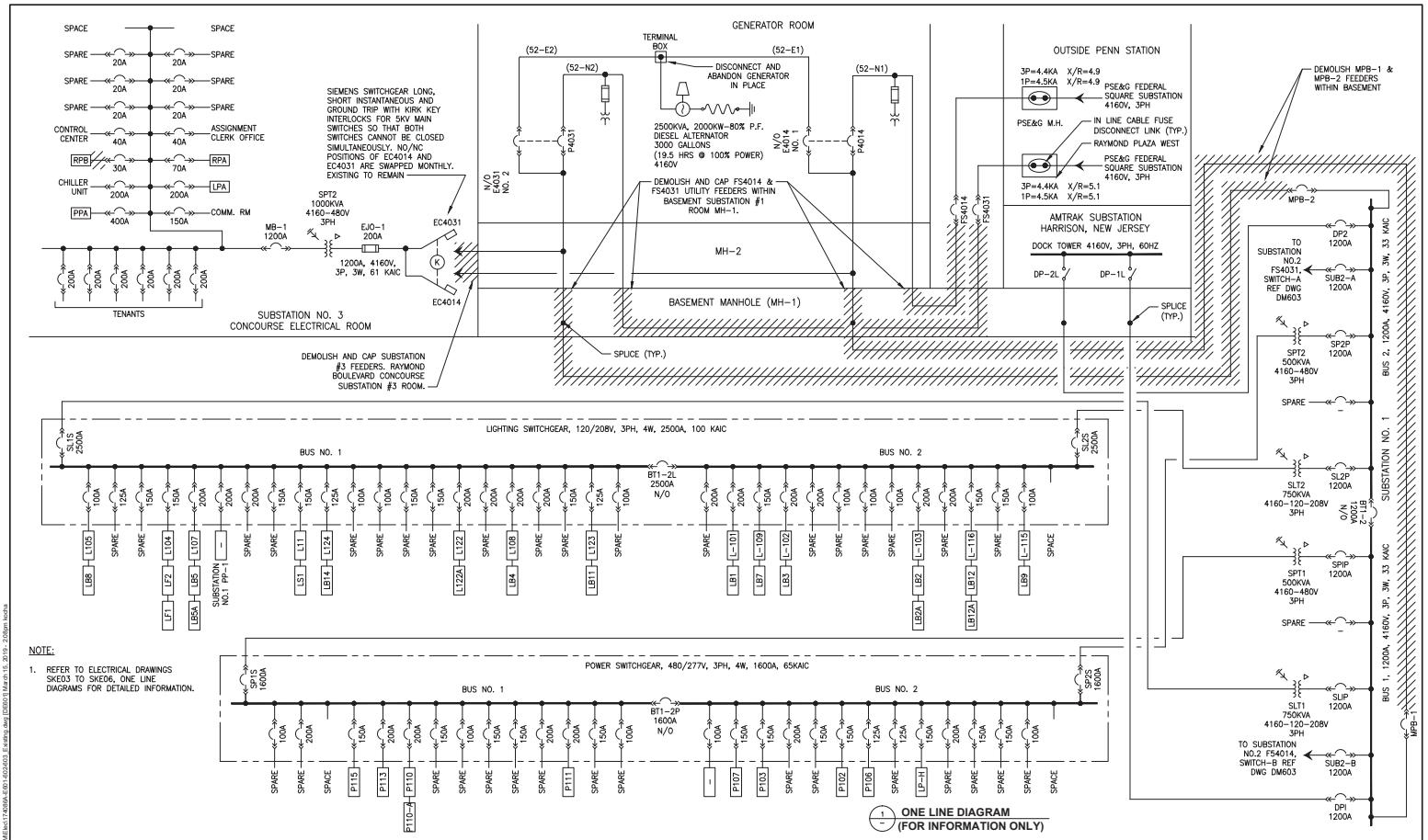
Scale 1/4"=1'-0"

Contract No.: 16-001

Drawing DM-202

Sheet 4 of 31

INFO - Y:\IT\ADB\ALN\IT_AECOM\Esx\17ADBA_DM202.dwg [DM202] March 15, 2019 - 2:08pm kschia



No.	Date	Eng.	Revision Notes	Chkd.Dwn.	AD
C	03/15/19	–	20% DESIGN SUBMISSION	Des.	AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd.	AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn.	GP

Date 03/15/19

Engineer of Record _____ P.E.

Professional Engineer N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

AECOM
125 BROAD STREET
NEW YORK, NY 10004

CONSULTANT
WSP USA
One Penn Plaza, New York, NY 10119

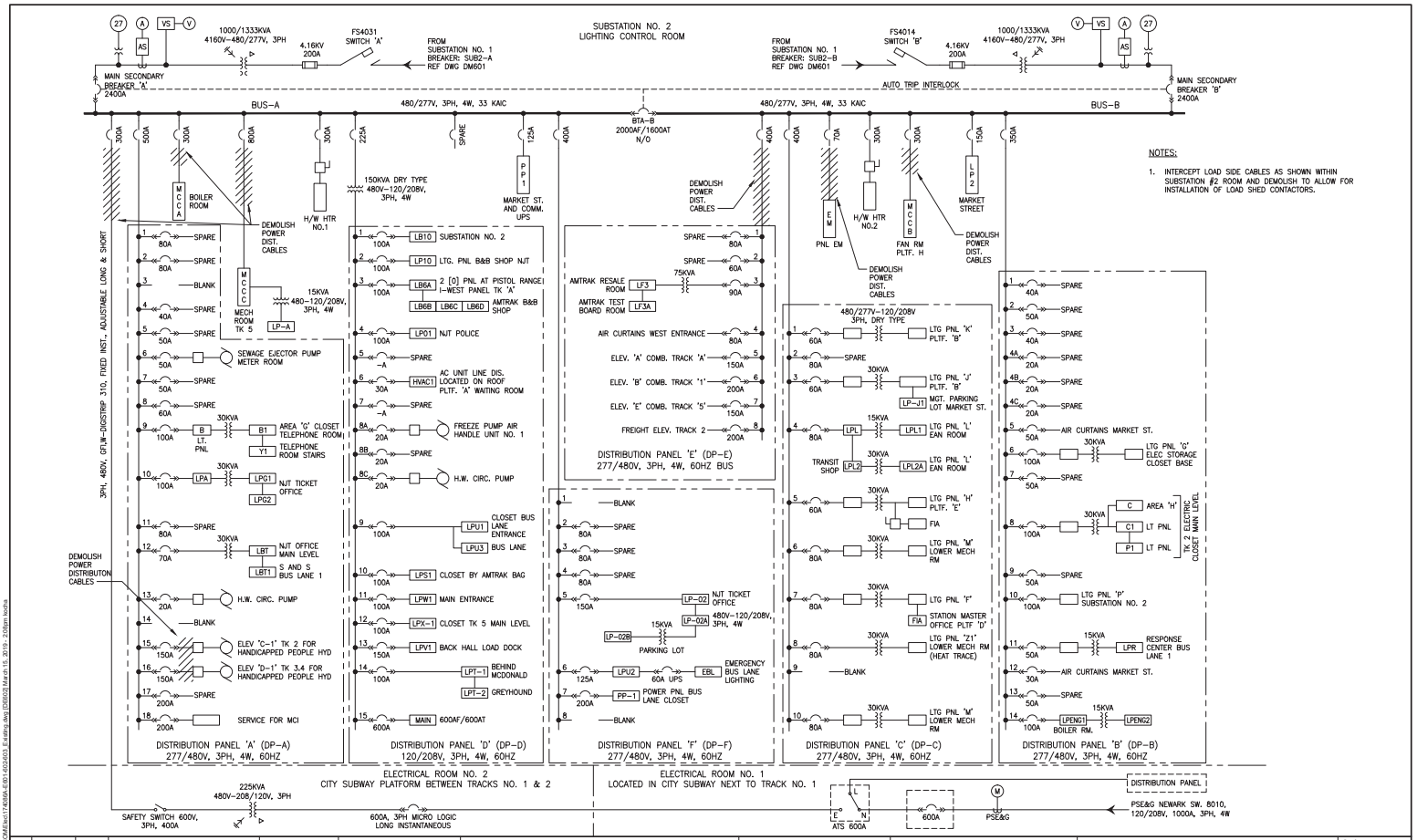
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
DEMOLITION ELECTRICAL
SINGLE LINE DIAGRAM -
GENERAL ARRANGEMENT

Scale NTS
Contract No.: 16-001
Drawing DE-601
Sheet 5 of 31

INFO - Y:\1745B\A/E_AECOM\Esk\1745BA-E601-602403_Existing.dwg [DE601] March 15, 2019 - 2:08pm kochs



No.	Date	Eng.	Revision Notes	Chkd.Dwn.	AD
C	03/15/19	–	20% DESIGN SUBMISSION	Des.	AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd.	AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn.	GP
				Date	03/15/19

Engineer of Record
P.E.
Professional Engineer
N.J. LIC.
Date:

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RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

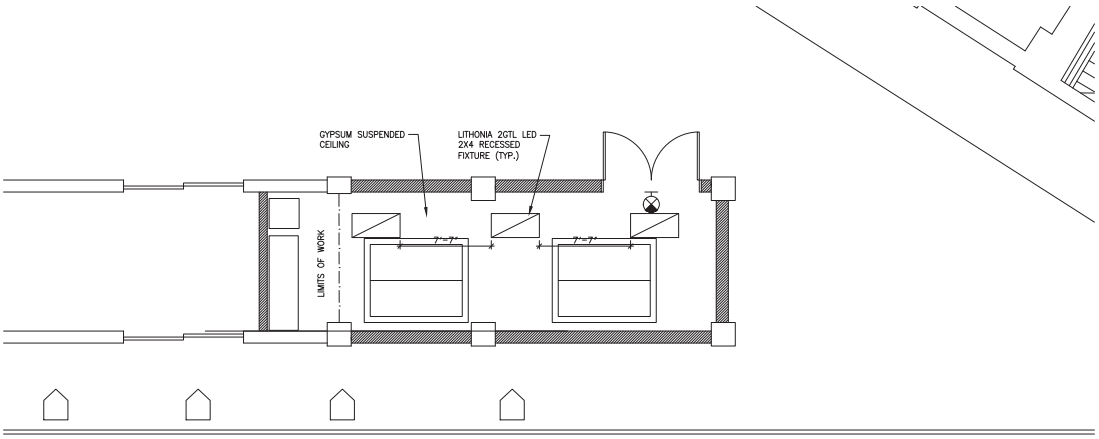
NEWARK PENN STATION
DEMOLITION ELECTRICAL SINGLE
LINE DIAGRAM - SUBSTATION 2

Scale	NTS
Contract No.:	16-001
Drawing	DE-602
Sheet	6 of 31

INFO - Y:\17408A\NJT_AECOM\Esch\17408A-E001-602403_Existing.dwg [DB503] March 15, 2019 - 2:08pm kochs

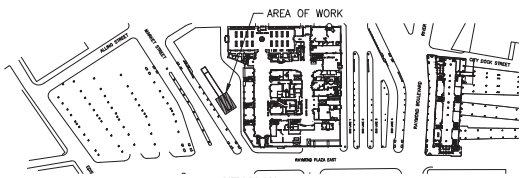
NOTE:

1. CEILING HEIGHT TO BE COORDINATED WITH REQUIRED TOP CLEARANCE OF SELECTED ATS MANUFACTURER.



NEW ATS ROOM CEILING PLAN
SCALE: 1/4"=1'-0"

LEGEND	
SYMBOL	DESCRIPTION
	EXIT SIGN
	RECESSED LIGHT FIXTURE



KEY PLAN
N.T.S.

0 4 8
SCALE IN FEET

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP
Chkd.Dwn. AD

Engineer of Record
P.E.
Professional Engineer
N.J. LIC.
Date:

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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DISTRIBUTED GENERATION

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NEWARK PENN STATION
ARCHITECTURAL NEW ATS ROOM
REFLECTED CEILING PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing A-601
Sheet 7 of 31

INFO - Y:\1TASKS\ALNJT_AECOM\Architecture\1TASK_A601.dwg [A-GRNG] March 15, 2019 - 2:08pm ksoha

ABBREVIATIONS

A	AMPERE
AC	ALTERNATING CURRENT
AF	AMP FUSE
AFF	ABOVE FINISHED FLOOR
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BSMT	BASEMENT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
C, CND	CONDUIT
CM	CIRCULAR MIL
CONT	CONTINUATION
DN	DOWN
DISC	DISCONNECT SWITCH
DOB	DEPARTMENT OF BUILDINGS
DOE	DEPARTMENT OF ENERGY
DWG	DRAWING
ECC	EMERGENCY COMMAND CENTER
EG	EMERGENCY SYSTEM GROUND
ELEV	ELEVATOR
EM	EMERGENCY
ENCL	ENCLOSURE
E, EXIST	EXISTING
EQPT	EQUIPMENT
ETR	EXISTING TO REMAIN
FDR	FEEDER
G, GND	GROUND
JB	JUNCTION BOX
KAIC	KILO-AMPERE INTERRUPTING CURRENT
KW	KILOWATT
KV	KILO VOLT
KVA	KILOVOLT AMPERE
KCMIL	THOUSAND CIRCULAR MIL
MCB	MAIN CIRCUIT BREAKER
MECH	MECHANICAL
MFG, MFR	MANUFACTURER
MLO	MAIN LUG-ONLY
MTD	MOUNTED
MTS	MANUAL TRANSFER SWITCH
N	NORTH, NEUTRAL
N/A	NOT APPLICABLE
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NGR	NEUTRAL GROUNDING RESISTOR
N.J.C.	NOT IN CONTRACT
No.	NUMBER
NTS	NOT TO SCALE
Φ, PH	PHASE
P	POLE
PGC	PORTABLE GENERATOR CONNECTION
PNL	PANEL
PWR	POWER
R	REMAIN
REF	REFERENCE
RGS	RIGID GALVANIZED STEEL
RM	ROOM
SCH	SCHEDULE
SPEC	SPECIFICATION
SW	SWITCH
SWBD	SWITCHBOARD
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES, INC.
UON	UNLESS OTHERWISE NOTED
V	VOLT
VT	VOLTAGE TRANSFORMER
WP	WEATHERPROOF
W/	WITH
XFMR	TRANSFORMER

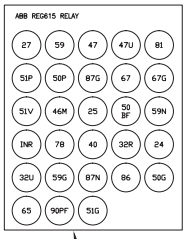
ELECTRICAL SYMBOLS

SYMBOL	DESCRIPTION
	NEW FEEDER
	EXISTING FEEDER
	EXISTING TO BE DEMOLISHED
	NEW EQUIPMENT
	EXISTING EQUIPMENT
	EXISTING EQUIPMENT TO BE DEMOLISHED
LSIG 800AF 800AT	CIRCUIT BREAKER (DRAW OUT TYPE) 'AF' REPRESENTS FRAME RATING 'AT' REPRESENTS TRIP RATING 'L' LONG TIME 'S' SHORT TIME 'I' INSTANTANEOUS 'G' GROUND FAULT
800A	CIRCUIT BREAKER (FIXED TYPE) SIZE AS INDICATED
100AS 100AF	DRAWOUT FUSED SWITCH 'AS' REPRESENTS SWITCH SIZE 'AF' REPRESENTS FUSE SIZE
VOLTS KVA Δ Y Z	TRANSFORMER, RATING AS INDICATED Δ – DELTA CONNECTED Y – Y CONNECTED
PT(3)	POTENTIAL TRANSFORMER QUANTITY = 3
CT(3)	CURRENT TRANSFORMER QUANTITY = 3
G	GENERATOR
5	MOTOR, "5" INDICATES HP RATING
	INDICATES GROUND CONNECTION
	SURGE ARRESTOR

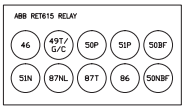
ELECTRICAL PROTECTION DEVICE FUNCTION NUMBERS

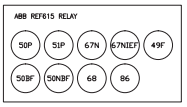
#	– REPRESENTS DEVICE NUMBERS
INR	– THREE PHASE INRUSH DETECTOR
24	– OVEREXCITATION PROTECTION
25	– SYNCHRONIZING OR SYNCHRONISM CHECK DEVICE
27	– UNDERVOLTAGE RELAY
27P	– PHASE UNDERVOLTAGE
27X	– AUXILIARY UNDERVOLTAGE
32	– DIRECTIONAL POWER
32R	– REVERSE POWER
32U	– UNDERPOWER PROTECTION
40	– FIELD RELAY / LOSS EXCITATION
46	– REVERSE PHASE OR PHASE BALANCE CURRENT RELAY OR STATOR CURRENT UNBALANCE
46M	– NEGATIVE SEQUENCE OVERCURRENT PROTECTION FOR MACHINES
46PD	– PHASE DISCONTINUITY PROTECTION
47	– NEGATIVE SEQUENCE OVERVOLTAGE
47U	– POSITIVE SEQUENCE UNDERVOLTAGE
49	– MACHINE (M) OR TRANSFORMER (T) THERMAL RELAY / THERMAL OVERLOAD
49F	– THREE PHASE THERMAL PROTECTION FOR FEEDERS
49T	– THREE PHASE THERMAL OVERLOAD PROTECTION, TWO TIME CONSTANTS
50	– INSTANTANEOUS OVERCURRENT
50BF	– CIRCUIT BREAKER FAILURE PROTECTION
50G	– GROUND INSTANTANEOUS OVERCURRENT
50N	– NEUTRAL INSTANTANEOUS OVERCURRENT
50NBF	– NEUTRAL INSTANTANEOUS BREAKER FAILURE
50P	– PHASE INSTANTANEOUS OVERCURRENT
50-2	– NEGATIVE SEQUENCE INSTANTANEOUS OVERCURRENT
51	– AC TIME OVERCURRENT
51G	– GROUND TIME OVERCURRENT
51N	– NEUTRAL TIME OVERCURRENT
51P	– PHASE TIME OVERCURRENT
51V	– VOLTAGE RESTRAINED TIME OVERCURRENT
51_2	– NEGATIVE SEQUENCE TIME OVERCURRENT
59	– OVERVOLTAGE
59G	– GROUND OVERVOLTAGE
59P	– PHASE OVERVOLTAGE
59N	– NEUTRAL OVERVOLTAGE
59X	– AUXILIARY OVERVOLTAGE
59-2	– NEGATIVE SEQUENCE OVERVOLTAGE
60	– FUSE FAILURE SUPERVISION
65	– MICROPROCESSOR ENGINE GOVERNOR LOAD SHARING AND SOFT LOADING CONTROL
67	– AC DIRECTIONAL OVERCURRENT
67G	– GROUND DIRECTIONAL OVERCURRENT
67N	– NEUTRAL DIRECTIONAL OVERCURRENT
67NIEF	– TRANSIENT/INTERMITTENT EARTH FAULT PROTECTION
67P	– PHASE DIRECTIONAL OVERCURRENT
68	– THREE PHASE INRUSH DETECTOR
78	– OUT OF STEP PROTECTION
81	– FREQUENCY
81O	– OVER FREQUENCY
81U	– UNDER FREQUENCY
86	– LOCKING-OUT RELAY
87G	– GENERATOR DIFFERENTIAL
87T	– TRANSFORMER DIFFERENTIAL
87N	– RESTRICTED EARTH FAULT
90PF	– VAR/POWER FACTOR CONTROLLER

ABB RELAY LEGEND



OR APPROVED EQUAL, (TYP.)





No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP

Date 03/15/19

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

AECOM
125 BROAD STREET
NEW YORK, NY 10004

CONSULTANT
WSP USA
One Penn Plaza, New York, NY 10119

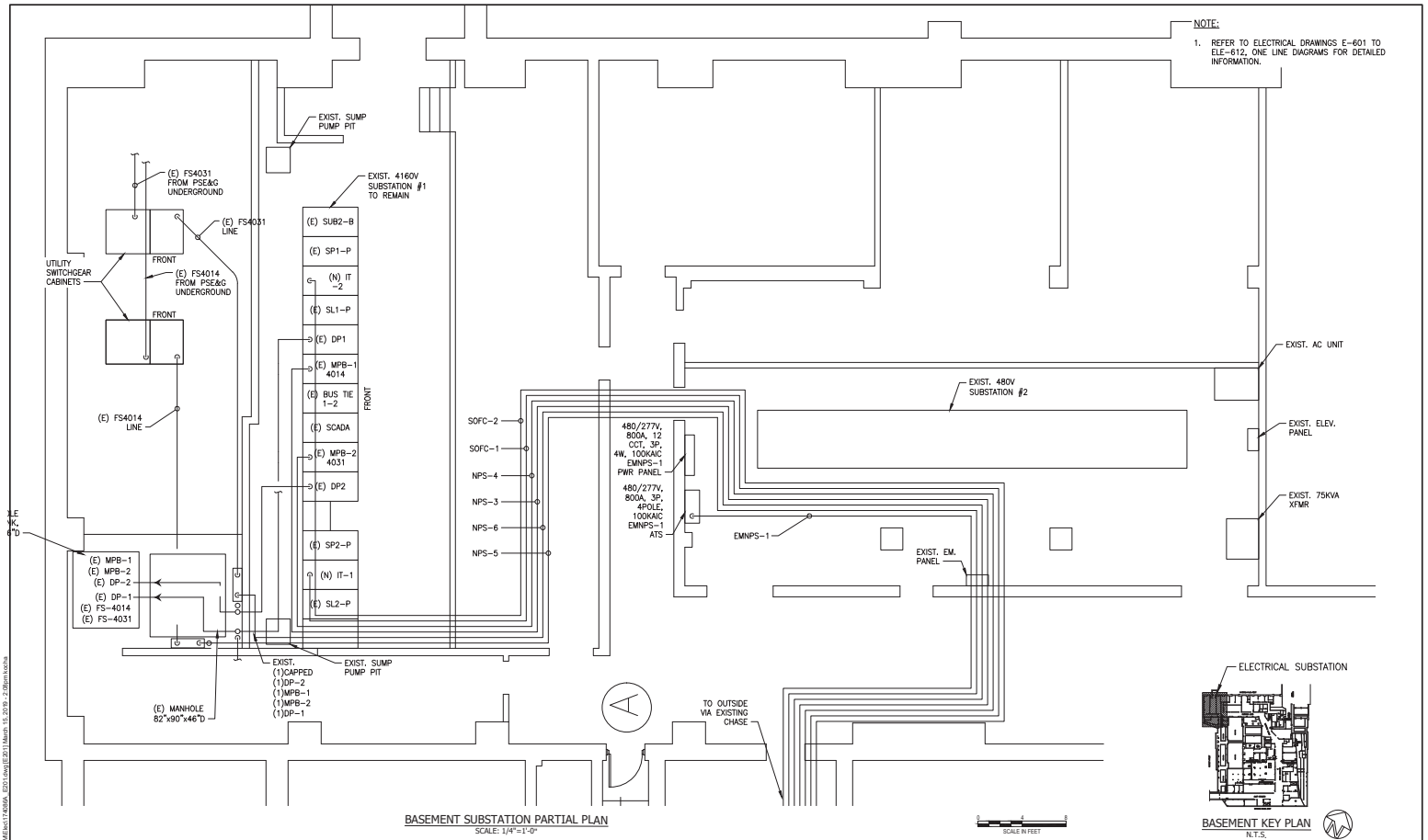
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
ELECTRICAL - NOTES,
ABBREVIATIONS, & SYMBOLS

Scale NTS
Contract No.: 16-001
Drawing E-001
Sheet 8 of 31

INFO - X:\17400\BIA\ALT_AECOM\Esk\17400A_EG01.dwg|E-001| March 15, 2019 - 2:28pm|kosha



BASEMENT SUBSTATION PARTIAL PLAN
SCALE: 1/4"=1'-0"

BASEMENT KEY PLAN
N.T.S.

SCALE IN FEET

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
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Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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NEW YORK, NY 10004
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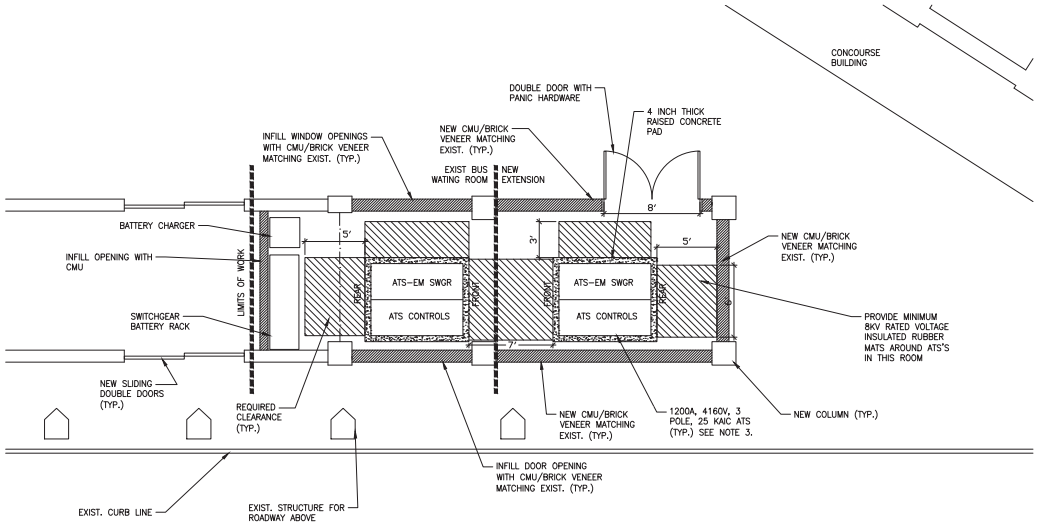
NEWARK PENN STATION
ELECTRICAL
NEWARK PENN STATION
SUBSTATION PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing E-201
Sheet 9 of 31

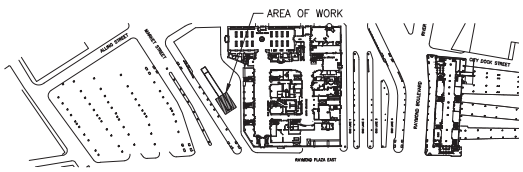
INFO - Y:\1745\BIA\ALT_AECOM\Sht\1745BIA_E201.dwg[E-201] March 15, 2019 - 2:08pm kosha

NOTE:

1. REFER TO ELECTRICAL DRAWING E-001 FOR SYMBOLS, ABBREVIATIONS AND NOTES.
2. EXTEND BUILDING AND ENCLOSE AS SHWON. FACADE TO MATCH EXISTING. INSTALL NEW SLIDING DOORS WITHIN THE BUS WAITING ROOM TO MATCH EXISTING.
3. 1200A, 4160V, 3 POLE, 40 KAIC ATS WITH CLOSED TRANSITION CAPABILITY.
4. INSTALL NEW FIRE ALARM SYSTEM TO CONNECT TO EXISTING NPS FIRE ALARM RISER



GROUND FLOOR PARTIAL PLAN
1/4" = 1'-0"



KEY PLAN
N.T.S.

0 4 8
SCALE IN FEET

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
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A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19 | Des. AK | Dwn. | Chkd.

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

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RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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125 BROAD STREET
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CONSULTANT
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One Penn Plaza, New York, NY 10119

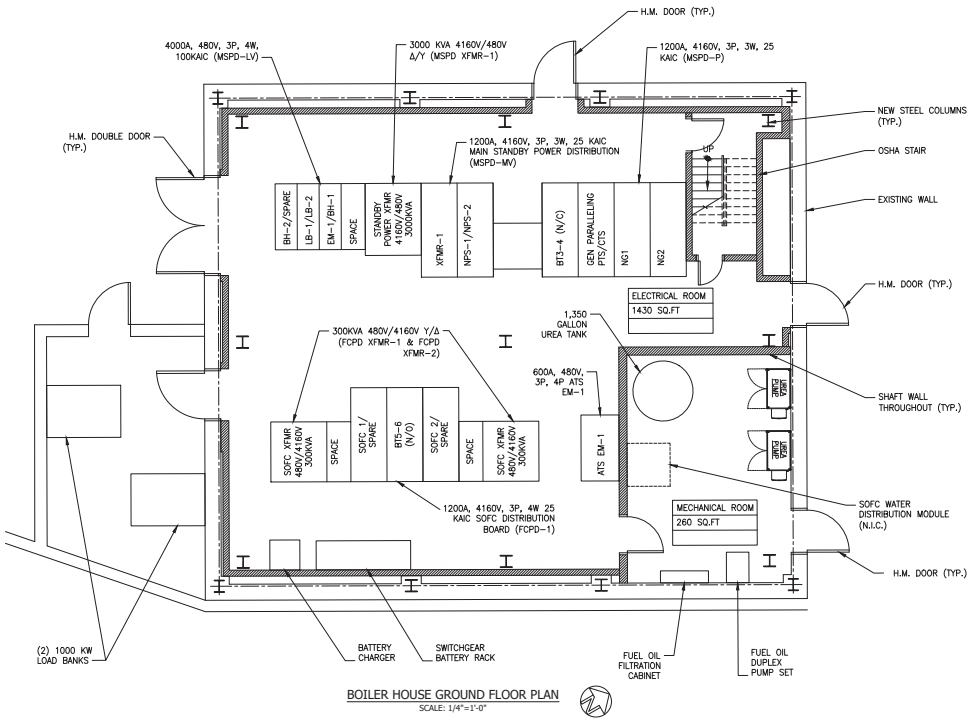
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
ELECTRICAL ATS ROOM
GROUND FLOOR PARTIAL PLAN

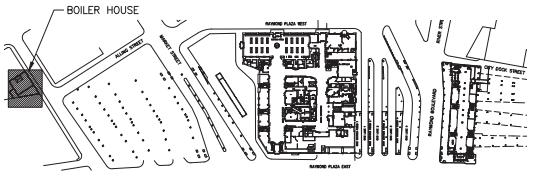
Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing E-202
Sheet 10 of 31

INFO - Y:\1TA\08\ALN\IT_AECOM\Esc\1TA08A_E202.dwg[E-202] March 15, 2019 - 2:08pm ksorka



BOILER HOUSE GROUND FLOOR PLAN

SCALE: 1/4"=1'-0"



KEY PLAN

N.T.S.

0 4 8

SCALE IN FEET

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B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19 | Des. AK | Dwn. | Chkd. AD

Engineer of Record _____ P.E.

Professional Engineer N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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125 BROAD STREET
NEW YORK, NY 10004

WSP USA
One Penn Plaza, New York, NY 10119

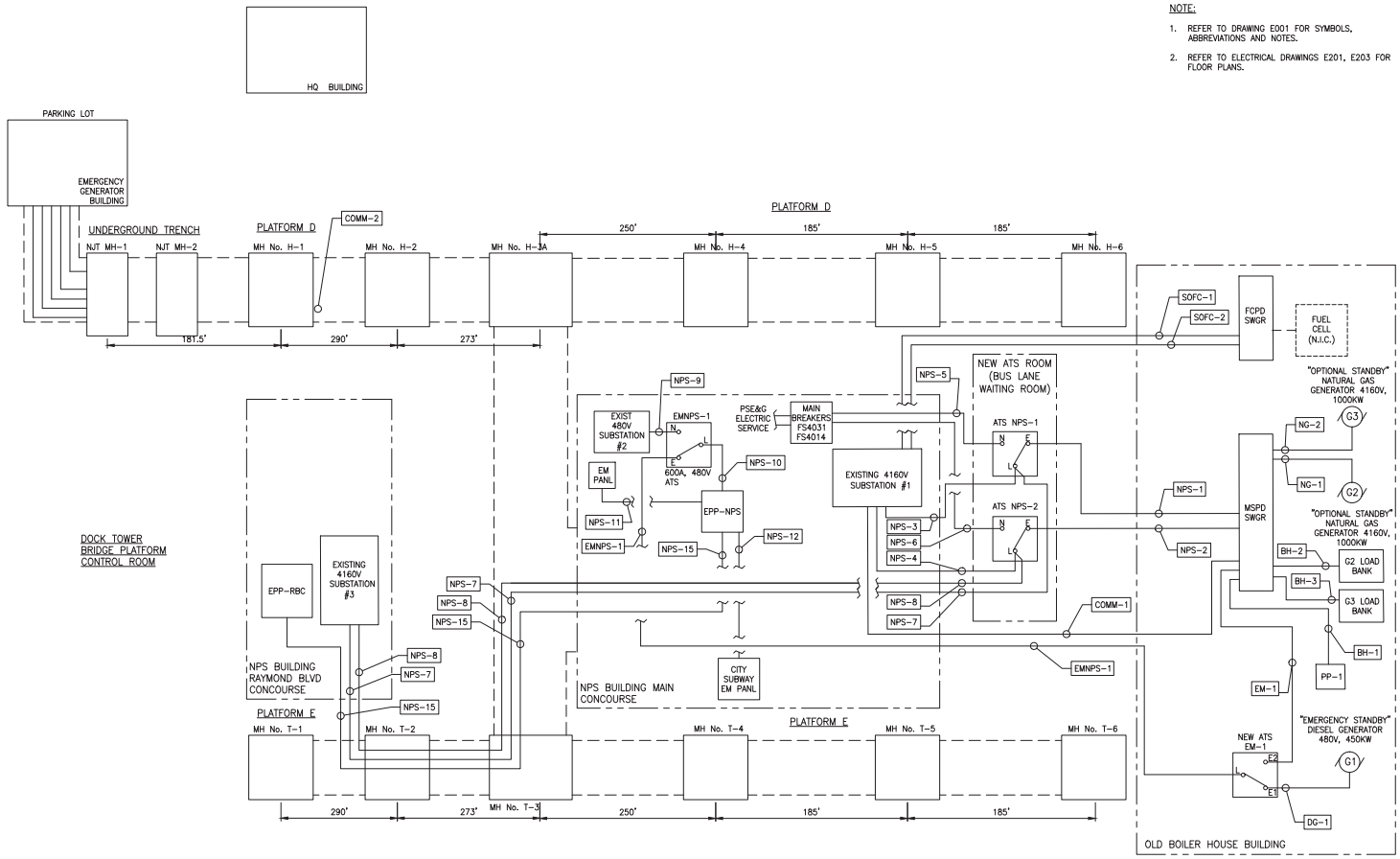
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
ELECTRICAL
BOILER HOUSE
GROUND FLOOR PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing E-203
Sheet 11 of 31

INFO - Y:\174\08\A/ALT_AECOM\Esc\174308A_E203.dwg[E-203 Fuel Cell] March 15, 2019 - 2:08pm ksoha



No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP
				Chkd.Dwn. AD

Date 03/15/19

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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CONSULTANT
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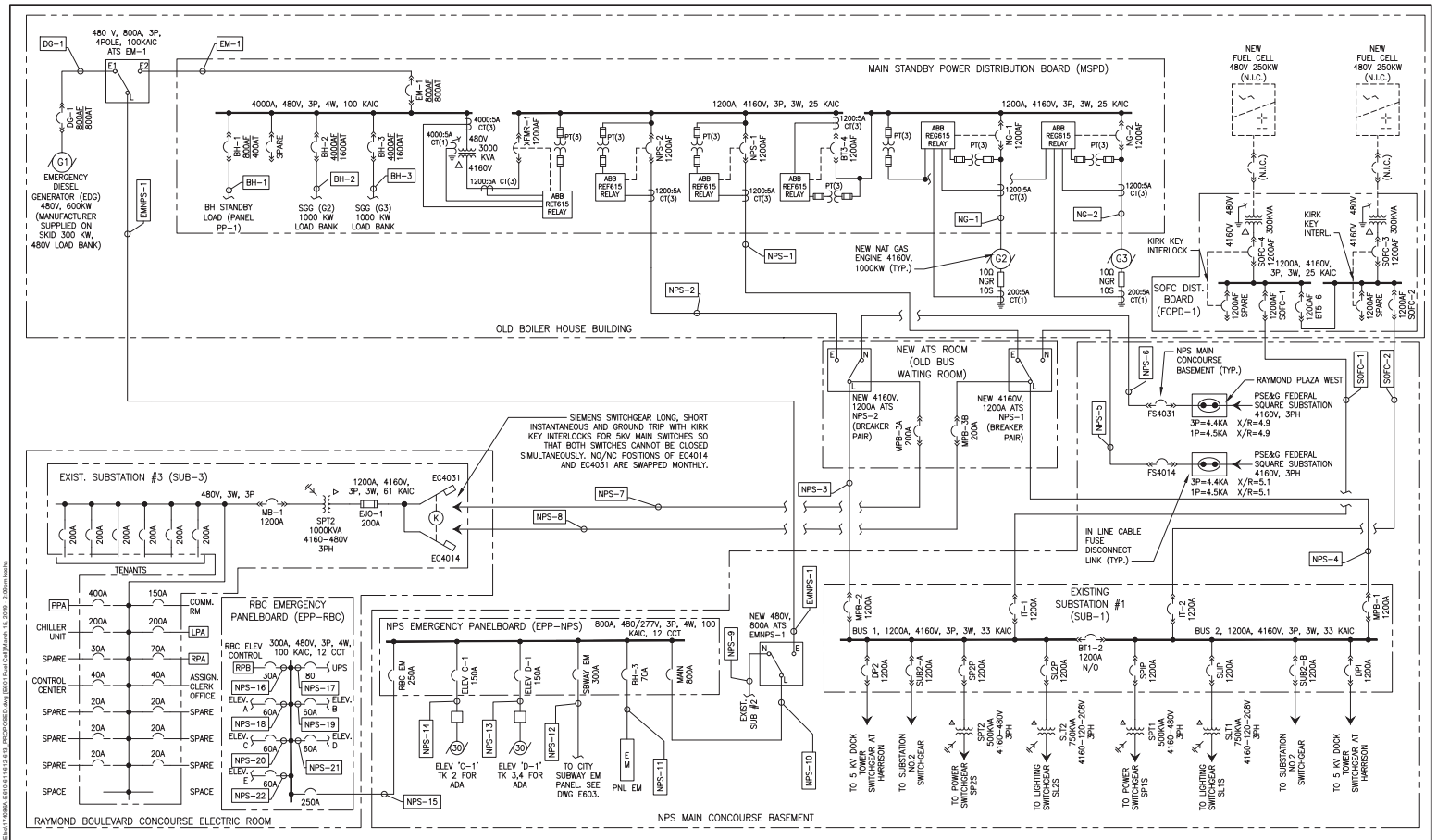
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
ELECTRICAL
BLOCK DIAGRAM OF DG PLANT
FEEDS

Scale NTS
Contract No.: 16-001
Drawing E-301
Sheet 12 of 31

INFO - Y:\1745\BIA\ALT_AE\COM\Esx\1745BIA-E301-350.dwg [E001 FUEL CELL] April 03, 2019 - 2:11pm kochk



No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19 | Des. AK | Dwn. | Chkd. AD

Engineer of Record
Professional Engineer P.E.
N.J. LIC.
Date:

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

AECOM
125 BROAD STREET
NEW YORK, NY 10004
CONSULTANT
WSP USA
One Penn Plaza, New York, NY 10119

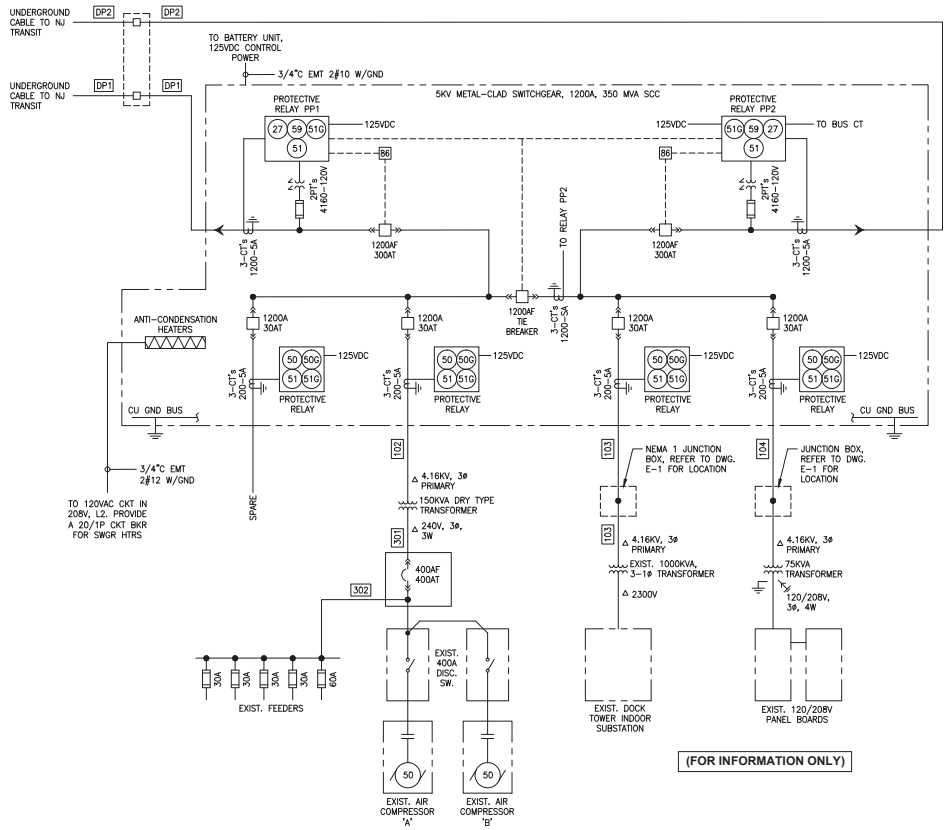
NEW JERSEY TRANSIT
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20% DESIGN

NEWARK PENN STATION
ELECTRICAL
SINGLE LINE DIAGRAM -
GENERAL ARRANGEMENT

Scale NTS
Contract No.: 16-001
Drawing E-601
Sheet 13 of 31

INFO - \\THADBA-NJT_AECOM\Esch\174369A-E610-451412-E10_PROPOSED.dwg (E610 Fuel Cell) March 15, 2019 - 2:09pm kcota



(FOR INFORMATION ONLY)

4.16KV SINGLE LINE DIAGRAM
(FOR INFORMATION ONLY)

NOTES:

1. USE #10 CABLES FOR ALL CT CIRCUITS.
2. WIRE ALL CT's TO SHORTING TYPE TERMINAL BLOCKS OR TEST SWITCHES.
3. CABLES DP1 AND DP2 ARE LOCATED IN DOCK TOWER BASEMENT CABLE VAULT. REFER TO DRAWING E-1 FOR LOCATION.

DEVICE LEGEND:

- (27) UNDERVOLTAGE
- (59) OVERVOLTAGE
- (50) INSTANTANEOUS OVERCURRENT
- (50G) INSTANTANEOUS GND OVERCURRENT
- (51) INVERSE TIME OVERCURRENT
- (51G) RESIDUAL GND TIME OVERCURRENT
- [86] LOCKOUT RELAY

CONDUIT AND CABLE SCHEDULE	
DP1	4"C EMT 3#4/0 5KV SHEILDED CABLE W/#2 GND
DP2	4"C EMT 3#4/0 5KV SHEILDED CABLE W/#2 GND
102	2 1/2"C EMT 3#2 5KV SHEILDED CABLE W/#4 GND
103	4"C EMT 3#4/0 5KV SHEILDED CABLE W/#2 GND
104	2 1/2"C EMT 3#2 5KV SHEILDED CABLE W/#4 GND
301	4"C EMT 3-500MCM W/#1/0 GND
302	3"C EMT 3-4/0 W/#1/0 GND

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP
				Chkd.Dwn. AD

Date 03/15/19

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
RAIL OPERATIONS
ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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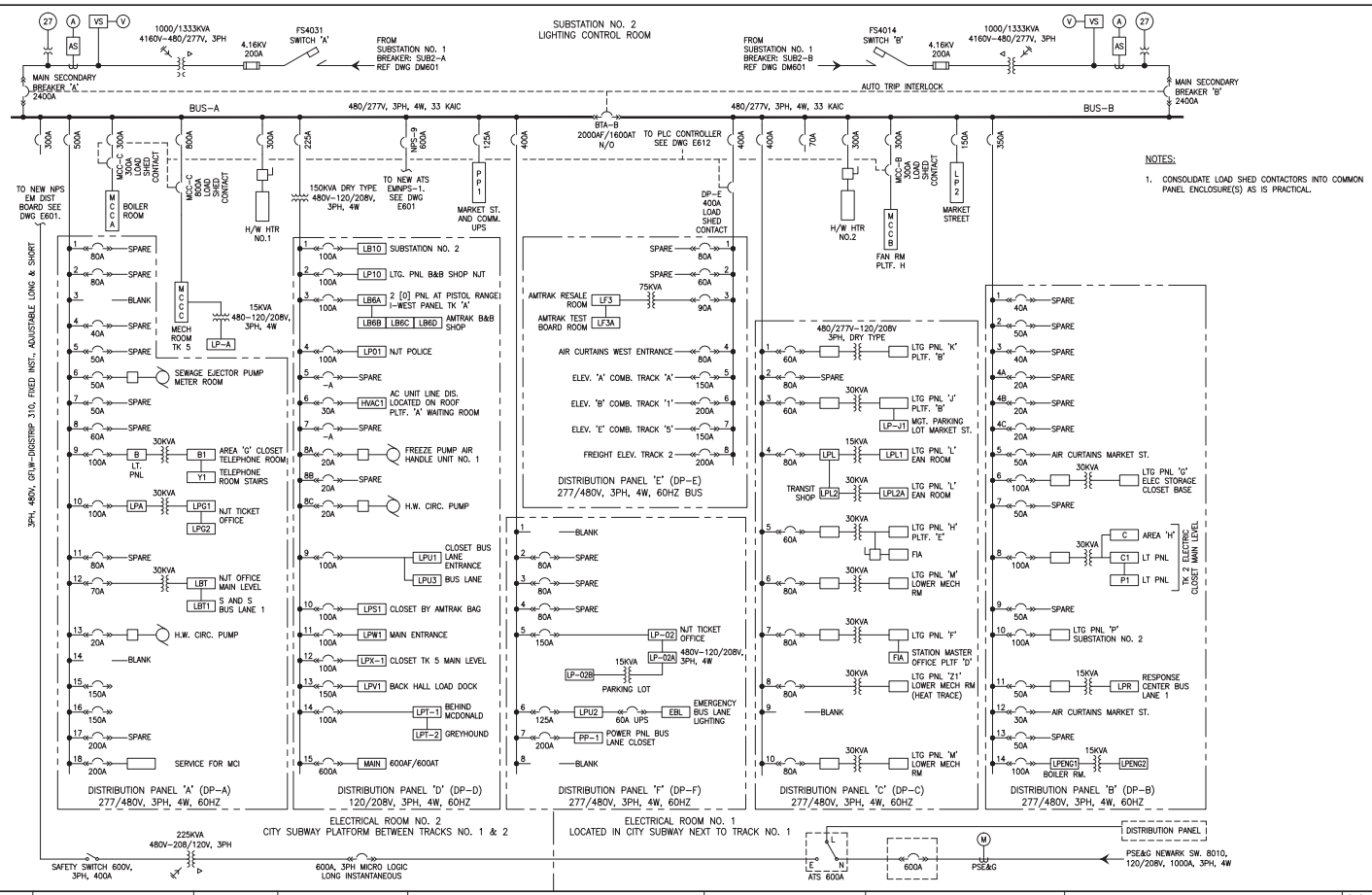
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NEWARK PENN STATION
ELECTRICAL
SINGLE LINE DIAGRAM
DOCK TOWER SWITCHGEAR

Scale: NTS
Contract No.: 16-001
Drawing: E-602
Sheet: 14 of 31

INFO - Y:\17408\A\ALT_AECOM\Esic\17408A-E001-002403_E.dwg dwg [E602] Mar 15, 2019 - 2:09pm kotha



No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AK
A	03/26/18	–	10% DESIGN SUBMISSION	GP
			Date 03/15/19	
			Des.	AK
			Dwn.	GP
			Chkd.	AD

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.
Date: _____

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NEWARK, NJ 07105-2246

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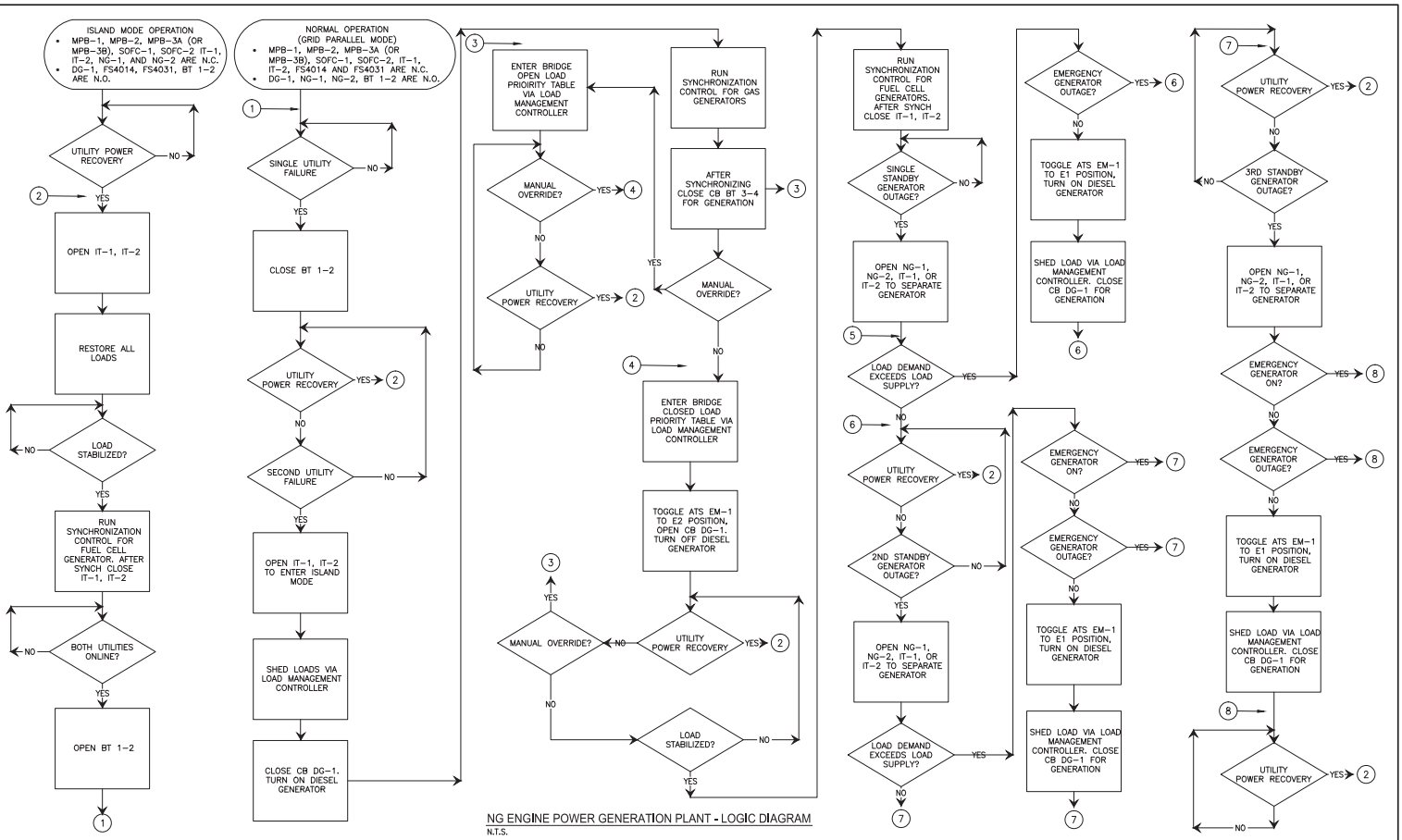
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NEWARK PENN STATION
ELECTRICAL SINGLE LINE
DIAGRAM - SUBSTATION 2

Scale: NTS
Contract No.: 16-001
Drawing: E-603
Sheet: 15 of 31

INFO - Y:\1743BA\NJT_AECOM\Esx\1743BA-E(B1-I-603-I03_E.dwg dwg [E603] Mar 15, 2019 - 2:09pm kotha



NG ENGINE POWER GENERATION PLANT - LOGIC DIAGRAM

N.T.S.

No.	Date	Eng.	Revision Notes		
C	03/15/19	–	20% DESIGN SUBMISSION	Des.	AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd.	AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn.	GP
				Chkd.Dwn.	AD

Date 03/15/19

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Professional Engineer N.J. LIC.

Date: _____

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NEWARK PENN STATION
ELECTRICAL
LOGIC DIAGRAM

Scale: NTS
Contract No.: 16-001
Drawing: E-610
Sheet: 16 of 31

INFO - \\TRADEA.NJT_AECOM\Esc\17A59A-ES\0-E\1-E\2-E\3_PROPOSED.dwg (E610 Fuel Cell April 03, 2019 - 2:06pm lvoha

SEQUENCE OF OPERATIONS PLAN:

1. NEW SYSTEM TO CONSIST OF (3) NEW GENERATORS:

- (2) NEW 1000 KW STANDBY NATURAL GAS FIRED ENGINE GENERATORS (SGG)
- (1) NEW 500 KW FUEL CELL SYSTEM (FUEL CELL SYSTEM IS BY OTHERS)

2. NEW SYSTEM CONSISTS OF (1) NEW EMERGENCY GENERATOR

- (1) NEW 450 KW EMERGENCY DIESEL FIRED ENGINE GENERATOR (EDG)

3. THE NEW 4160V ENGINE GENERATORS AND THE NEW 480V FUEL CELL SYSTEM TO BE INSTALLED IN THE OLD BOILER HOUSE BUILDING AT NEWARK PENN STATION.

4. NORMAL OPERATION:

4.1. FUEL CELL OPERATES IN GRID PARALLEL MODE
4.2. NG-1, NG-2, BT 3-4, NPS-1, NPS-2, BT5-6, DG-1 CB'S ARE OPEN.
4.3. THE AUTOMATION IS STANDING BY TO ACT IN RESPONSE TO A RUN REQUEST FROM ASSOCIATED AUTOMATIC TRANSFER SWITCHES.

5. ISLAND MODE OPERATION:
5.1. UPON A SINGLE UTILITY OUTAGE (FS4014 OR FS4031), BT 1-2 ON SUBSTATION #1 IS CLOSED TO ALLOW A SINGLE UTILITY TO FEED BOTH SIDES OF THE MAIN-TIE MAIN BUS.
5.2. UPON A SECOND UTILITY OUTAGE, THE FUEL CELL GENERATOR INTERTIE CB'S IT-1 AND IT-2 ARE OPENED TO CLEAR ANY FAULTS.
5.3. THE ATS UNITS SENSE THE LOSS OF UTILITY POWER IN THE NORMAL FEED AND SEND A RUN REQUEST.
5.4. ALL AVAILABLE GENERATORS ARE STARTED.
5.5. THE EDG POWERS THE EMERGENCY/LIFE SAFETY LOAD FEEDERS IN LESS THAN 10 SECONDS.
5.6. THE NON-CRITICAL LOADS ARE SHED VIA CB'S AND CONTACTORS AT THE ELECTRICAL DISTRIBUTION SWITCHGEARS BASED UPON THE PLC BASED LOAD MANAGMENT PROGRAM.
5.7. THE FIRST SGG UP TO VOLTAGE AND FREQUENCY IS CLOSED TO THE BUS. THE REMAINING SGG IS SYNCHRONIZED AND PARALLED TO THE BUS AS IT COMES UP TO VOLTAGE AND FREQUENCY.
5.8. BUS TIE BT3-4 IS CLOSED TO PROVIDE GENERATION. NPS-1 & NPS-2 CB'S ARE CLOSED.
5.9. THE PLC PLACES THE SYSTEM INTO "BRIDGE CLOSED" CONTINGENCY MODE. A PUSHBUTTON SHALL BE INCLUDED WITHIN THE HMI INTERFACE TO ALLOW THE PLC TO BE MANUALLY PLACED INTO "BRIDGE OPEN" OR "BRIDGE CLOSED" OPERATION.

5.9.1. TRANSITION TO/FROM BRIDGE OPEN:

5.9.1.1. IF EDG IS NOT OPERATING IT SHALL START AND ALL EMERGENCY/LIFE SAFETY LOADS SHALL BE TRANSITIONED TO THE EDG.
5.9.1.2. THE NON-CRITICAL LOADS ARE SHED VIA CB'S AND CONTACTORS AT THE ELECTRICAL DISTRIBUTION SWITCHGEARS BASED UPON THE LOAD MANAGEMENT "BRIDGE OPEN" PRIORITY TABLE.
5.9.1.3. THE SGG'S ARE OPERATED WITH LOAD BANKS TO ENERGIZE THE BRIDGE MG SETS.
5.9.1.4. THE BRIDGE MOTORS ARE MANUALLY OPERATED BY AMTRAK STAFF TO CLOSE ANY OPEN BRIDGE SPANS.
5.9.1.5. UPON THE SIGNAL THAT THE MANUAL OVERRIDE BUTTON IS IN THE "OFF" POSITION THE PLC PLACES THE SYSTEM INTO THE "BRIDGE CLOSED" CONTINGENCY MODE.

5.9.2. ENTRANCE TO BRIDGE CLOSED:

5.9.2.1. LOAD SHED PRIORITY LEVELS ARE ADDED, POWERING THEIR ASSOCIATED LOADS.
5.9.2.2. ATS EM-1 SENSES THE SGG SOURCE IS WITHIN ACCEPTABLE OPERATIONAL TOLERANCES FOR A TIME DURATION SET AT THE AUTOMATIC TRANSFER SWITCH.
5.9.2.3. AS THE ATS TRANSFERS LOAD TO THE SGG SOURCE, IT REMOVES ITS RUN REQUEST FROM THE EDG.
5.9.2.4. EDG CB DG-1 IS OPENED.
5.9.2.5. THE GENERATOR IS ALLOWED TO RUN FOR ITS PROGRAMMED COOL DOWN PERIOD.
5.9.2.6. ONCE ALL PRIORITY LEVELS ARE ADDED AND VOLTAGE AND FREQUENCY HAVE STABILIZED A RUN REQUEST IS SENT TO THE FUEL CELLS.
5.9.2.7. THE FUEL CELL INVERTERS ARE SYNCHRONIZED AND PARALLED TO THE BUS AS THEY COME UP TO VOLTAGE AND FREQUENCY

5.9.3. EXIT FROM BRIDGE CLOSED:

5.9.3.1. AUTOMATIC TRANSFER SWITCHES SENSE THE UTILITY SOURCE IS WITHIN ACCEPTABLE OPERATIONAL TOLERANCES FOR A TIME DURATION SET AT THE AUTOMATIC TRANSFER SWITCH.
5.9.3.2. AS EACH AUTOMATIC TRANSFER SWITCH TRANSFER BACK TO UTILITY POWER, IT REMOVES A RUN REQUEST FROM THE GENERATOR PLANT.
5.9.3.3. WHEN THE LAST AUTOMATIC TRANSFER SWITCH HAS RETRANSFERRED TO THE UTILITY AND ALL RUN REQUESTS HAVE BEEN REMOVED FROM THE GENERATOR PLANT, ALL GENERATOR SET MAIN CIRCUIT BREAKERS SHALL BE OPENED.
5.9.3.4. THE GENERATOR SETS ARE ALLOWED TO RUN FOR THEIR PROGRAMMED COOL DOWN PERIOD AND SHUT DOWN.
5.9.3.5. THE SYSTEM IS RETURNED TO AUTOMATIC/STANDBY MODE.

6. AUTOMATION SUB MODES: WHEN THE GENERATOR SETS ARE CARRYING THE FACILITY LOAD, THE AUTOMATION SHALL SUPPORT (2) SUB MODES: LOAD SHED/LOAD ADD AND GENEREATOR DEMAND PRIORITY.

6.1. LOAD SHED CONTROL

6.1.1. THE SYSTEM CONTROLS SHALL INCLUDE LOAD SHED CONTROL FUNCTION TO CONTROL THE LOADS SERVED BY THE GENERATOR PLANT.
6.1.2. THE LOAD SHED CONTROL SHALL HAVE ONE ESSENTIAL LOAD SHED PRIORITY FOR EACH GENERATOR IN THE SYSTEM PLUS ONE NON-ESSENTIAL LOAD SHED PRIORITY LEVEL.
6.1.3. THE LOAD SHED CONTROL SHALL CONTROL EACH OF THE DISTRIBUTION CB'S AND LOAD SHED CONTACTORS THAT ARE SHOWN ON THE DRAWINGS.
6.1.4. DISTIBUTION CB'S AND CONTACTORS SHALL BE ELECTRICALLY OPERATED.
6.1.5. EACH ELECTRICALLY OPERATED CIRCUIT BREAKER OR CONTACTOR SHALL BE FIELD SELECTABLE TO BE ASSIGNED TO ANY OF THE AVAILABLE LAOD SHED PRIORITY LEVELS.

6.1.5.1. PROVIDE THE FOLLOWING CONTROLS FOR EACH ESSENTIAL LOAD SHED PRIORITY LEVEL

6.1.5.1.1. SHED DELAY TIMER, ADJUSTABLE FROM 0 TO 1024 SECONDS
6.1.5.1.2. ADD DELAY TIMER, ADJUSTABLE FROM 0 TO 1024 SECONDS
6.1.5.1.3. LOAD SHED OVERRIDE SELECTOR (SHED/AUTO/ADD)
6.1.5.1.4. STATUS INDICATORS TO SHOW WHETHER THE PRIORITY LEVEL IS ADDED OR SHED

6.1.5.2. PROVIDE THE FOLLOWING CONTROLS FOR NON-ESSENTIAL LOAD SHED PRIORITY

6.1.5.2.1. LOAD SHED OVERRIDE SELECTOR (SHED/AUTO/ADD)
6.1.5.2.2. STATUS INDICATORS TO SHOW WHETHER THE PRIORITY LEVEL IS ADDED OR SHED

6.1.5.3. ADDITIONALLY THE LOAD SHED CONTROLS SHALL HAVE:

6.1.5.3.1. LOAD SHED CONTROL SWITCH (ON/OFF)
6.1.5.3.2. USER-SETTABLE LOAD SHED % (AS A FUNCTION OF ON-LINE GENERATOR CAPACITY)
6.1.5.3.3. USER SETTABLE LOAD SHED TIME DELAY
6.1.5.3.4. USER SETTABLE LOAD ADD % (AS A FUNCTION OF ON-LINE GENERATOR CAPACITY)
6.1.5.3.5. USER-SETTABLE LOAD ADD TIME DELAY
6.1.5.3.6. USER SETTABLE BUS UNDERFREQUENCY SET POINT
6.1.5.3.7. USER SETTABLE BUS UNDERFREQUENCY TIME DELAY
6.1.5.3.8. BUS UNDERFREQUENCY RESET PUSHBUTTON
6.1.5.3.9. BUS UNDER FREQUENCY INDICATOR

6.1.5.4. LOAD SENSITIVE LOAD SHED: AFTER ALL GENERATORS HAVE BEEN GIVEN SUFFICIENT TIME TO COME TO THE BUS, LOAD SHED SHALL SHIFT TO "LOAD SENSITIVE" MODE. THE SYSTEM SHALL COMPARE CURRENT GENERATOR ON-LINE CAPACITY (IN KW) TO CURRENT LOAD REQUIREMENTS. IF SURPLUS CAPACITY IS GREATER THAN THE CALCULATED LOAD ADD SETPOINT, AFTER THE LOAD ADD TIME DELAY THE NEXT LOAD SHED PRIORITY SHALL BE ADDED. THIS CALCULATION SHALL CONTINUE UNTIL ALL SHEDDABLE LOADS ARE ADDED, OR UNTIL SURPLUS CAPACITY IS LESS THAN THE CALCULATED LOAD SHED SETPOINT, IF SURPLUS CAPACITY IS LESS THAN THE CALCULATED LOAD SHED SETPOINT, AFTER THE LOAD SHED TIME DELAY THE NEXT LOAD SHED PRIORITY SHALL BE SHED. THIS CALCULATIONS SHALL CONTINUE UNTIL ALL SHEDDABLE LOADS ARE SHED, OR UNTIL SURPLUS CAPACITY IS GREATER THAN THE CALCULATED LOAD SHED SETPOINT. THE LOAD SHED CONTROL, IN IT'S AUTOMATIC SHEDDING AND ADDING OF LOADS, SHALL NOT OVERRIDE ANY MANUAL LOAD SHED/ADD OPERATION.

6.1.5.5. SHOULD THE LOAD BUS FREQUENCY FALL BELOW THE USER SELECTED BUS UNDERREQUENCY SETPOINT FOR A PERIOD LONGER THAN THE BUS UNDERFREQUENCY TIME DELAY, THEN ALL PRIORITY LEVEL LOADS SHALL BE SHED AND LOAD ADDITION SHALL NOT RESUME UNTIL THE OPERATOR HAS DEPRESSED THE BUS UNDERFREQUENCY RESET BUTTON. THE BUS UNDERFREQUENCY PROTECTION SHALL OVERRIDE ANY MANUAL LAOD ADD OPERATION.

6.2. GENERATOR DEMAND PRIORITY CONTROL

6.2.1. THE SYSTEM CONTROLS SHALL INCLUDE A GENERATOR DEMAND PRIORITY CONTROL FUNCTION TO AUTOMATICALLY MATCH THE ON-LINE GENERATOR CAPACITY TO THE LOADS TO AVOID UNNECESSARY OPERATION OF ALL THE GENERATORS WHEN THE LOADS ARE LOW.

6.2.2. THE FOLLOWING CONROLS SHALL BE PROVIDED FOR EACH GENERATOR:

6.2.2.1. USER-SETTABLE GENERATOR PRIORITY SELECTOR
6.2.2.2. STATUS INDICATOR FOR THE GENERATOR PRIORITY SELECTED
6.2.2.3. STATUS INDICATOR FOR GENERATOR ON-LINE OR OFF-LINE

6.2.3. THE GENERATOR DEMAND PRIORITY CONTROL SHALL HAVE THE FOLLOWING CONTROLS:

6.2.3.1. GENERATOR DEMAND PRIORITY CONTROL SWITCH (ON/OFF)
6.2.3.2. USER SETTABLE GENERATOR REMOVE % (AS A FUNCTION OF A SINGLE GENERATOR CAPACITY)
6.2.3.3. USER SETTABLE GENERATOR REMOVE DELAY
6.2.3.4. USER SETTABLE GENERATOR ADD % (AS A FUNCTION OF A SINGLE GENERATOR CAPACITY)
6.2.3.5. USER SETTABLE GENERATOR ADD DELAY

6.2.4. AFTER THE REMOVE TIME DELAY, GENERATORS SHALL BE REMOVED FROM THE BUS AS A FUNCTION OF THE GENERATOR PERCANTAGE LOADING BY THE USER SELECTED GENERATOR REMOVE TIME DELAY. GENERATORS SHALL BE REMOVED FROM THE BUS IN DESCENDING PRIORITY. SHOULD THE GENERATOR PERCENTAGE LOADING REACH THE USER SELECTED GENERATOR ADD LIMIT FOR A PERIOD EQUAL TO THE USER SELECTED ADD DELAY, THE NEXT GENERATOR SHALL BE STARTED, SYNCHRONIZED AND PARALLELED TO THE BUS. GENERATORS SHALL BE ADDED TO THE BUS IN ASCENDING PRIORITY ORDER. SHOULD THE GENERATOR PLANT EVER REACH 95% LOADING, THE NEXT PRIORITY GENERATOR SHALL BE STARTED AND ADDED TO THE BUS WITH NO TIME DELAY.

7. MANUAL OPERATION:

7.1. NO LOAD TEST MODE:

7.1.1. ENTRANCE INTO NO LOAD TEST MODE

7.1.1.1. THE NO LOAD TEST PUSHBUTTON ON THE HMI IS PLACED IN THE "ON" POSITION
7.1.1.2. ALL AVAILABLE GENERATORS ARE STARTED
7.1.1.3. THE EDG IS CLOSED AS IT COMES UP TO VOLTAGE AND FREQUENCY.
7.1.1.4. LOAD IS PROVIDED VIA THE ONBOARD LOAD BANK.
7.1.1.5. THE FIRST NATURAL GAS GENERATOR UP TO VOLTAGE AND FREQUENCY IS CLOSED TO THE BUS
7.1.1.6. THE REMAINING NATURAL GAS GENERATOR IS SYNCHRONIZED AND PARALLELED TO THE BUS AS IT COMES UP TO VOLTAGE AND FREQUENCY.
7.1.1.7. THE LOAD BANKS ARE ENERGIZED TO PROVIDE LOAD.
7.1.1.8. THE SYSTEM IS NOW IN NO LOAD TEST MODE

7.1.2. EXIT FROM NO LOAD TEST MODE

7.1.2.1. THE NO LOAD TEST PUSHBUTTON ON THE HMI IS PLACED IN THE "OFF" POSITION
7.1.2.2. ALL GENERATOR BREAKERS ARE OPENED,
7.1.2.3. THE GENERATORS ARE ALLOWED TO RUN FOR THEIR PROGRAMMED COOL DOWN PERIOD
7.1.2.4. THE SYSTEM IS NOW BACK IN THE ABOVE DESCRIBED NORMAL OPERATION

No.	Date	Eng.	Revision Notes
C	03/15/19	–	20% DESIGN SUBMISSION
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION
A	03/26/18	–	10% DESIGN SUBMISSION

Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP
Chkd.Dwn. AD

Engineer of Record _____ P.E.
Professional Engineer N.J. LIC.
Date: _____

NJ TRANSIT
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NEWARK PENN STATION
ELECTRICAL
SEQUENCE OF OPERATION 1 OF 2

Scale NTS
Contract No.: 16-001
Drawing E-611
Sheet 17 of 31

INFO - Y:\ITA\BRA\ALT_AECOM\Esk\17A56A-E610-E611-E612-E613_PROPOSED.dwg (E611 Fuel Cell) April 04, 2019 - 4:38pm locke

7.2.1.1. THE UTILITY FAIL TEST PUSHBUTTON ON THE HMI IS PLACED IN THE "ON" POSITION
7.2.1.2. A DRY CONTACT IS SENT TO EACH ATS, WHICH SIMULATES A LOSS OF UTILITY WITHIN THE ATS CONTROLS.
7.2.1.3. THE SYSTEM ENTERS INTO THE "ISLAND MODE OPERATION" SEQUENCE ABOVE.

7.2.2. EXIT FROM UTILITY FAIL TEST MODE

7.2.2.1. THE UTILITY FAIL TEST PUSHBUTTON ON THE HMI IS PLACED IN THE "OFF" POSITION
7.2.2.2. A DRY CONTACT IS REMOVED FROM EACH ATS WHICH SIMULATES THE RETURN OF THE UTILITY WITHIN THE ATS CONTROLS
7.2.2.3. THE SYSTEM EXITS INTO "NORMAL OPERATION" AS DESCRIBED IN THE "ISLAND MODE OPERATION" SEQUENCE ABOVE.

7.3. DEMAND RESPONSE MODE

7.3.1. ENTRANCE INTO DEMAND RESPOND MODE:

7.3.1.1. THE DEMAND RESPONSE PUSHBUTTON ON THE HMI IS PLACED IN THE "ON" POSITION.
7.3.1.2. A SINGLE SGG IS STARTED IN ACCORDANCE WITH THE USER-SETTABLE GENERATOR PRIORITY SELECTOR.
7.3.1.3. THE NATURAL GAS GENERATOR IS SYNCHRONIZED TO UTILITY SOURCE FS4031 AND CLOSED TO THE BUS AS IT COMES UP TO VOLTAGE AND FREQUENCY. BUS TIE BT3-4 IS CLOSED.
7.3.1.4. SOFC-1 CB IS OPENED TO DISCONNECT FUEL CELL POWER.
7.3.1.5. THIS TRIGGERS BT5-6 TO CLOSE. THE FUEL CELL INVERTER IS RESYNCHRONIZED TO UTILITY FS4014 AND PARALLELED TO THE BUS AS IT COMES UP TO VOLTAGE AND FREQUENCY. SOFC-1 IS CLOSED TO PROVIDE FUEL CELL GENERATION.
7.3.1.6. A DRY CONTACT IS SENT TO ATS NPS-2, WHICH TRIGGERS A CLOSED TRANSITION FROM THE UTILITY SOURCE TO THE SGG SOURCE
7.3.1.7. THE SYSTEM IS NOW IN DEMAND RESPONSE MODE.

7.3.2. EXIT FROM DEMAND RESPONSE MODE

7.3.2.1. THE DEMAND RESPONSE PUSHBUTTON ON THE HMI IS PLACED IN THE "OFF" POSITION.
7.3.2.2. A DRY CONTACT IS REMOVED FROM ATS NPS-2, WHICH TRIGGERS A CLOSED TRANSITION FROM THE SGG SOURCE TO THE UTILITY SOURCE.
7.3.2.3. THE GENERATOR BREAKER AND BUS TIE BT3-4 ARE OPENED.
7.3.2.4. THE GENERATOR IS ALLOWED TO RUN FOR ITS PROGRAMMED COOL DOWN PERIOD.
7.3.2.5. SOFC-1 IS OPENED TO DISCONNECT FUEL CELL POWER.
7.3.2.6. THE FUEL CELL INVERTER IS RESYNCHRONIZED TO UTILITY FS4031 AND PARALLELED TO THE BUS AS IT COMES UP TO VOLTAGE AND FREQUENCY. SOFC-1 IS CLOSED TO PROVIDE FUEL CELL GENERATION.
7.3.2.7. THE SYSTEM IS NOW BACK IN THE ABOVE DESCRIBED NORMAL OPERATION.

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			Date 03/15/19	AD

Engineer of Record _____ P.E.
Professional Engineer
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Date: _____

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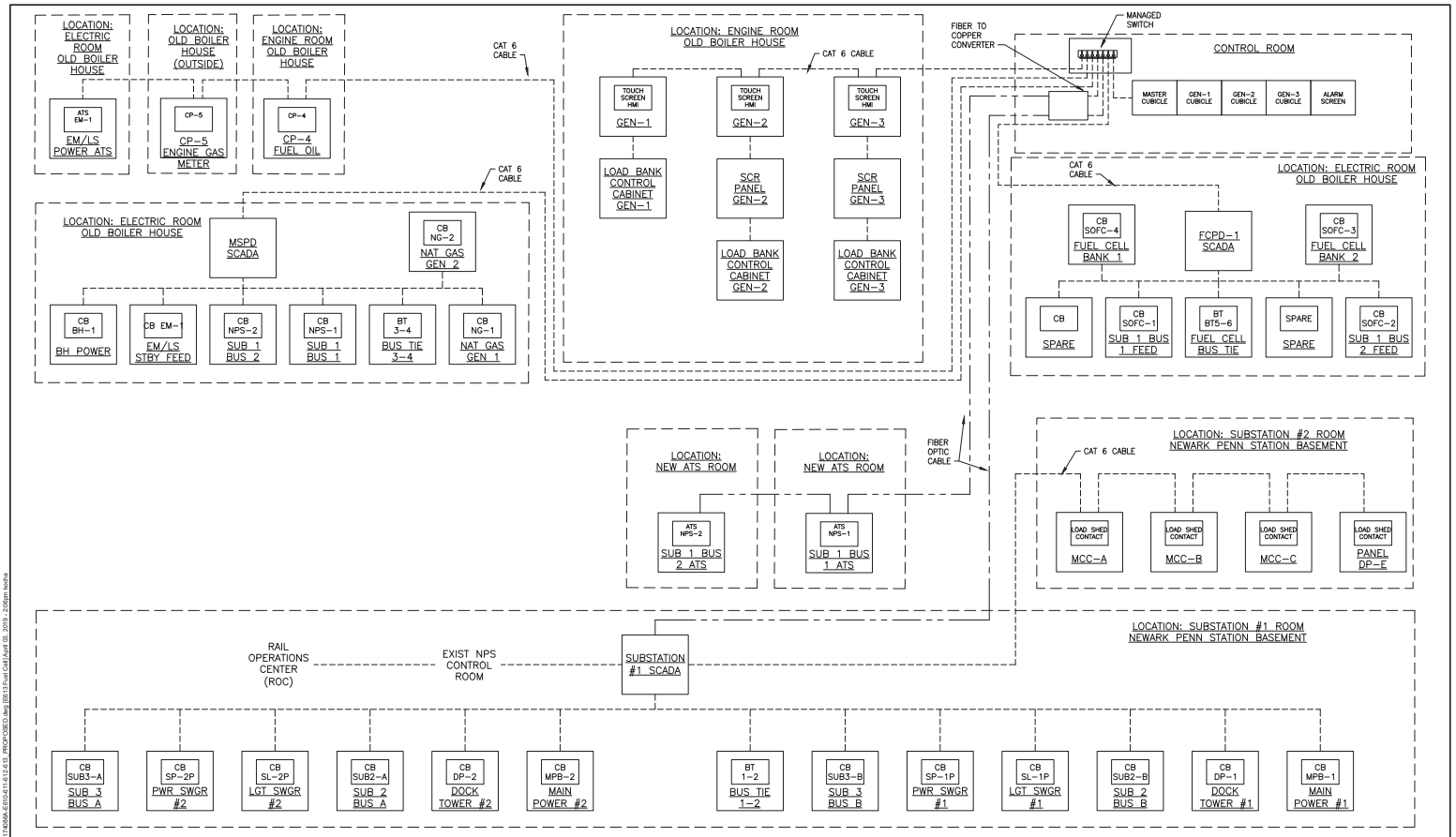
NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
PROPOSED ELECTRICAL
SEQUENCE OF OPERATION 2 OF 2

Scale NTS
Contract No.: 16-001
Drawing E-612
Sheet 18 of 31

INFO - Y:\17A08A\ALT_AECOM\Esk\17A08A-ES10-E1512-E1513_PROPOSED.dwg (E512 Fuel Cell) April 03, 2019 - 2:06pm lvoha



No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
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P.E.
Professional Engineer
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NEW JERSEY TRANSIT
DISTRIBUTED GENERATION

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NEWARK PENN STATION
ELECTRICAL
COMMUNICATION DIAGRAM

Scale NTS
Contract No.: 16-001
Drawing E-613
Sheet 19 of 31

INFO - Y:\TASK\A\NJT_AECOM\Esx\17A59A-ES10-E1512-E13_PROPOSED.dwg (E613 Fuel Cell April 03, 2019 - 2:06pm) kocha

SWITCHGEAR SCHEDULE

TAG	LOCATION	SERVICE	ENCLOSURE TYPE	VOLTAGE CLASS	AMPACITY	TYPE	SHORT CIRCUIT	NOTES
MSPD-P	OLD BOILER HOUSE GROUND FLOOR	GENERATOR PARALLELING SWITCHGEAR	METAL CLAD	5KV	1200A	3-PHASE, 3 WIRE	26KA	G2 AND G3 PARALLELING SWITCHGEAR
MSPD-MV	OLD BOILER HOUSE GROUND FLOOR	MEDIUM VOLTAGE POWER DISTRIBUTION	METAL CLAD	5KV	1200A	3-PHASE, 3 WIRE	26KA	NEWARK PENN STATION "STANDBY" POWER DISTRIBUTION
MSPD-LV	OLD BOILER HOUSE GROUND FLOOR	LOW VOLTAGE POWER DISTRIBUTION	METAL CLAD	480V	4000A	3-PHASE, 4 WIRE	100KA	NEWARK PENN STATION "STANDBY" POWER DISTRIBUTION
FCPD-1	OLD BOILER HOUSE GROUND FLOOR	FUEL CELL POWER DISTRIBUTION	METAL CLAD	4160V	1200A	3-PHASE, 3 WIRE	26KA	NEWARK PENN STATION "CONTINUOUS" POWER DISTRIBUTION
ATS NPS-1	BUS WAITING ROOM	NEWARK PENN STATION MAIN AUTOMATIC TRANSFER SWITCH 1	METAL CLAD	4160V	1200A	3-PHASE, 3 POLE	26KA	MEDIUM VOLTAGE "BREAKER PAIR" TYPE AUTOMATIC TRANSFER SWITCH WITH CLOSED TRANSITION CAPABILITY
ATS NPS-2	BUS WAITING ROOM	NEWARK PENN STATION MAIN AUTOMATIC TRANSFER SWITCH 2	METAL CLAD	4160V	1200A	3-PHASE, 3 POLE	26KA	MEDIUM VOLTAGE "BREAKER PAIR" TYPE AUTOMATIC TRANSFER SWITCH WITH CLOSED TRANSITION CAPABILITY
ATS EM-1	OLD BOILER HOUSE GROUND FLOOR	EMERGENCY-STANDBY POWER AUTOMATIC TRANSFER SWITCH	METAL CLAD	480V	800A	3-PHASE, 4 POLE	100KA	"EMERGENCY"-"STANDBY" POWER SOURCE TRANSFER SWITCH
ATS EMNPS-1	NEWARK PENN STATION MAIN CONCOURSE BASEMENT	EMERGENCY/LIFE SAFETY POWER DISTRIBUTION	METAL CLAD	480V	600A	3-PHASE, 4 POLE	100KA	NEWARK PENN STATION "EMERGENCY" POWER DISTRIBUTION

TRANSFORMER SCHEDULE

TAG	LOCATION	SERVICE	ENCLOSURE TYPE	HIGH SIDE VOLTAGE	LOW SIDE VOLTAGE	TYPE	SIZE	NOTES
MSPD XFMR-1	OLD BOILER HOUSE GROUND FLOOR	POWER DISTRIBUTION STEP DOWN TRANSFORMER	METAL CLAD	4160V Δ	480/277V Y	3-PHASE	3000KVA	INDOOR NEMA 1 LOUVERED ENCLOSURE CAST COIL TRANSFORMER
FCPD XFMR-1	OLD BOILER HOUSE GROUND FLOOR	VOLTAGE STEP UP TRANSFORMER	METAL CLAD	4160V Δ	480/277V Y	3-PHASE	300KVA	INDOOR NEMA 1 LOUVERED ENCLOSURE CAST COIL TRANSFORMER
FCPD XFMR-2	OLD BOILER HOUSE GROUND FLOOR	VOLTAGE STEP UP TRANSFORMER	METAL CLAD	4160V Δ	480/277V Y	3-PHASE	300KVA	INDOOR NEMA 1 LOUVERED ENCLOSURE CAST COIL TRANSFORMER

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19
Des. AK
Dwn.
Chkd.

Engineer of Record
_____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
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NEWARK PENN STATION
ELECTRICAL - SCHEDULES 1 OF 2

Scale NTS
Contract No.: 16-001
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FEEDER TAG	SERVICE FROM	LOCATION	SERVICE TO	LOCATION	VOLTAGE	LOAD	COPPER CONDUCTOR	CONDUIT	APPROXIMATE FEEDER LENGTH	NOTES
DG-1	EDG (G1) CB	OLD BOILER HOUSE	EM-1 ATS	OLD BOILER HOUSE	480	800A	(2) SETS (3) 500 MCM CABLE + GROUND	(2) 3"	700'	INDOOR(XHHW-2 CABLE AND RGS CONDUIT)
NG-1	SGG (G2) CB	OLD BOILER HOUSE	MSPD 4160V BUS	OLD BOILER HOUSE	4160	200A	(1) SET (3) 4/0 CABLE + GROUND	(3) 3"	15'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
NG-2	SGG (G3) CB	OLD BOILER HOUSE	MSPD 4160V BUS	OLD BOILER HOUSE	4160	200A	(1) SET (3) 4/0 CABLE + GROUND	(3) 3"	15'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
SOFC-1	FCPD	OLD BOILER HOUSE	NPS SUB #1 SPARE CABINET	NPS MAIN CONC. BASEMENT	4160V	100A	(1) SET OF (3) #4 CABLE + GROUND	2"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
SOFC-2	FCPD	OLD BOILER HOUSE	NPS SUB #1 SPARE CABINET	NPS MAIN CONC. BASEMENT	4160V	100A	(1) SET OF (3) #4 CABLE + GROUND	2"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
EM-1	MSPD 480V BUS	OLD BOILER HOUSE	EM-1 ATS	OLD BOILER HOUSE	480	800A	(2) SETS (3) 500 MCM CABLE + GROUND	(2) 3"	700'	INDOOR(XHHW-2 CABLE AND RGS CONDUIT)
EMNPS-1	EM-1 ATS	OLD BOILER HOUSE	EMNPS-1 ATS	NPS MAIN CONC. BASEMENT	480	800A	(3) SETS (3) 300 MCM CABLE + GROUND	(3) 3"	700'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
BH-1	MSPD 480V BUS	OLD BOILER HOUSE	PNL PP-1	OLD BOILER HOUSE	480	400A	(2) SETS (3) 3/0 CABLE + GROUND	(2) 2"	50'	INDOOR(XHHW-2 CABLE AND RGS CONDUIT)
BH-2	MSPD 480V BUS	OLD BOILER HOUSE	SGG (G2) LOAD BANK	OLD BOILER HOUSE	480	1600A	(3) SETS (3) 500 MCM CABLE + GROUND	(3) 3"	50' (EACH)	INDOOR(XHHW-2 CABLE AND RGS CONDUIT)
BH-3	MSPD 480V BUS	OLD BOILER HOUSE	SGG (G3) LOAD BANK	OLD BOILER HOUSE	480	1600A	(3) SETS (3) 500 MCM CABLE + GROUND	(3) 3"	50' (EACH)	INDOOR(XHHW-2 CABLE AND RGS CONDUIT)
NPS-1	MSPD 4160V BUS	OLD BOILER HOUSE	NPS-1 ATS	BUS WAITING ROOM	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
NPS-2	MSPD 4160V BUS	OLD BOILER HOUSE	NPS-2 ATS	BUS WAITING ROOM	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
NPS-3	NPS-1 ATS	BUS WAITING ROOM	NPS SUB #1 MPB-1 CABINET	NPS MAIN CONC. BASEMENT	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	75'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
NPS-4	NPS-2 ATS	BUS WAITING ROOM	NPS SUB #1 MPB-2 CABINET	NPS MAIN CONC. BASEMENT	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	75'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
NPS-5	PSE&G UT. CAB. FS4014	NPS MAIN CONC. BASEMENT	NPS-1 ATS	BUS WAITING ROOM	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	75'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
NPS-6	PSE&G UT. CAB. FS4031	NPS MAIN CONC. BASEMENT	NPS-2 ATS	BUS WAITING ROOM	4160	300A	(1) SET (3) 250 MCM CABLE + GROUND	3"	75'	INDOOR(MV-105, 133% INSULATED CABLE AND RGS CONDUIT)
NPS-7	NPS-1 ATS	BUS WAITING ROOM	RAY BLVD SUB#3 EC4031	RAY BLVD CONC. ELEC. RM	4160	150A	(1) SET (3) 1/0 CABLE + GROUND	2 1/2"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
NPS-8	NPS-2 ATS	BUS WAITING ROOM	RAY BLVD SUB#3 EC4014	RAY BLVD CONC. ELEC. RM	4160	150A	(1) SET (3) 1/0 CABLE + GROUND	2 1/2"	700'	OUTDOOR ABOVE 15' (MV-105, 133% INSULATED CABLE AND PVC COATED RGS)
NPS-9	SUBSTATION #2	NPS MAIN CONC. BASEMENT	EMNPS-1 ATS	NPS MAIN CONC. BASEMENT	480	600A	(2) SETS (3) 300 MCM CABLE + GROUND	(2) 2 1/2"	15'	INDOOR(THHN CABLE AND RGS CONDUIT)
NPS-10	EMNPS-1 ATS	NPS MAIN CONC. BASEMENT	EPP-NPS	NPS MAIN CONC. BASEMENT	480	600A	(2) SETS (3) 300 MCM CABLE + GROUND	(2) 2 1/2"	5'	INDOOR(THHN CABLE AND RGS CONDUIT)
NPS-11	EPP-NPS	NPS MAIN CONC. BASEMENT	PNL EM	NPS MAIN CONC. BASEMENT	480	70A	(1) SET (3) #6 CABLE + GROUND	3/4"	50'	INDOOR(THHN CABLE AND RGS CONDUIT)
NPS-12	EPP-NPS	NPS MAIN CONC. BASEMENT	CITY SUBWAY EM PNL	CITY SUBWAY PLATFORM ELEC. RM 2	480	300A	(1) SET (3) 350 CABLE + GROUND	2 1/2"	300'	INDOOR (XHHW-2 CABLE AND RGS CONDUIT)
NPS-13	EPP-NPS	NPS MAIN CONC. BASEMENT	ELEV D-1 (TRACK 3-4 ADA)	PLATFORM 3/4 ELEVATOR ROOM	480	150A	(1) SET OF (4) 1/0 CABLE + GROUND	2"	300'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-14	EPP-NPS	NPS MAIN CONC. BASEMENT	ELEV C-1 (TRACK 2 ADA)	PLATFORM 2 ELEVATOR ROOM	480	150A	(1) SET OF (4) 1/0 CABLE + GROUND	2"	300'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-15	EPP-NPS	NPS MAIN CONC. BASEMENT	EPP-RBC	RAY BLVD CONC. ELEC. RM	480	250A	(1) SET OF (3) 4/0 CABLE + GROUND	2 1/2"	700'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-16	EPP-RBC	RAY BLVD CONC. ELEC. RM	RPB-PWR TO ELEV CONTR. PANELS	RAY BLVD CONC. ELEC. RM	480	30A	(1) SET (3) #10 CABLE + GROUND	3/4"	15'	INDOOR(THHN CABLE AND RGS CONDUIT)
NPS-17	EPP-RBC	RAY BLVD CONC. ELEC. RM	EM LIGHTING UPS	RAY BLVD CONC. ELEC. RM	480	80A	(1) SET (3) #4 CABLE + GROUND	1"	15'	INDOOR(THHN CABLE AND RGS CONDUIT)
NPS-18	EPP-RBC	RAY BLVD CONC. ELEC. RM	ELEV. A PANEL	ELEV A MACHINE RM	480	30A	(1) SET (4) #8 CABLE + GROUND	1"	200'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-19	EPP-RBC	RAY BLVD CONC. ELEC. RM	ELEV. B PANEL	ELEV B MACHINE RM	480	30A	(1) SET (4) #8 CABLE + GROUND	1"	150'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-20	EPP-RBC	RAY BLVD CONC. ELEC. RM	ELEV. C PANEL	ELEV C MACHINE RM	480	30A	(1) SET (4) #8 CABLE + GROUND	1"	100'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-21	EPP-RBC	RAY BLVD CONC. ELEC. RM	ELEV. D PANEL	ELEV D MACHINE RM	480	30A	(1) SET (4) #8 CABLE + GROUND	1"	50'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
NPS-22	EPP-RBC	RAY BLVD CONC. ELEC. RM	ELEV. E PANEL	ELEV E MACHINE RM	480	30A	(1) SET (4) #8 CABLE + GROUND	1"	100'	OUTDOOR ABOVE 15' (RHW CABLE AND PVC COATED RGS)
COMM-1	MPSD CONTR. CABINET	OLD BOILER HOUSE	NPS SUB#1	NPS MAIN CONC. BASEMENT	–	–	–	4"	700'	MULTIMODE FIBEROPTIC COMMUNICATION CABLE
COMM-2	SUBSTATION #1 CONTR.	OLD BOILER HOUSE	BRIDGE LOCK BAR SENSORS	DOCK BRIDGE CONTROL TOWER	–	–	–	4"	800'	MULTIMODE FIBEROPTIC COMMUNICATION CABLE

No.	Date	Eng.	Revision Notes
C	03/15/19	–	20% DESIGN SUBMISSION
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A	03/26/18	–	10% DESIGN SUBMISSION

Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP
Chkd.Dwn. AD

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
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CONSULTANT

WSP USA
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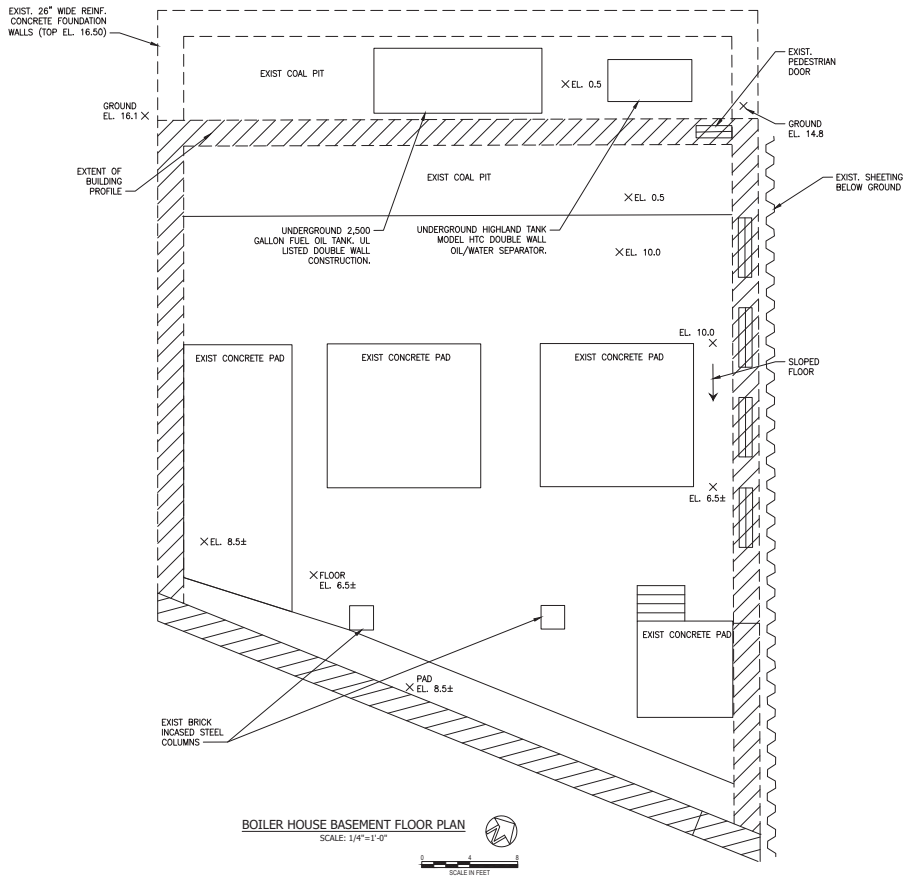
NEW JERSEY TRANSIT
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NEWARK PENN STATION
ELECTRICAL - SCHEDULES 2 OF 2

Scale NTS
Contract No.: 16-001
Drawing E-802
Sheet 21 of 31

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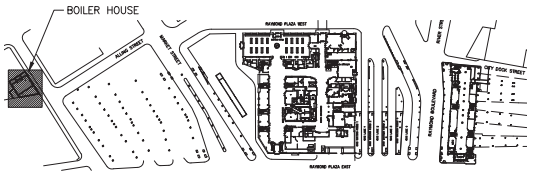
BOILER HOUSE BASEMENT FLOOR PLAN

SCALE: 1/4"=1'-0"

SCALE IN FEET

NOTE:

1. FILL IN BASEMENT FLOOR TO BOTTOM OF FIRST FLOOR WITH SAND.
2. FILL PORT AND VENTS FOR FUEL OIL TANK TO BE RUN THROUGH SLAB EXTERIOR TO THE BUILDING PROFILE.



KEY PLAN

N.T.S.

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
				Date 03/15/19
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP
				Chkd.Dwn. AD

Engineer of Record

P.E.

Professional Engineer
N.J. LIC.

Date:

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125 BROAD STREET
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WSP USA
One Penn Plaza, New York, NY 10119

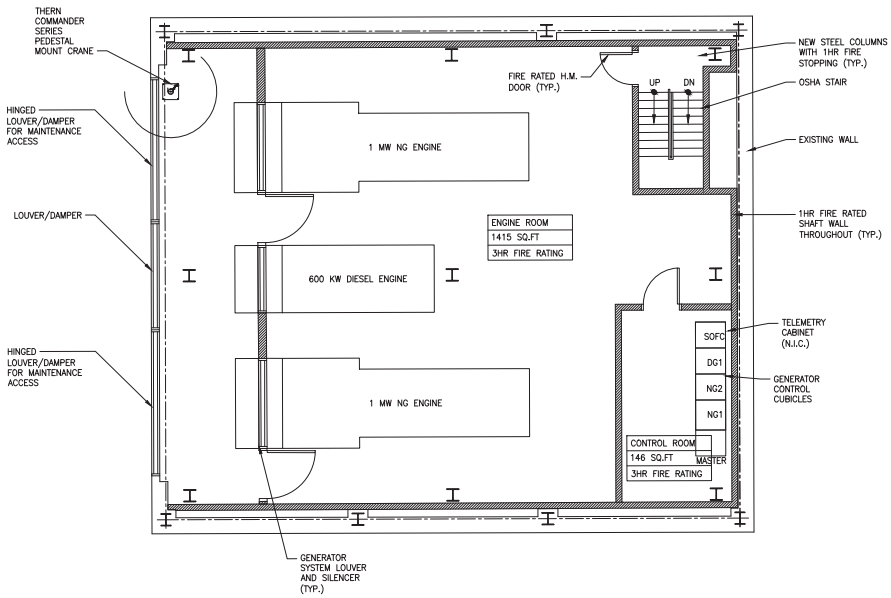
NEW JERSEY TRANSIT
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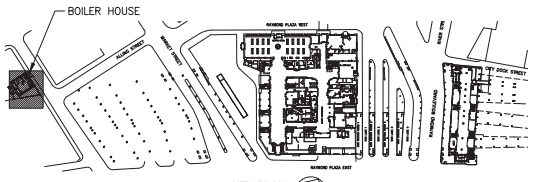
NEWARK PENN STATION
MECHANICAL
BOILER HOUSE
BASEMENT FLOOR PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing M-101
Sheet 22 of 31

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BOILER HOUSE SECOND FLOOR PLAN
SCALE: 1/4"=1'-0"



KEY PLAN
N.T.S.

0 4 8
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				Date 03/15/19
C	03/15/19	–	20% DESIGN SUBMISSION	Des. AK
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. AD
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. GP
				Chkd.Dwn. AD

Engineer of Record
P.E.
Professional Engineer
N.J. LIC.
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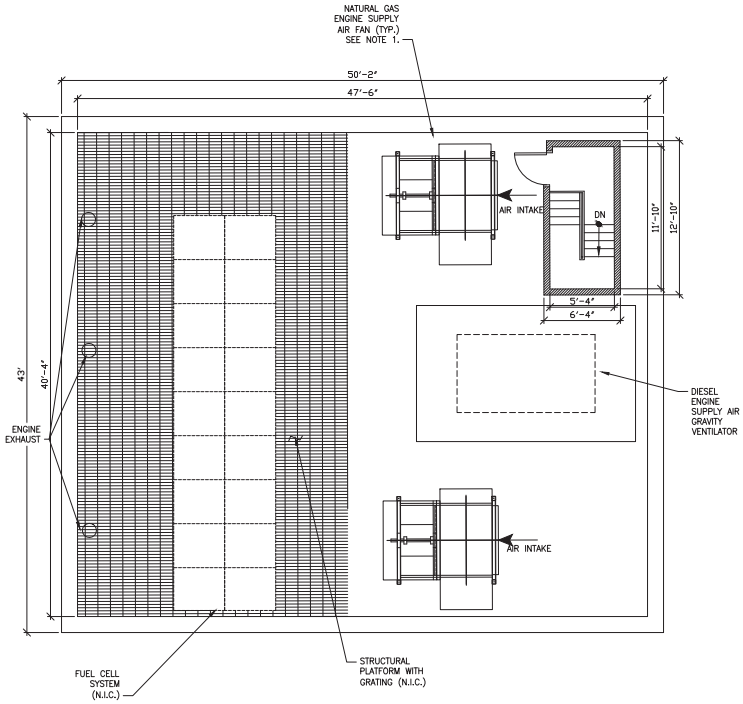
NEWARK PENN STATION
MECHANICAL
BOILER HOUSE
SECOND FLOOR PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing M-102
Sheet 23 of 31

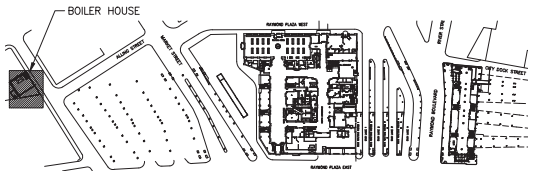
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NOTE:

1. PROVIDE MINIMUM 15' CLEARANCE BETWEEN ALL OA INTAKES FOR AND PROPOSED LOCATION OF FUTURE FUEL CELL.



BOILER HOUSE ROOF PLAN
SCALE: 1/4"=1'-0"



KEY PLAN
N.T.S.

0 4 8
SCALE IN FEET

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	AD
A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP
Chkd.Dwn. AD

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

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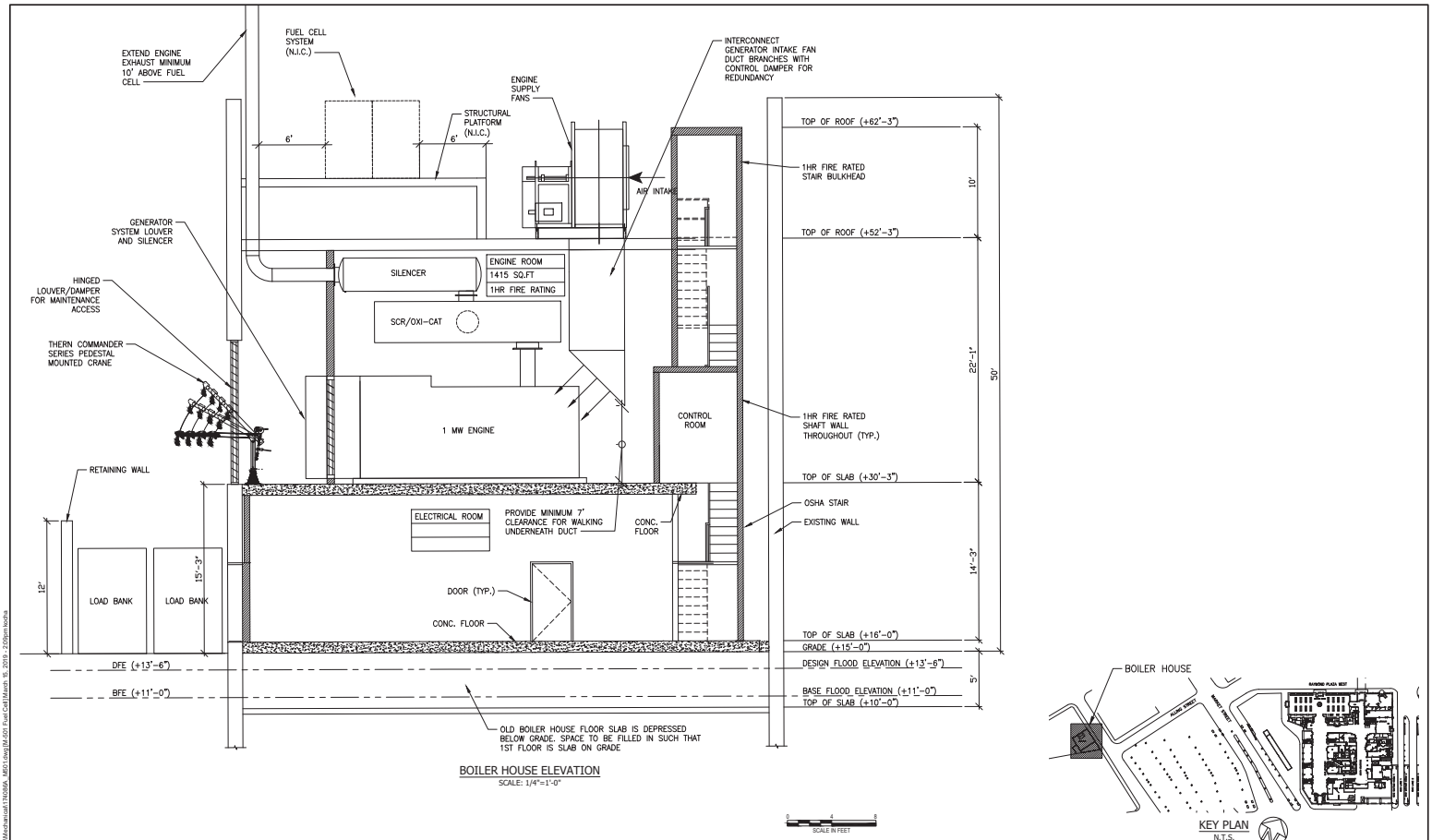
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DISTRIBUTED GENERATION

20% DESIGN

NEWARK PENN STATION
MECHANICAL
BOILER HOUSE
ROOF PLAN

Scale 1/4"=1'-0"
Contract No.: 16-001
Drawing M-103
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INFO - Y:\1HA08\ANJT_AECOM\Architecture\1HA08A_M103.dwg(M-103 Fuel Cell) March 15, 2019 - 2:09pm kosha



BOILER HOUSE ELEVATION
SCALE: 1/4"=1'-0"

SCALE IN FEET

KEY PLAN
N.T.S.

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/15/19	–	20% DESIGN SUBMISSION	AD
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A	03/26/18	–	10% DESIGN SUBMISSION	GP

Date 03/15/19
Des. AK
Chkd. AD
Dwn. GP

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

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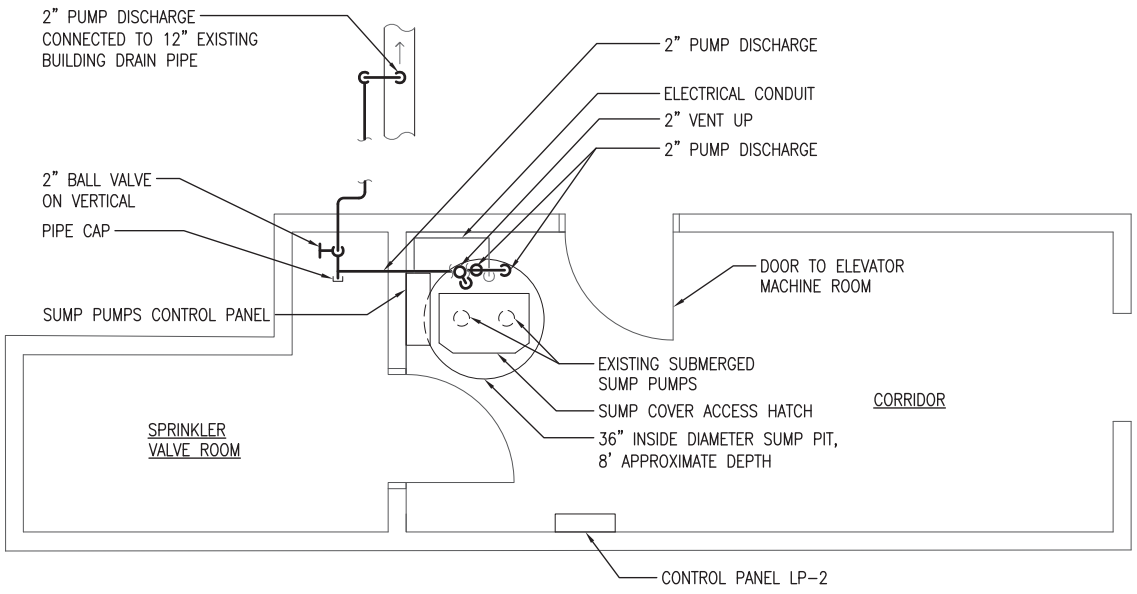
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NEWARK PENN STATION
MECHANICAL
BOILER HOUSE
ELEVATION

Scale 1/4"=1'-0"
Contract No.: 16-001
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EXISTING SUMP PIT AND PIPING LAYOUT

3/8"=1'-0" 0 1 2 3 5 FT.

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/13/19		20% DESIGN SUBMISSION	Des. IZ
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	Chkd. JH
A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. IZ
				Chkd.Dwn. JH

Date 03/13/19

Engineer of Record
_____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

NJ TRANSIT
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ONE PENN PLAZA EAST
NEWARK, NJ 07105-2246

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NEWARK PENN STATION

PLUMBING EXISTING SUMP PIT
AND PIPING LAYOUT

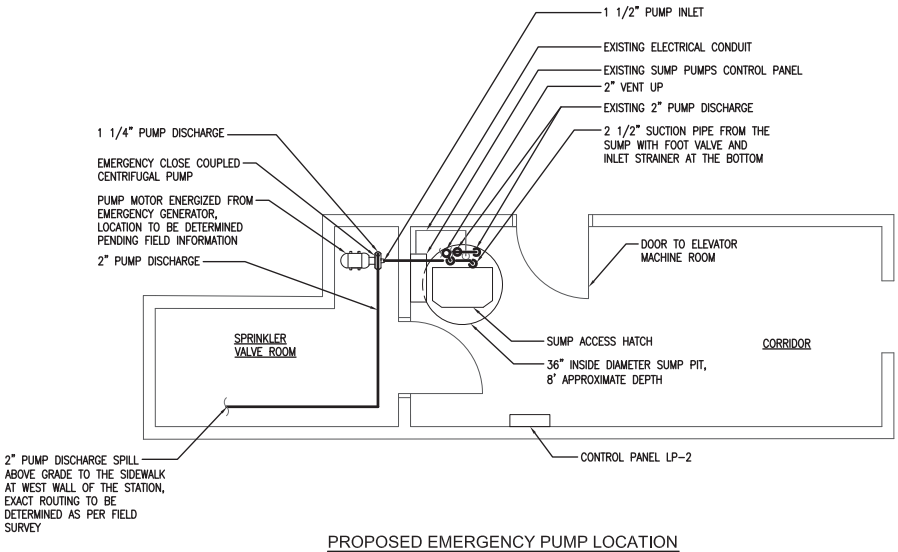
Scale

Contract No.: 16-001

Drawing P-101

Sheet 26 of 31

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PROPOSED EMERGENCY PUMP LOCATION
AND NEW PIPING LAYOUT

1/4"=1'-0" 0 4 8 FT.

No.	Date	Eng.	Revision Notes	Chkd./Dwn.
C	03/13/19		20% DESIGN SUBMISSION	Des. IZ
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A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. IZ

Date 03/13/19

Engineer of Record _____ P.E.
Professional Engineer
N.J. LIC.

Date: _____

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NEW JERSEY TRANSIT
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PLUMBING PROPOSED EMERGENCY PUMP LOCATION AND NEW PIPING LAYOUT

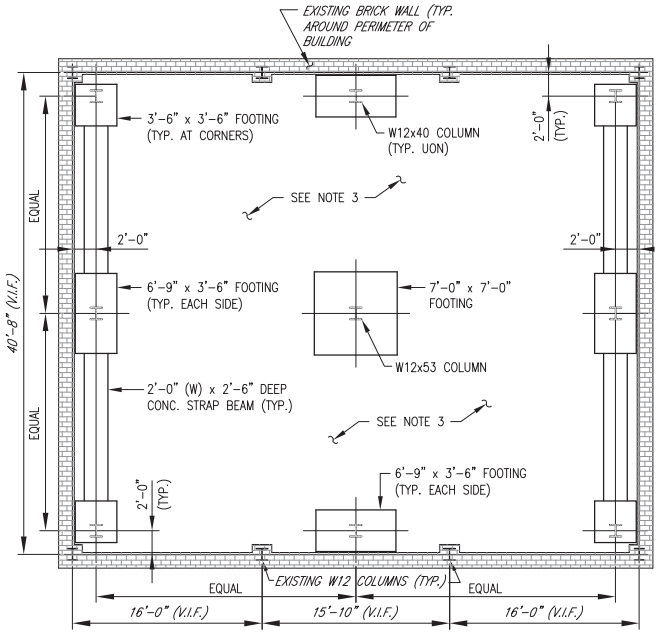
Scale

Contract No.: 16-001

Drawing P-102

Sheet 27 of 31

M:\PD - Jobs\Data\ECAD\JOBS\NEWARK\Plumbing\Alternate 2.dwg [Layout1] March 15, 2019 - 12:56pm Eva Tzonedis



FOUNDATION PLAN

SCALE IN FEET

8 6 4 2 0 8

NOTES:

1. FOOTINGS SIZES ARE BASED ON A MINIMUM SOIL BEARING CAPACITY OF 2.0 TONS PER SQUARE FOOT (4,000 PSF) IN THE ABSENCE OF A LOCAL GEOTECHNICAL REPORT FOR THE SITE. BASE OF ALL FOOTINGS SHALL BE SET A MINIMUM OF 4'-0" BELOW GRADE, UON.
2. FOR ESTIMATING PURPOSES, ALL FOOTINGS SHALL BE 3'-0" DEEP, UON. ALSO, A 5% ADDITION TO PLAN SIZE OF ALL FOOTINGS SHOWN SHALL BE APPLIED IN VIEW OF INCREASES IN DEAD LOADING APPLICABLE AT SECOND FLOOR. FOR DETAILS OF LATTER LOADING, SEE NOTES ON DRAWING S-102.
3. EXISTING BASEMENT (CRAWLSPACE) SHALL BE BACKFILLED WITH SOIL OVER THE ENTIRE AREA AND COMPACTED IN MAXIMUM 1'-0" THICK LAYERS, UP TO GRADE LEVEL. THIS IS IN PREPARATION OF NEW CONCRETE FLOOR SLAB ON GRADE. SEE NOTE 1 ABOVE REGARDING SOIL BEARING CAPACITY FOR NEW FOOTINGS.

No.	Date	Eng.	Revision Notes	Chkd.Dwn.
C	03/13/19	–	20% DESIGN SUBMISSION	UP
B	09/14/18	–	DRAFT 20% DESIGN SUBMISSION	UP
A	03/26/18	–	10% DESIGN SUBMISSION	EG

Date 03/13/19
Des. EG
Chkd. UP
Dwn. EG

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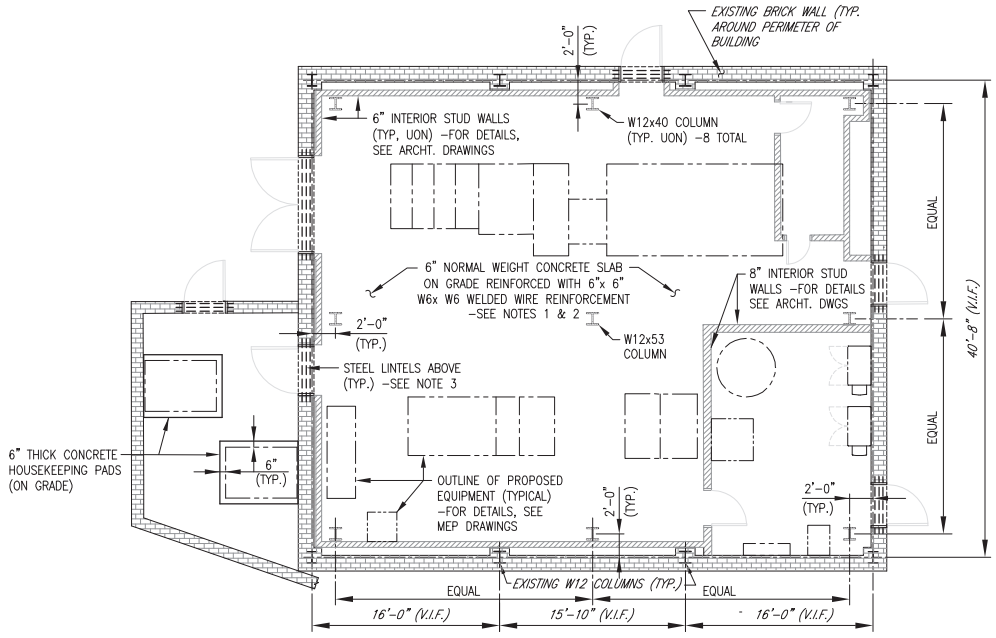
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NEWARK PENN STATION
STRUCTURAL OLD BOILER HOUSE

FOUNDATION PLAN

Scale
Contract No.: 16-001
Drawing S-100
Sheet 28 of 31

#EFD - UAC Dina Andreoni\U Transit Distribution Generation\Arch\ Plans - Old Boiler House\Boiler House Structural Framing - 2018-03-16.dwg [Foundation] March 18, 2019 - 4:00pm gfoels



GROUND FLOOR FRAMING PLAN

SCALE IN FEET

8 6 4 2 0 8

NOTES:

1. SEE NOTE 3 ON FOUNDATION DRAWING S-100.
2. SLAB REINFORCEMENT SHALL BE LOCATED 1" FROM TOP OF SLAB, UON.
3. LINTELS SHALL BE L 4 x 4 x ½ FOR EACH 4" BRICK WYTHE, WITH MINIMUM 6" EMBEDMENT IN THE WALL BEYOND. IT IS ASSUMED THAT MAIN BUILDING WALLS ARE 4 WYTHES THICK & SHED BUILDING WALLS ARE 2 WYTHES THICK.

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Date 03/13/19
Des. EG
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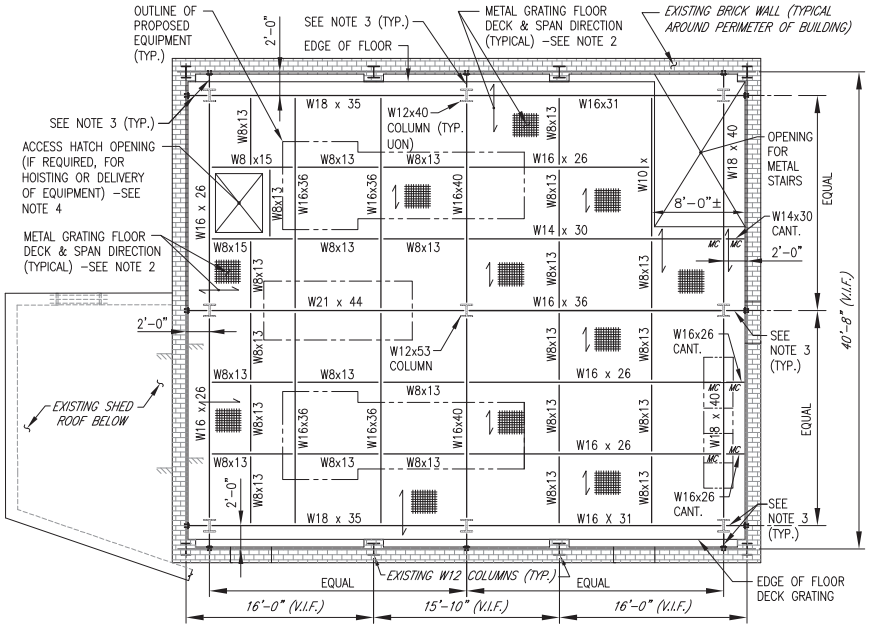
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STRUCTURAL OLD BOILER HOUSE

GROUND FLOOR FRAMING PLAN

Scale
Contract No.: 16-001
Drawing S-101
Sheet 29 of 31

BIM 360 - NJDC Data Archive\NJ Transit Distribution Generation\NJ Penn - Old Boiler House\Boiler House Structural Framing - 2018-03-22.dwg [Ground] March 18, 2019 - 3:58pm gbeda



SECOND FLOOR FRAMING PLAN

SCALE IN FEET

8 6 4 2 0 8

NOTES:

1. CONTRACTOR NOTE:
   STEEL FRAMING AND FLOOR DECK DESIGN PRESENTED IS BASED STRICTLY ON APPLICABLE LOADING IN THE ABSENCE OF FIREPROOFING REQUIREMENTS FOR THE FLOOR. IT IS SINCE REQUIRED THAT A 3–HOUR FIRE RATING OF THE FLOOR IS TO BE PROVIDED FOR PROTECTION OF PROPOSED EQUIPMENT ON THE GROUND LEVEL BELOW. THE CONTRACTOR SHALL THUS PERFORM A FULL DESIGN OF THE FLOOR SYSTEM, INCLUDING THE ACCOMMODATION OF ALL STATIC AND DYNAMIC LOADING CONSIDERATIONS IN THIS DESIGN. HOWEVER, FOR MATERIAL ESTIMATING PURPOSES, THE FOLLOWING IS SUGGESTED BASED ON THE CURRENT FRAMING PLAN SHOWN:
   - FLOOR DECK SHALL BE REVISED TO 8" (TOTAL THICKNESS) LIGHT–WEIGHT CONCRETE SLAB ON 3", 16 GAUGE METAL DECK, BY VULCRAFT STEEL DECK SYSTEMS, OR EQUIVALENT EQUAL.
   - A SURCHARGE OF 20% MINIMUM SHALL BE APPLIED TO THE TOTAL STEEL WEIGHT OF FLOOR FRAMING AS A RESULT OF THE ADDITIONAL DEAD LOADING (LATTER ESTIMATED TO BE IN THE ORDER OF 45 PSF ADDITIONAL MINIMUM).
2. ⌐▦ NOTATION DENOTES 1¾ x ¾ HEAVY–DUTY STEEL METAL GRATING (& SPAN DIRECTION) OF TYPE 19W4 (16 PSF) OR 19W2 (16.6 PSF) BY BROWN CAMPBELL COMPANY, OR APPROVED EQUAL.
3. BEAM SHOWN INDICATES W14x22 STUB BRACE ANCHORED ONTO THE EXISTING WALL IN PROVIDING LATERAL BRACING OF THE FRAMING SYSTEM WHICH IMPOSES NO GRAVITY LOADING ONTO THE EXISTING WALL AT ANY ONE LOCATION. CONNECTION OF STUB BRACE SHALL COMPRISE A WELDED STEEL END PLATE SET AGAINST THE WALL WITH MIN. TWO ⅜" DIAMETER HILTI HIT–HY 70 THREADED ANCHOR RODS WITH 3 ½" EMBEDMENT INTO BRICK, OR EQUIVALENT EQUAL. AT NO TIME SHALL ANY BRICK PIECE(S) BE REMOVED TO PROVIDE A POCKET FOR THE STUB AS AN ALTERNATIVE CONNECTION DETAIL.
4. CONTRACTOR SHALL INCLUDE PROVISIONS FOR LOCAL LOADING & THE ATTACHMENT OF HOIST EQUIPMENT ONTO THE FLOOR, AS REQUIRED, IN THE VICINITY OF THE ACCESS HATCH SHOWN OR OTHERWISE. FOR SUGGESTED TYPE OF HATCH EQUIPMENT, SEE MECHANICAL DRAWINGS.

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A	03/26/18	–	10% DESIGN SUBMISSION	Dwn. EG
				Chkd.Dwn. UP

Date 03/13/19

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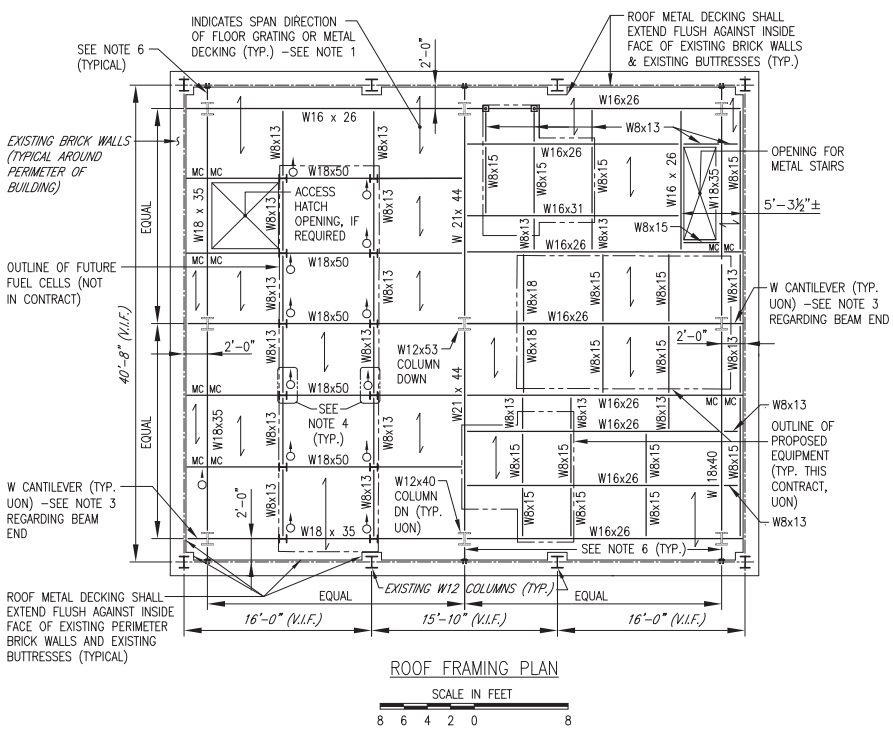
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SECOND FLOOR FRAMING PLAN

Scale
Contract No.: 16-001
Drawing S-102
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BIM 360 - (JVC Dina Andreeva\NJ Transit Distribution Generation\Penn - Old Boiler House\Boiler House Structural Framing - 2018-02-22.dwg [Second] March 18, 2019 - 2:58pm gbeda



ROOF FRAMING PLAN

SCALE IN FEET

8 6 4 2 0 8

NOTES:

1. METAL DECKING SHALL BE 1 ½", 18 GA. TYPE 1.5 B ROOF DECK BY VULCRAFT STEEL DECK SYSTEMS, OR APPROVED EQUAL.
2. ROOF DECK SHALL EXTEND TO FULLY COVER THE ROOF SURFACE, AND SHALL BE COVERED WITH A LAYER OF INSULATION AND WATERPROOFING MEMBRANE, AS REQUIRED. FOR ESTIMATING PURPOSES, WATERPROOFING MEMBRANE SHALL EXTEND 6" (MIN.) VERTICALLY UP AGAINST THE INSIDE FACE OF BRICK PARAPET WALLS AROUND THE PERIMETER.
3. DESIGNATION "MC" DENOTES BEAM MOMENT CONNECTION. CANTILEVER BEAM SHALL BE SAME SIZE AS THAT OF THE BACK–UP MAIN SPAN AND SHALL EXTEND TO FACE OF EXISTING BRICK WALL BUT NOT PENETRATE IT.
4. H INDICATES W8x31 POST UP (x 4'–0" MIN. LONG FOR THE PURPOSE OF MATERIAL ESTIMATES) AS PART OF FUTURE DUNNAGE FRAMING FOR SUPPORT OF EQUIPMENT. ALL LOCAL INTERRUPTIONS TO WATERPROOFING MEMBRANE AT NOTED POST LOCATIONS SHALL BE ADDRESSED WITH ADDITION OF OVERLAPPING WATERPROOFING PIECE(S), AS REQUIRED, TO ENSURE THAT ALL JOINTS AROUND PERIMETER OF POSTS ARE FULLY SEALED.
5. THE CONTRACTOR MAY ELECT A 4" MINIMUM THICK PRECAST CONCRETE HOUSEKEEPING PAD OVER & BEYOND THE FOOTPRINT AREA OF THE EQUIPMENT IN LIEU OF METAL DECKING. THIS WOULD IMPLY AN INCREASE IN DEAD LOADING WHICH SHALL BE CONSIDERED IN HIS/HER DESIGN PROCEDURE.
6. BEAM SHOWN INDICATES W14x22 STUB BRACE ANCHORED ONTO THE EXISTING WALL IN PROVIDING LATERAL BRACING OF THE FRAMING SYSTEM WHICH IMPOSES NO GRAVITY LOADING ONTO THE EXISTING WALL AT ANY ONE LOCATION. CONNECTION OF STUB BRACE SHALL COMPRISE A WELDED STEEL END PLATE SET AGAINST THE WALL WITH MIN. TWO ⅜" DIAMETER HILTI HIT–HY 70 THREADED ANCHOR RODS WITH 3 ½" EMBEDMENT INTO BRICK, OR EQUIVALENT EQUAL. AT NO TIME SHALL ANY BRICK PIECE(S) BE REMOVED TO PROVIDE A POCKET FOR THE STUB AS AN ALTERNATIVE CONNECTION DETAIL.

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ROOF FRAMING PLAN

Scale
Contract No.: 16-001
Drawing S-103
Sheet 31 of 31

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