COUNTY OF WESTCHESTER
NEW YORK

DIVISION OF ENGINEERING

ADDENDUM NO. 3

CONTRACT NO. 17-519

BLUE MOUNTAIN RESERVATION
SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT AND CITY OF PEEKSKILL, NEW YORK

The attention of the bidders is directed to the following changes, additions, and/or substitutions affecting the above referenced contract.

I. RE: THE SPECIFICATIONS:

Item 1: **REMOVE** Proposal – Page 6 (1 of 7) through Proposal – Page 6 (7 of 7) and **REPLACE** with the attached Proposal – Page 6 (1 of 6) through Proposal – Page 6 (6 of 6) labelled Addendum No. 3.

Item 2: Specification section 01 11 00 shall be deleted and the revised specification section 01 11 00 is attached hereto.

Item 3: Specification section 01 20 00 shall be deleted and the revised specification section 01 20 00 is attached hereto.

Item 4: Specification section 26 05 13 shall be deleted and the revised specification section 26 05 13 is attached hereto.

Item 5: Specification section 26 32 13 shall be deleted and the revised specification section 26 32 13 is attached hereto.

Item 6: Specification section 26 32 14 shall be deleted and the revised specification section 26 32 14 is attached hereto.

Item 7: Specification section 26 36 00 shall be deleted and the revised specification section 26 36 00 is attached hereto.

Item 8: Specification section 32 34 13 shall be deleted and the revised specification section 32 34 13 is attached hereto.

Item 9: Specification section 33 32 16 shall be deleted and the revised specification section 33 32 16 is attached hereto.

II. RE: THE PLANS:

Item 1: **REMOVE** drawing G-02 and **REPLACE** with the attached drawing G-02 labelled Rev. 1

Item 2: **REMOVE** drawing C-11 and **REPLACE** with the attached drawing C-11 labelled Rev. 1

Item 3: **REMOVE** drawing C-12 and **REPLACE** with the attached drawing C-12 labelled Rev. 1

Item 4: **REMOVE** drawing C-14 and **REPLACE** with the attached drawing C-14 labelled Rev. 1

Item 5: **REMOVE** drawing E-04 and **REPLACE** with the attached drawing E-04 labelled Rev. 1

Item 6: **REMOVE** drawing E-05 and **REPLACE** with the attached drawing E-05 labelled Rev. 1

Item 7: **REMOVE** drawing E-06 and **REPLACE** with the attached drawing E-06 labelled Rev. 1

Item 8: **REMOVE** drawing E-07 and **REPLACE** with the attached drawing E-07 labelled Rev. 1

Item 9: **REMOVE** drawing E-08 and **REPLACE** with the attached drawing E-08 labelled Rev. 1

Item 10: **REMOVE** drawing E-09 and **REPLACE** with the attached drawing E-09 labelled Rev. 1

III. RE: REQUESTS FOR INFORMATION:

Item 1: Bidder Questions and Responses
Attached hereto.

All provisions of the contract not affected by the foregoing shall remain in full force and effect.

COUNTY OF WESTCHESTER
DEPARTMENT OF PUBLIC WORKS AND TRANSPORTATION

By: Hugh J. Greechan Jr., P.E.
Commissioner

Dated: Friday, June 25, 2021
WHITE PLAINS, NEW YORK

CONTRACT NO. **17-519**

ITEMIZED PROPOSAL - BASE BID

ITEM NO.	APPROXIMATE QUANTITIES	PAY UNIT	ITEM DESCRIPTION	UNIT BID PRICE		AMOUNT BID	
				DOLLARS	CTS.	DOLLARS	CTS.
1	1	L.S.	BASE BID: Payment for Item 1 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material, sanitary services, electric services, water services, site work, landscaping, site restoration including pavement, walkways, sidewalks, railings, finish grading, benches, plantings, as built survey and all other items necessary for the Base Bid located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York.	$ _____	_____	$ _____	_____
2	500	CY	ROCK REMOVAL: Payment for Item 2 will be a unit price bid of a quantity of 500 cubic yards of Rock Removal. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, and all other items necessary for the Rock Removal located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This unit price bid shall be calculated based on the contract drawings and technical specifications divisions 1 through 35.	$ _____	_____	$ _____	_____
			Subtotal of All Items Above:			$ _____	_____

CONTRACT NO. **17-519**

ITEMIZED PROPOSAL - BASE BID

ITEM NO.	APPROXIMATE QUANTITIES	PAY UNIT	ITEM DESCRIPTION	UNIT BID PRICE		AMOUNT BID	
				DOLLARS	CTS.	DOLLARS	CTS.
W699.020001	NEC	LS	MOBILIZATION (Must not exceed 2.00% of Subtotal Shown Above/Previous Page)			$	
W699.040002	NEC	LS	CONTRACT BONDS AND INSURANCE (Must not exceed 3.00% of Subtotal Shown Above/Previous Page)			$	
W800	300000	DC	MISCELLANEOUS ADDITIONAL WORK			$ 300,000	00
W851	25000	DC	TESTING OF MATERIALS AND FIELD TESTING EQUIPMENT			$ 25,000	00

	DOLLARS	CTS.
Gross Sum of Total Base Bid Written in Figures:	$	

CONTRACT NO. **17-519**

ITEMIZED PROPOSAL - ADD ALTERNATE #1

ITEM NO.	APPROXIMATE QUANTITIES	PAY UNIT	ITEM DESCRIPTION	UNIT BID PRICE		AMOUNT BID	
				DOLLARS	CTS.	DOLLARS	CTS.
ALT 1	1	L.S.	LOWER B lump sum accordanc limited to, excavatio for the Lo Town of C bid price s C-11 and NOT IN CONTRACT DO NOT FILL IN NOT IN CONTRACT DO NOT FILL IN				

	DOLLARS	CTS.
Gross Sum of Total Bid Add Alternate #1 Written in Figures:	$	

ITEMIZED PROPOSAL - ADD ALTERNATE #2

ITEM NO.	APPROXIMATE QUANTITIES	PAY UNIT	ITEM DESCRIPTION	UNIT BID PRICE		AMOUNT BID	
				DOLLARS	CTS.	DOLLARS	CTS.
ALT 2	1	L.S.	UPPER BRIDGE: Payment for Alternate Bid Item 2 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the Upper Bridge located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This lump sum bid price shall be calculated based on the contract drawing sheet C-12 and technical specifications divisions 1 through 35.	$ _____	_____	$ _____	_____

	DOLLARS	CTS.
Gross Sum of Total Bid Add Alternate #2 Written in Figures:	$ _____	_____

CONTRACT NO. **17-519**

ITEMIZED PROPOSAL - ADD ALTERNATE #3

ITEM NO.	APPROXIMATE QUANTITIES	PAY UNIT	ITEM DESCRIPTION	UNIT BID PRICE		AMOUNT BID	
				DOLLARS	CTS.	DOLLARS	CTS.
ALT 3	1	L.S.	PARKING LOT STAIRCASE: Payment for Alternate Bid Item 3 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the Parking Lot Staircase located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This lump sum bid price shall be calculated based on the contract drawing sheet C-13 and technical specifications divisions 1 through 35.	$ _____	_____	$ _____	_____

	DOLLARS	CTS.
Gross Sum of Total Bid Add Alternate #3 Written in Figures:	$ _____	_____

CONTRACT NO. **17-519**

BID SUMMARY SHEET

	DOLLARS	CENTS
TOTAL BID FOR BASE BID (Written in Figures)	$	

	DOLLARS	CENTS
TOTAL BID FOR BASE BID + ALTERNATE #2 (Written in Figures)	$	

	DOLLARS	CENTS
TOTAL BID FOR BASE BID + ALTERNATE #2 AND ALTERNATE #3 (Written in Figures)	$	

CONTRACTOR: _____

_____

_____

BY: _____

This contract consists of the Base Bid and two Add Alternates, Alternate 2 and Alternate 3 as defined in the Specifications and on the Drawings.

It is the goal of the County to award the Base Bid and Alternates 2 and 3 if the low bid for all items are within the amount budgeted for this project. If the Base Bid and Alternates 2 and 3 exceed the amount budgeted for this project, the contract will be awarded to the bidder submitting the lowest Base Bid plus additional Add Alternate Bid Items in the order they are listed, to include as many Add Alternate Bid Items as possible, up to an amount that does not exceed the project budget. If the Base Bid and Alternate 2 exceed the amount budgeted for this project, the contract will be awarded to the bidder submitting the lowest Base Bid.

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Work to be performed under the Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the Site Work Improvements located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. The Contractor shall perform all Work required for such construction in accordance with the Contract Documents and subject to the terms and conditions of the Contract, complete and ready for use.

B. The Contractor shall furnish all labor, materials, equipment and appurtenant work necessary to construct all work as shown, specified and required for the Site Work Improvements at Blue Mountain Reservation.

1. General Project Requirements

a. Locate existing utilities, retain an independent contractor to assist in locating all on-site utilities.

1) NOTE: The Montrose Improvement District 16” water main must be protected. Shutdowns of this water main are not permitted.

b. Installation of erosion control measures.

c. Sawcut trench, excavation.

d. Removal of existing sanitary sewer and water utilities.

e. Installation of new sanitary sewer, water, buried electrical utilities and associated appurtenances (generator, power panels/outlets, sanitary sewer manhole, sewage grinder pumps, valves, water fountains, etc.).

f. Removal of existing electrical utilities.

g. Trench backfill and compaction. Either topsoil and seed or pavement restoration; base, binder, and top course.

h. Removal of one (1) existing wood bridge and concrete foundations, and one (1) exterior wood stairs.

i. Installation of one (1) new wood bridge and concrete foundations, and one (1) new exterior wood stairs.

j. Paving of asphalt top course for walking paths.

k. Installation of concrete sidewalk ramp.

l. General site improvements: Parking striping, overlay ¾" stone in parking area, new picnic tables and grills.

m. Final site restoration and seeding.

n. Final As-Built Survey.

1.2 GENERAL

A. The Instructions for Bidders, General Conditions, Supplementary Conditions and Division 1 of the Technical Specifications, shall apply equally to all Work under the Contract for this Project.

B. Where the words "Contract" and "Contractor" are used in Sections of Division 1, they shall apply equally to all parties entering into agreements with the Owner to perform Work specified herein and to all Contracts derived from said agreements.

C. Where the word "Owner" is used in these Specifications, it shall refer to the Westchester County Parks Department and Westchester County Department of Public Works.

1.3 CONTRACT DOCUMENTS

A. The Work to be done is shown on the set of Contract Drawings entitled Site Work Improvements, Blue Mountain Reservation.

1.4 GENERAL ARRANGEMENT

A. The Contract Drawings indicate the extent and general arrangement of the Work. The specific equipment proposed for use by the Contractor on the Project may require changes in the construction detailed on the Contract Drawings, and all such changes shall be performed in accordance with the requirements of the Supplementary Conditions and shall be made without additional cost to the District and shall include the increase in costs of the other Contracts.

1.5 TIME OF WORK

A. Overtime work shall conform to the requirements of Division 1, Supplementary Conditions, shall be considered as normal procedure under this Contract, and the Contractor shall make no claims for extra compensation as a result thereof.

B. Unless otherwise specifically permitted, all work that would be subject to damage shall be stopped during inclement, stormy or freezing weather. Only such work as will not suffer injury to workmanship or materials will be permitted. The Contractor shall carefully protect his Work against damage or injury from the weather, and when work is permitted during freezing weather shall provide and maintain approved facilities for heating the materials and for protecting the finished Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION

A. The items listed below beginning with Article 1.3, refer to and are the same pay items listed in the Proposal. They constitute all the pay items for the completion of the Work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, layout surveys, job signs, sanitary requirements, testing, reparation of damages produced by Contractor, safety devices, approval and Record Drawings, water supplies, power, maintaining traffic, removal of waste, watchmen, Bonds, insurance, and all other requirements of the Contract, General and Supplementary Conditions. Compensation for all such services, things and materials shall be included in the price stipulated for the lump sum listed herein.

1.2 RELATED PROVISIONS SPECIFIED ELSEWHERE

A. Payments to Contractor: Refer to Contract, General Conditions and Supplementary Conditions.

1.3 CONTRACT - GENERAL CONSTRUCTION

A. For providing all mobilization, temporary systems, surveying, demobilization, permitting, traffic control, dewatering, restoration, etc. and all labor, material and equipment necessary to complete all work as shown on the contract drawings and in accordance with the project manual and specifications. Demolition and legal disposal of all brush and tree debris, and other material not otherwise defined herein shall be included in the lump sum price.

1.4 BID PROPOSAL ITEMS

A. The Contract consists of the Base Bid, Rock Removal and Alternates 1, 2, and 3

B. Item 1 – Base Bid

Payment for Item 1 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material, sanitary services, electric services, water services, site work, landscaping, site restoration including pavement, walkways, sidewalks, railings, finish grading, benches, plantings, as built survey and all other items necessary for the Base Bid located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York.

This lump sum bid price shall be calculated based on the contract drawings and technical specifications divisions 1 through 35.

C. Item 2 – Rock Removal

Payment for Item 2 will be a unit price bid of a quantity of 500 cubic yards of Rock Removal. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, and all other items necessary for the Rock Removal located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This unit price bid shall be calculated based on the contract drawings and technical specifications divisions 1 through 35.

D. Item 3 – Contract Bonds and Insurance

This item provides payment for Contract Bonds and Insurances which must not exceed 3% of the subtotal of Bid Items 1 and 2.

E. Item W800 – Miscellaneous Additional Work

This item provides for miscellaneous additional work to be accomplished as ordered by the Owner as described in Article 14 of the Information for Bidders (W-800). The cost of this item shall be included in the total amount bid for the project.

F. Alternate Bid Item 1 – Lower Bridge - Not in Bid Contract

G. Alternate Bid Item 2 – Upper Bridge

Payment for Alternate Bid Item 2 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the Upper Bridge located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This lump sum bid price shall be calculated based on the contract drawing sheet C-12 and technical specifications divisions 1 through 35.

H. Alternate Bid Item 3 – Parking Lot Staircase

Payment for Alternate Bid Item 3 will be a lump sum bid. Work to be performed under this Contract and in accordance with these Specifications consists of, but is not limited to, furnishing of all equipment, superintendents, labor, skill, material and all other items necessary for the Parking Lot Staircase located at Blue Mountain Reservation; Town of Cortlandt, City of Peekskill, New York. This lump sum bid price shall be calculated based on the contract drawing sheet C-13 and technical specifications divisions 1 through 35.

1.5 DAMAGES BY CONTRACTOR

A. No payments shall be made for reparation of damages caused by Contractor.

1.6 CONTRACTOR PAY REQUISITIONS

A. The Contractors shall submit monthly payment requisitions, prepared as directed by the Engineer. A maximum of one payment requisition shall be submitted each month.

B. The Contractor may, at the approval of the Engineer, submit payment for unit cost items based upon agreed upon estimated amounts each month prior to completion of as built surveys.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 05 13

KV MEDIUM VOLTAGE CABLE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Medium voltage cable.

B. Cable terminations.

1.2 REFERENCES

A. ANSI/IEEE C2 - National Electrical Safety Code.

B. ANSI/NFPA 70 - National Electrical Code.

C. IEEE 48 - Test Procedures and Requirements for High Voltage Alternating Current Cable Terminations.

D. NEMA WC3 - Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

E. NEMA WC5 - Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

F. NEMA WC8 - Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

G. NETA ATS (International Electrical Testing Association) - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

1.3 PURPOSE AND INTENT

A. This specification covers the construction and testing of 5KV solid dielectric ethylene propylene insulated distribution cables. These cables utilize a concentric neutral, and a black heavy duty hypalon jacket shall be used in conduits and in transformer vaults for primary wiring on 5KV systems.

1.4 ABBREVIATIONS

A. AEIC - Association of Edison Illuminating Companies.

B. ICEA - Insulated Cable Engineering Association.

C. NEMA - National Electrical Manufacturers Association.

D. ASTM - American Society of Testing Manufacturers.

E. EPR - Ethylene-Propylene Rubber.

F. HTK - High Temperature Kerite.

G. UL - Underwriters Laboratories.

1.5 SHOP DRAWINGS

A. Shop drawings shall be submitted and approved prior to ordering cables. The following shall be the minimum submitted for approval:

1. Complete manufacturer's construction details and specifications for the cables, including physical and electrical characteristics of insulation, shields and jackets.

2. Overall dimension and ampacity of cable.

3. Splicing and termination data, including the following:

a. Written statement from cable manufacturer that splices and terminations submitted are acceptable.

b. Written statement from splicing/termination manufacturer that splices and terminations submitted are suitable for the proposed application.

c. Details of cable preparation.

d. Method of connecting conductors.

e. List of materials.

f. Method of applying materials (including quantities).

g. Precautionary measures.

h. Drawings showing method of splicing, complete with dimensions.

4. Testing certificates as required in Article 1.06.

5. Written statement from the cable manufacturer consenting to the terms of the warranty; refer to Article 1.12.

1.6 QUALIFICATION TESTING

A. Qualification tests shall be performed by the manufacturer initially on each design of cable and whenever any change occurs in the insulation system or in any other cable component. These tests shall be performed in accordance with AEIC No. CS6 prior to shipment, as applicable.

B. The completed cable, while on the shipping reel, shall be tested at room temperature at 35KV DC and 9 KV AC for 5 minutes. The insulation resistance shall also be measured and the insulation resistance constant shall not be less than 21,000 megohms/1,000 feet corrected to 60 degrees F.

OR

C. The completed EPR cable shall be subjected to a partial discharge test and an insulation resistance test for each reel. The partial discharge corona test shall be as outlined in ICEA Standard S-68-516, AEIC CS6-96, and meet the following:

Vt/Vg Ratio	1.0	1.5	2.5	3.0	4.0
Maximum particle	5	5	5	5	10
Discharge in picocoulombs	8.5	13.0	21.5	26.0	35.0

The insulation resistance shall not be less than 50,000 megohm/1,000 feet at 60 degrees F with an applied voltage of 44KVAC for 5 minutes.

The conductor shield, conductor shield-insulation interface, insulation, and insulation-insulation shield interface shall be tested according to AEIC No. CS6 to determine the size and magnitude of voids and contaminants. The contact area between the insulation and the shield extrusions shall be tested according to AEIC No. CS6 to determine the size of protrusions. The test results shall meet the requirements of AEIC No. CS6.

D. Certification shall be provided to show that test samples of cable insulated with the same insulating system as that to be supplied have been subjected to and passed the following test:

As described in ICEA S-68-516, Paragraph 6.23.3, with the energy source equal to a minimum of 250 volts/mil of insulation thickness, cable shall withstand this test for a minimum of 200 hours without failure. EPR cables employing single or double extrusions must apply this test and withstand it for a minimum of 200 hours. However, EPR cables employing triple tandem extrusion need not comply with this test.

The tests shall be made on #2 (7 stranded) AWG copper conductor insulated with an inner stress control layer and 115 mil minimum average wall of insulating material.

E. The conductor resistance and shield continuity shall be measured on each shipping length of cable and recorded. Each end of every shipping length shall also be inspected for water in strands and checked dimensionally for conformance with the above standards.

F. Each length of completed cable on the shipping reel shall be tested dry and shall pass an AC voltage withstand test applied for 1 minute at a test voltage of 9 KV, and dc voltage test at 31KV.

G. The insulation resistance shall again be measured according to the criteria stated above.

H. The Engineer reserves the right to witness all tests. Schedule of testing to be provided to the Owner two weeks before the test date.

I. Visual examination of both ends of every shipping length of cable shall be made to assure that no water is in the completed cable when shipped.

J. Test Reports - Indicate results of cable test in tabular form and in plots of current versus voltage for incremental voltage steps, and current versus time at 30-second intervals at maximum voltage.

1.7 QUALIFICATIONS

A. All manufacturers shall have a minimum successful track record in production and use of their materials as proposed as follows:

1. Cable - 20 years.

2. Terminations - 10 years.

3. Splices - 10 years.

B. Any workers performing splices or terminations on high voltage cable shall have a minimum of 10 years of experience.

C. Contractor shall submit manufacturer’s and splicer’s experience as specified above including references to projects completed. Five installations shall be provided and considered only if no failures have occurred.

1.8 CABLE APPROVAL

A. Submit the following for final approval:

1. Cable manufacturers certified test data, including full documentation package.

2. Two 2-foot samples of each cable, taken from reels at job site prior to installation. Reseal cable on reel. Additional samples may be required during the contract period. Include the following additional information on the sample labels; the maximum voltage at which the conductor is designed to be used, date of manufacturer. Certify ethylene content if EPR cable is furnished.

3. Samples of all splicing and termination materials. Samples of complete kits will be returned and if approved may be used in the work. Samples shall include a full roll of all tapes in original box or container, with the date of manufacture indicated thereon, other materials in sufficient quantity to construct a complete splice and labeled for identification, entire factory packaged kit if splice or termination is of the kit type. Provide three spare splice kits of each type to Owner.

4. Written statement from cable manufacturer indicating recommended pulling compounds and pulling tensions.

5. Product Data - Submit manufacturer's catalog sheets for all products.

1.9 QUALITY ASSURANCE

A. Manufacturer's Representative - Secure the services of cable manufacturer's representative for minimum of three days (not necessarily consecutive) for the consultation on method of installing cable, inspection of equipment for installing cable, witness representative amount of cable pulling, witness construction of at least one splice and one termination by each cable splicer, certify to the Engineer in writing that the aforementioned particulars are satisfactory and the cable has been installed in accordance with cable manufacturer's recommendations.

B. If the splices or terminations are other than the cable manufacturer's, secure the services of the splice and termination manufacturer's representative to concurrently witness construction of the splices and terminations and also certify with an affidavit that the splices and terminations were constructed in accordance with the splice and termination manufacturer's recommendation.

1.10 TESTING COMPANY

A. Secure the services of one of the following companies for performing a high voltage after installation test on cables having a rated voltage of 5,000 volts or higher:

1. Electrical Testing Laboratories, 2 East End Avenue, New York, NY 10021 (212) 288-2600.

2. General Electric Co., Installation and Service Engineering Div., 3532 James Street, P.O. Box 1021, Syracuse, NY 13201, (315) 456-7718.

3. Westinghouse Electric Corp., Apparatus Service Center, P.O. Box 270, Utica, NY 13503, (315) 736-3021.

4. Advanced Testing Systems, Inc., P.O. Box 27, Carmel, NY 10512, (914) 225-3110.

B. Submit names and addresses for approval of or equal companies.

C. Third party testing is required.

1.11 MANUFACTURER'S REPRESENTATIVE

A. The cable manufacturer shall designate a manufacturer's representative to ensure compliance with the provisions of the warranty specified in Article 1.12. The manufacturer's representative shall be designated by full name, title, business address, and telephone number. In the event of any change in representation, the manufacturer shall notify the Owner in writing as follows: _____.

1.12 HIGH VOLTAGE CABLE WARRANTY

A. The cable manufacturer shall warranty the cable and installation as follows:

The cable manufacturer _____ (state manufacturer name) warrants solely to the County of Westchester, its successors and assigns, hereinafter collectively known as "Purchaser," that any wire or cable of its own manufacture ("Product") supplied for Project No. 17-519 Blue Mountain Reservation Site Work Improvements (project description) will be free from defects in material and workmanship provided the wire and cable is employed under conditions contemplated and covered by the design specifications, and provided further that the wire and cable is installed, spliced, terminated, maintained and operated in accordance with the manufacturers recommended standards and procedures.

If a product fails electrically while in service, Purchaser shall notify the manufacturer within five (5) days of the discovery of such failure, and shall permit a representative of the manufacturer a reasonable opportunity to inspect the Product. If the failure is the result of defective material or workmanship, the manufacturer's sole responsibility under this warranty shall be to repair or replace the defective Product, the choice of which will be at the manufacturer's option. If the manufacturer chooses to replace the defective Product, the new Product will be delivered free of charge to the above noted project site.

THE FOREGOING WARRANTY SUPPLEMENTS ALL OTHER WARRANTIES. THIS WARRANTY SHALL BE EFFECTIVE FOR A PERIOD OF 40 YEARS FROM DATE OF ACCEPTANCE BY PURCHASER.

The manufacturer, in signing this document, additionally declares that they have inspected all installations, splices, terminations, tests, etc. and have deemed the installation acceptable. Any further testing by the purchaser will also be witnessed by the manufacturer.

This warranty is executed by an employee of the manufacturer with full authority to bind the manufacturer to the terms hereof.

_____

Name Title Date

Notary Public and Corporate Seal Required

1.13 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Accept cable and accessories on site in manufacturer's packaging. Inspect for damage.

C. Store and protect in accordance with manufacturer's instructions.

D. Protect from weather. Provide adequate ventilation to prevent condensation. Protect cable ends from moisture.

1.14 PROJECT CONDITIONS

A. Verify that field measurements are as shown on Drawings.

B. Verify routing and termination locations of cable bank prior to rough-in.

C. Cable routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Kerite.

B. Okonite.

2.2 CABLES

A. One single conductor cable making up a single-phase circuit, unless otherwise indicated on the Drawings. Each cable shall consist of a Aluminum conductor, semiconducting layer, insulation, semiconducting layer, concentric neutral as required by local utility, jacket separator, if required and outer jacket. Grounding wire shall be 600 volt insulated copper wire, Type XHHW.

2.3 CABLE CONSTRUCTION

A. Cables shall be single conductors, concentric neutral, and jacketed. Keep ends of cables sealed at all times, except when making splices or terminations. Use heat shrinkable plastic end caps with sealant as manufactured by Raychem Corp., Thomas & Betts Co., or other methods approved by cable manufacturer. Cable shall be UL listed, Type MV-105, and comply with U.L. 1072 medium voltage cable.

B. Marking and Tagging - Mark and tag cables for delivery to the site. Entire length of cable shall be color labeled or color coded.

C. Date of Manufacture - No insulated cable over one year old, from date of manufacture when installed, will be acceptable.

D. Conductor

1. The copper wire to be used for stranding shall be annealed uncoated in accordance with ASTM B3 and B8.

2. Central conductor shall be Class B concentric copper in accordance with the current ASTM Standard B-8.

3. The conductor sizes shall be from 2 AWG up to 1000 kcmil.

E. Insulation shall be as follows:

1. Kerite insulated conductors shall be rated 5KV between phases, ungrounded, 133 percent insulation level, Permashield insulation system shall consist of a permashield and a high temperature kerite (HTK) insulation, insulation shield, copper tape shield minimum 5.0 mils thick or concentric neutral as required by local utility, uncoated, fabric separator tape over metal tape shield as required, outer heavy duty black jacket. Kerite insulated cable shall meet the intent for testing cables per ICEA S-68-516/NEMA WC-8. Manufacturer shall be Kerite Company, a subsidiary of Hubbel Corporation.

OR

EPR insulated conductors shall be rated 5 KV between phases, ungrounded 133 percent insulation level, insulation shall be a high-quality, heat, moisture, impact and ozone-resistant flexible thermosetting ethylene-propylene rubber based elastomer. The content of the elastomer used in the insulation compound shall not exceed 72 percent by weight of ethylene. The insulation shall be concentrically extruded directly over the semiconducting conductor shield.

2. All insulations must be compounded and mixed by the cable manufacturer in its own facilities to ensure maximum control and continuity of quality.

The insulation thickness on all conductor sizes 2 AWG through 1000 kcmil shall be 115 mils, and a minimum at any one point shall not be less than 90 percent of this value.

The insulation shield shall be an extruded semiconducting compound with a volume resistivity not in excess of 500 ohm-meters at 90 degrees when

tested per AEIC No. CS6. The insulation shield shall also be an EPR, clean stripped and shall have a peel strength from the insulation between 6 and 24 lbs./0.5 inch width when tested per AEIC No. CS6. Kerite insulated cables shall employ single extrusions while EPR cables shall be triple tandem extruded for conductor shield, insulation, and insulation shield.

Cables shall utilize a concentric neutral as required by local utility.

3. Cross-linked polyethylene insulated cables will not be accepted.

F. Jacket - The overall jacket over the concentric neutral shall be heavy duty black Hypalon accepted by local utility in accordance with ICEA S-68-516 (NEMA WC-8). The jacket thickness on complete size range from 2 AWG up to 500 kcmils shall be 80 mils and 110 mils for larger conductors.

G. The conductor temperatures shall not exceed 90 degrees C (194 degrees F) under normal operating temperature, 130 degrees C (266 degrees F) for emergency overload, and 250 degrees C (482 degrees F) for short circuit conditions.

H. Listing Agency - Cable types for which UL provides product listing service shall be listed and bear the listing mark.

2.4 TERMINATIONS

A. Provide cable manufacturer's terminations. If cable manufacturer does not fabricate terminations, provide terminations by one of the manufacturers listed below if acceptable to the cable manufacturer. All materials shall be the standard product of one manufacturer. Ampere rating of termination shall not be less than ampere rating of cable. Voltage rating of termination shall not be less than voltage rating of cable.

B. Terminations

1. Elastimold elbow with test point and shield adapter.

2. G&W Slip-On Terminators.

3. Cooper Deadbreak Elbows, feed throughs and underground connection systems.

4. RTE.

5. Mac Products.

C. Hand-applied terminations shall be 166CR elbow with test point and with voltage rated stress cones.

2.5 SPLICES

A. The high voltage cable splice shall be a factory engineered kit containing all necessary components to reinsulate the primary cable installation, metallic shielding/grounding system and overall jacket.

B. Each splice shall consist of a linear stress relief system with a high outer conductive layer for shielding.

C. Each splice shall pass the following electrical tests 1EEE-48-1975, and 1EEE-404-1986 and shall pass ANSI-C 119.2-1974 water immersion test. The splice manufacturer shall provide test reports demonstrating compliance with the above requirements.

D. All splices shall have the following ratings:

1. Voltage Class 5KV.

2. Minimum corona extinction voltage less than or equal to 3pc at 4 KV, for EPR cables.

a.	AC With Stand	1 minute	9 KV
b.	DC With Stand	15 minutes	25 KV
c.	Impulse With Stand	1.2 x 50	37 KV, microseconds

3. Continuous current rating equal to cable capacity.

E. Furnish splices of type that are capable of being disconnected, deadened, or reconnected at future times without destruction to original splices. All materials shall be the standard product of one manufacturer. Ampere rating of splice shall not be less than ampere rating of cable. Field made epoxy-resin units are not acceptable. Provide one set of special tools required for the assembly of premolded splices to facility.

F. All Applications

1. Elastimold premolded splices.

2. G & W Electric Specialty Co. Universal Splice System.

3. Raychem Thermofit Heat-Shrinkable High Voltage Termination System.

G. All splice kits to be approved by cable manufacturers.

2.6 POTHEADS

A. Manufacturers

1. G&W.

2. A.B. Chance Company

B. Description - IEEE 48; Class 1 termination. Pothead with porcelain insulators, cable connector and aerial lug, sealed cable entrance and support, and insulating compound.

C. Conductors - One.

2.7 TAGS

A. Phenolic Type - Standard phenolic nameplates with 3/8-inch minimum size lettering engraved thereon.

B. Embossed Aluminum - Standard stamped or embossed aluminum tags. Tech Products, Inc., Seton Name Plate Corp.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Provide and install all high voltage cables with all connections complete, as specified herein and as indicated on the Drawings.

B. Install cables in conduit after conduit system is complete and cleaned.

C. Keep ends of cables sealed watertight at all times, except when making splices and terminations.

D. No grease, oil, lubricant other than approved pulling compound may be used to facilitate the pulling-in of cables.

E. Use pulling eye factory installed to conductor(s) for pulling in cables. Cable grip will not be allowed. Seal pulling eye attachment watertight.

F. Pull all cables with a dynamometer or strain gauge incorporated into the pulling equipment. Do not pull cables unless the designated representative is present to observe readings on the dynamometer or strain gauge during the time of actual pulling. Total strain shall not exceed manufacturer's recommendations.

G. Splice and terminate primary cables in accordance with manufacturers approved

installation instructions. Ground shield at all splices and terminations. Incorporate solder dam or other method to prevent moisture from entering splices through grounding conductor.

H. Arc Proofing - Arc proof new feeders installed in manholes where splices occur, arc proof each feeder as a unit with half-lapped layer of arc proofing tape and random wrapped or laced with glass cloth tape or glass-fiber cord.

I. Identification of Feeders - Identify feeders in manholes, pullboxes and in equipment to which they connect with phenolic or embossed aluminum tags:

J. Install tags on each insulated conductor indicating phase leg. Attach tags with non-ferrous metal wire. Install phase leg tags under arc proofing tapes. Install tags on each feeder indicating feeder number, date installed, (month, year), type of cable, voltage rating, size, and manufacturer. Attach tags so that they are easily read without moving adjacent feeders or requiring removal of arc proofing tapes.

K. High Voltage After Installation Test - Perform test after cable has been installed complete with all splicing, bonding, etc., and prior to placing cable into service. Perform test with potential and duration specified by the manufacturer after approval of manufacturers certified test data. Test methods shall be in accordance with latest applicable ICEA and AEIC Specification. Do not make tests until test voltages and duration have been specified in writing by the manufacturer. List results of the tests on standard form supplied by the testing company. Leakage during test shall be read on a micro-ammeter. Perform test in the presence of the designated representative. Send results to Engineer and manufacturer for approval and designated representative for informational purposes.

L. Avoid abrasion and other damage to cables during installation.

M. Sustain cable pulling tensions and bending radii below manufacturer's recommended limits.

N. Ground cable shield at each termination and splice.

O. Install cables in manholes along wall providing longest route.

P. Arrange cable in manholes to avoid interference with duct entrances.

Q. Use suitable manufacturer-approved lubricants and pulling equipment.

3.2 PREPARATION

A. Use swab to clean conduits and ducts before pulling cables.

3.3 EXISTING WORK

A. Remove abandoned medium-voltage cable, install pull rope.

3.4 INSTALLATION TESTING

A. Sample Field Test Instructions - Direct current acceptance tests on cable after installations (Hi-Potential Proof Test).

B. After installation and prior to connecting into service, test cables with a direct potential of 9KV for 15 consecutive minutes.

C. Test Procedure

1. Set up test equipment. Do not connect test lead to cables, but temporarily hang the lead free with a plastic bag over the clip. Raise the voltage to the same final level at which the cables are to be tested. The leakage current seen on the DC meter is leakage in the test lead, and should be subtracted from the readings taken later during the cable test. Shut the set off and discharge the lead.

2. Clear the circuit of any connected equipment so as to preclude damage to such equipment during the test, i.e., remove pothead taps, disconnect transformers, accessible switch taps, etc.

3. Seal and protect cable ends from moisture to prevent high leakage readings.

4. Check that adequate clearance exists between the circuit ends under test and ground and to other equipment to prevent flashovers.

5. Megger cable with minimum 1,000 volts.

6. Perform insulation resistance test phase to phase and phase to ground on all cables. If satisfactory, proceed with current leakage test.

7. Ground circuit phases not under test.

8. Apply the direct current voltage slowly, increasing in steps of 3 KV. Record the micro-ampere leakage at each step. When the specified test voltage is reached, record current leakage at required durations on current leakage test chart.

9. Reduce test voltage control to zero. Permit residual voltage on circuit to reduce to about 50 to 20 percent of test value before discharging by application of manual grounds.

10. Repeat Steps 4 to 9 for remainder of phases of each feeder to be tested.

11. It should be recognized that DC charges remaining on a cable can build up to potentially dangerous voltages if grounds have not been applied for a sufficient length of time. The cable shall remain grounded for as long a period as possible, but in no case for less than one hour.

12. Copies of all hi-potential proof tests shall be sent to the following parties within three working days after the test via first class mail.

    a. Engineer.

    b. Facility superintendent.

    c. Cable manufacturer.

D. If the cable does not pass any of the tests, the contractor and manufacturer shall remedy the situation and/or replace defective cable. If not, installation will not be accepted.

E. An additional high potential proof test will be required one month before one year has passed since original acceptance. Test results shall be sent to Owner for approval.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 26 32 13

30 kW PACKAGED ENGINE GENERATOR SYSTEMS - DIESEL OUTDOOR

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish and install 30 kW, outdoor, diesel generator with sub-base fuel tank at the Trail Lodge.

1.2 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.

2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

3. NFPA37 –

4. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.

5. NFPA99 – Essential Electrical Systems for Health Care Facilities.

6. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.

2. UL142 – Sub-base Tanks.

3. UL1236 – Battery Chargers.

4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.

2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.

3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.

4. FCC Part 15, Subpart B.

5. IEC8528 part 4. Control Systems for Generator Sets.

6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.

7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.

8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.3 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.

B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.

C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.

D. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.4 OPERATION AND MAINTENANCE

A. Manuals: Furnish four (4) Operation and Maintenance manuals.

B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.5 QUALITY ASSURANCE

A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:

1. Prototype model tests

2. Fully assembled factory production model tests

3. Field acceptance tests

B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory Production tested as described herein shall not be acceptable.

C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.

D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.

E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the

windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.

F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.

I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.

J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (104 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.

K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.

M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, an eight-(8) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power,

voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The Contractor and/or equipment supplier at their expense shall coordinate and provide all transportation and lodging for the owner and Owner's engineering representative to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.

N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 30 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.

O. Testing Procedure:

1. Test diesel-alternator unit at 0.8 PF in the following sequence:

2. 0.5 hour at ¼ load.

3. 1.0 hours at ½ load.

4. 1.0 hours at ¾ load.

5. 2 hours at full load.

P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:

1. Barometric Pressure.

2. Intake Air Pressure.

3. RPM.

4. Output voltage per phase.

5. Output amperes per phase.

6. Power Factor.

7. KW.

8. Winding temperature.

9. Transient response testing sequence:

10. 0-25%, 25%-0.

11. 0-50%, 50%-0.

12. 0-75%, 75%-0.

13. 0-100%, 100%-0.

Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.

R. Field Acceptance Tests: Generator supplier shall provide and conduct a four (4) hour load bank test at unity power factor for the generator set. Contractor must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

S. Initial start up and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Contractor responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.

T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.

B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.

B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. eliver, store, protect and handle products to site.

B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.10 EXTRA MATERIALS

A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.11 WARRANTY

A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.12 SERVICE AGREEMENT

A. Manufacturer shall provide Owner with a two (2) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturer:

1. Cummins Power Generation, model C30 D6 rated for STANDBY POWER with BB96 Frame Alternator as distributed by Cummins Power Generation, 890 Zerega Avenue, Bronx, NY 10473. Contact Ed Cheung: 718-892-2400, ext. 217.

B. Alternate Approved Manufacturers: Caterpillar, with engine C4.4, model D40 GC

C. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.2 DIESEL ENGINE-GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 120/240 Volts AC, 1-phase, 3-wire, 60 hertz.

2. The generator set shall be rated at 30 kW, 37.5 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 104 degrees F (40 degrees C).

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.

2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.

3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.

4. Motor starting capability shall be a minimum of 112 kVA. The generator set shall 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. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 15% –based on gensize calculations.

5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3^{rd} order harmonics or their multiples. Telephone influence factor shall be less than 40.

6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices,[with required protection located at a wall-mounted common distribution panel] If walk-in enclosure.

3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.3 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be diesel, EPA TIER 3 Certified, 4 cycle, radiator and fan cooled. Minimum displacement shall be 199 cubic inches, with 4 cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.

B. A digital electronic governor system shall provide automatic isochronous frequency regulation. 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 and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

C. Skid-mounted radiator and cooling system rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the

cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.4 ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:

1. Positive displacement, contact.

2. Mechanical, full pressure, lubrication oil pump.

3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.

5. Replaceable dry element air cleaner with restriction indicator.

6. Flexible supply and return fuel lines.

7. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

B. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

4. The coolant heater(s) shall be 120V, 1500 watts and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

C. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

D. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed inside the sound enclosure.

F. A UL listed/CSA certified 10 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger may be located in an automatic transfer switch, or may be wall mounted, at the discretion of the installer. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:

1. Loss of AC power - red light

2. Low battery voltage - red light

3. High battery voltage - red light

4. Power ON - green light (no relay contact)

G. Charger shall include an Analog DC voltmeter and ammeter, 12 hour equalize charge timer, and AC and DC fuses.

2.5 AC ALTERNATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. Provide 120VAC alternator anti-condensation heater, size as recommended by manufacturer.

D. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

E. The subtransient reactance of the alternator shall not exceed 7 percent, based on the 105°C rise rating.

F. Alternator shall be rated for a minimum of 33 KW at a 105°C, standby.

2.6 ENGINE GENERATOR SET CONTROL

A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.

2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.

3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.

3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.

4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display.

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).

b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start

signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.

c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.

d. The control shall include an amber common warning indication lamp.

2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:

a. low oil pressure (warning)

b. low oil pressure (shutdown)

c. oil pressure sender failure (warning)

d. low coolant temperature (warning)

e. high coolant temperature (warning)

f. high coolant temperature (shutdown)

g. high oil temperature (warning)

h. engine temperature sender failure (warning)

i. low coolant level (warning)

j. fail to crank (shutdown)

k. fail to start/overcrank (shutdown)

l. overspeed (shutdown)

m. low DC voltage (warning)

n. high DC voltage (warning)

o. weak battery (warning)

p. low fuel-daytank (warning)

q. high AC voltage (shutdown)

r. low AC voltage (shutdown)

s. under frequency (shutdown)

t. over current (warning)

u. over current (shutdown)

v. short circuit (shutdown)

w. ground fault (warning) (optional--when required by code or specified)

x. over load (warning)

y. emergency stop (shutdown)

z. (4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

F. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control:

a. engine oil pressure (psi or kPA)

b. engine coolant temperature (degrees F or C)

c. engine oil temperature (degrees F or C)

d. engine speed (rpm)

e. number of hours of operation (hours)

f. number of start attempts

g. battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

3. Provide and install a 20-light LED type remote alarm annunciator with horn, located as shown on the Drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

   The annunciator shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Genset Supplying Load	Amber	No
Charger AC Failure	Amber	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Red	Yes
Check Genset	Amber	No
Not In Auto	Red	Yes
Genset Running	Amber	No
High Battery Voltage	Amber	Yes
Low Battery Voltage	Red	Yes
Weak Battery	Red	Yes
Fail to Start	Red	Yes
Low Coolant Temperature	Red	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Red	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
(4) Spares	Configurable	Configurable

2.7 ENGINE CONTROL FUNCTIONS

A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.

C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

2.8 ALTERNATOR CONTROL FUNCTIONS

A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level

approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

F. When required by National Electrical Code or indicated on project drawings, the control System shall include a ground fault monitoring relay. The relay shall be adjustable from 3.8-1200 amps, and include adjustable time delay of 0-10.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay that will function correctly in system as installed.

2.9 OTHER CONTROL FUNCTIONS

A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10 GENERATOR MAIN LINE CIRCUIT BREAKER

A. The generator set shall be provided with dual mounted main line circuit breakers, rated 100 amps and 60 amps. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator,

demonstrating the effectiveness of the protection provided.

2.11 OUTDOOR WEATHER-PROTECTIVE SOUND ATTENUATED ENCLOSURE

A. Construction:

1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure
   a. Package shall comply with the requirements of the NEC for all wiring materials and components.

   b. Sound attenuation rating of 67.5 dBA @ 7m.

   c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 104 F.

B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a nominal 74 Gallon fuel tank base, incorporating prepainted aluminum construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed to provide the specified level of sound attenuation.

C. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.

D. The enclosure shall include flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure with internal drain valves.

E. External radiator fill provision must be provided.

F. Doors shall be recessed, lockable with retainers to hold doors open for easy access

G. Inlet of enclosure shall be provided with rodent barriers.

2.12 SUBBASE FUEL TANK

A. Provide a sub-base nominal 74 gallon fuel tank for the generator set. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:

1. Emergency tank and basin vents.

2. Mechanical level gauge.

3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.

4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.

5. Low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.

6. Basin drain.

7. Integral lifting provisions.

PART 3 - EXECUTION

3.1 ACCEPTANCE

A. Equipment shall be initially started and operated by representatives of the manufacturer.

B. 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 final testing of the system.

3.2 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility owner.

3.3 DEMONSTRATION

A. Provide systems demonstration. Electric Contractor shall provide fuel for testing and shall fill tank complete after all testing is done and before turning over to Owner.

B. Describe loads connected to standby system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 26 32 14

50kW PACKAGED ENGINE GENERATOR SYSTEMS - DIESEL OUTDOOR

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish and install 50 kW, outdoor, diesel generator with sub-base fuel tank at the Maintenance Building.

1.2 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:

1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.

2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.

3. NFPA37 –

4. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.

5. NFPA99 – Essential Electrical Systems for Health Care Facilities.

6. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:

1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.

2. UL142 – Sub-base Tanks.

3. UL1236 – Battery Chargers.

4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.

1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.

2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.

3. EN55011, Limits and Methods of Measurement of Radio Interference Characteristics of Industrial, Scientific and Medical Equipment.

4. FCC Part 15, Subpart B.

5. IEC8528 part 4. Control Systems for Generator Sets.

6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.

7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.

8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.3 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.

B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.

C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.4 OPERATION AND MAINTENANCE

A. Manuals: Furnish four (4) Operation and Maintenance manuals.

B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.5 QUALITY ASSURANCE

A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:

1. Prototype model tests

2. Fully assembled factory production model tests

3. Field acceptance tests

B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory Production tested as described herein shall not be acceptable.

C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall be performed and available for review, but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.

D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.

E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.

F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.

I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.

J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (104 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.

K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.

M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, an eight-(8) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The Contractor and/or equipment supplier at their expense shall coordinate and provide all transportation and lodging for the owner and Owner's engineering representative to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.

N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 50 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.

O. Testing Procedure:

1. Test diesel-alternator unit at 0.8 PF in the following sequence:

2. 0.5 hour at ¼ load.

3. 1.0 hours at ½ load.

4. 1.0 hours at ¾ load.

5. 2 hours at full load.

P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:

1. Barometric Pressure.

2. Intake Air Pressure.

3. RPM.

4. Output voltage per phase.

5. Output amperes per phase.

6. Power Factor.

7. KW.

8. Winding temperature.

9. Transient response testing sequence:

10. 0-25%, 25%-0.

11. 0-50%, 50%-0.

12. 0-75%, 75%-0.

13. 0-100%, 100%-0.

Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.

R. Field Acceptance Tests: Generator supplier shall provide and conduct a four (4) hour load bank test at unity power factor for the generator set. Contractor must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

S. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Contractor responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.

T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.

B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.

B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.10 EXTRA MATERIALS

A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.11 WARRANTY

A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.12 SERVICE AGREEMENT

A. Manufacturer shall provide Owner with a two (2) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturer:

1. Cummins Power Generation, model C50 D6 rated for STANDBY POWER with BB96 Frame Alternator as distributed by Cummins Power Generation, 890 Zerega Avenue, Bronx, NY 10473. Contact Ed Cheung: 718-892-2400, ext. 217.

B. Alternate Approved Manufacturers: Caterpillar Caterpillar, with engine C4.4, model D50 GC

C. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.2 DIESEL ENGINE-GENERATOR SET

A. Ratings

1. The generator set shall operate at 1800 rpm and at a voltage of: 120/240 Volts AC, 1-phase, 3-wire, 60 hertz.

2. The generator set shall be rated at 50 Kw, 62.5 Kva at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 104 degrees F (40 degrees C).

B. Performance

1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.

2. Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%.

3. The diesel engine-generator set shall accept a single step load of 100% nameplate Kw and power factor, less applicable derating factors, with the engine-generator set at operating temperature.

4. Motor starting capability shall be a minimum of 180 Kva. The generator set shall 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. Maximum voltage dip on application of this load, considering both alternator performance and engine speed changes shall not exceed 15% –based on gensize calculations.

5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.

6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.

C. Construction

1. The engine-generator set shall be mounted on a heavy-duty steel base to maintain alignment between components. The base shall incorporate a battery tray with hold-down clamps within the rails.

2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections

1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.

2. Power connections to auxiliary devices shall be made at the devices.

3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.3 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be diesel, EPA TIER 3 Certified, 4 cycle, radiator and fan cooled. Minimum displacement shall be 272 cubic inches, with 4 cylinders. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.

B. A digital electronic governor system shall provide automatic isochronous frequency regulation. 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 and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

C. Skid-mounted radiator and cooling system rated for full load operation in 104 degrees F (40 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.4 ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:

1. Positive displacement, contact.

2. Mechanical, full pressure, lubrication oil pump.

3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.

4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature

specified shall be provided if required for operation due to the design of the engine and the installation.

5. Replaceable dry element air cleaner with restriction indicator.

6. Flexible supply and return fuel lines.

7. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

B. Coolant heater

1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

4. The coolant heater(s) shall be 120V, 1500 watts and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

C. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

D. Starting and Control Batteries shall be calcium/lead antimony type, 12 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. Exhaust system shall be installed inside the sound enclosure.

F. A UL listed/CSA certified 10 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger may be located in an automatic transfer switch, or may be wall mounted, at the discretion of the installer. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:

1. Loss of AC power - red light

2. Low battery voltage - red light

3. High battery voltage - red light

4. Power ON - green light (no relay contact)

G. Charger shall include an Analog DC voltmeter and ammeter, 12 hour equalize charge timer, and AC and DC fuses.

2.5 AC ALTERNATOR

A. The AC generator shall be; synchronous, four pole, 2/3 pitch, revolving field, drip-proof construction, single prelubricated sealed bearing, air cooled by a direct drive centrifugal blower fan, and directly connected to the engine with flexible drive disc. All insulation system components shall meet NEMA MG1 temperature limits for Class H insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 105 degrees Centigrade.

B. The generator shall be capable of delivering rated output (kVA) at rated frequency and power factor, at any voltage not more than 5 percent above or below rated voltage.

C. Provide 120VAC alternator anti-condensation heater, size as recommended by manufacturer.

D. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

E. The subtransient reactance of the alternator shall not exceed 13 percent, based on the 105°C rise rating.

F. Alternator shall be rated for a minimum of 55 KW at a 105°C, standby.

2.6 ENGINE GENERATOR SET CONTROL

A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set, or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches

1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start, and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. In the OFF position the generator set shall immediately stop, bypassing all time delays. In the AUTO position the generator set shall be ready to accept a signal from a remote device to start and accelerate to rated speed and voltage.

2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down, and be locked out from automatic restarting.

3. RESET switch. The RESET switch shall be used to clear a fault and allow restarting the generator set after it has shut down for any fault condition.

4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:

1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.

2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.

3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.

4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display.

1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:

   a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).

   b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.

   c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.

d. The control shall include an amber common warning indication lamp.

2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:

a. low oil pressure (warning)

b. low oil pressure (shutdown)

c. oil pressure sender failure (warning)

d. low coolant temperature (warning)

e. high coolant temperature (warning)

f. high coolant temperature (shutdown)

g. high oil temperature (warning)

h. engine temperature sender failure (warning)

i. low coolant level (warning)

j. fail to crank (shutdown)

k. fail to start/overcrank (shutdown)

l. overspeed (shutdown)

m. low DC voltage (warning)

n. high DC voltage (warning)

o. weak battery (warning)

p. low fuel-daytank (warning)

q. high AC voltage (shutdown)

r. low AC voltage (shutdown)

s. under frequency (shutdown)

t. over current (warning)

u. over current (shutdown)

v. short circuit (shutdown)

w. ground fault (warning) (optional--when required by code or specified)

x. over load (warning)

y. emergency stop (shutdown)

z. (4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. The non-automatic indicating lamp shall be red, and shall flash to indicate that the generator set is not able to automatically respond to a command to start from a remote location.

F. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control

a. engine oil pressure (psi or kPA)

b. engine coolant temperature (degrees F or C)

c. engine oil temperature (degrees F or C)

d. engine speed (rpm)

e. number of hours of operation (hours)

f. number of start attempts

g. battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

3. Provide and install a 20-light LED type remote alarm annunciator with horn, located as shown on the Drawings or in a location that can be conveniently monitored by facility personnel. The remote annunciator shall provide all the audible and visual alarms called for by NFPA Standard 110 for level 1 systems for the local generator control panel. Spare lamps shall be provided to allow future addition of other alarm and status functions to the annunciator. Provisions for labeling of the annunciator in a fashion consistent with the specified functions shall be provided. Alarm silence and lamp test switch(es) shall be provided. LED lamps shall be replaceable, and indicating lamp color shall be capable of changes needed for specific application requirements. Alarm horn (when switched on) shall sound for first fault, and all subsequent faults, regardless of whether first fault has been cleared, in compliance with NFPA110 3-5.6.2. The interconnecting wiring between the annunciator and other system components shall be monitored and failure of the interconnection between components shall be displayed on the annunciator panel.

   The annunciator shall include the following alarm labels, audible annunciation features, and lamp colors:

Condition	Lamp Color	Audible Alarm
Genset Supplying Load	Amber	No
Charger AC Failure	Amber	Yes
Low Coolant Level	Amber	Yes
Low Fuel Level	Red	Yes
Check Genset	Amber	No
Not In Auto	Red	Yes
Genset Running	Amber	No
High Battery Voltage	Amber	Yes
Low Battery Voltage	Red	Yes
Weak Battery	Red	Yes
Fail to Start	Red	Yes
Low Coolant Temperature	Red	Yes
Pre-High Engine Temperature	Amber	Yes
High Engine Temperature	Red	Yes
Pre-Low Oil Pressure	Red	Yes
Low Oil Pressure	Red	Yes
Overspeed	Red	Yes
(4) Spares	Configurable	Configurable

2.7 ENGINE CONTROL FUNCTIONS

A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.

C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure conditions.

2.8 ALTERNATOR CONTROL FUNCTIONS

A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the

rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

F. When required by National Electrical Code or indicated on project drawings, the control System shall include a ground fault monitoring relay. The relay shall be adjustable from 3.8-1200 amps, and include adjustable time delay of 0-10.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set, and provide relay that will function correctly in system as installed.

2.9 OTHER CONTROL FUNCTIONS

A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10 GENERATOR MAIN LINE CIRCUIT BREAKER

A. The generator set shall be provided with dual mounted main line circuit breakers, rated 200 amps and 100 amps. The circuit breaker shall incorporate an electronic

trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

2.11 OUTDOOR WEATHER-PROTECTIVE SOUND ATTENUATED ENCLOSURE

A. Construction:

1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure

a. Package shall comply with the requirements of the NEC for all wiring materials and components.

b. Sound attenuation rating of 70.3 dBA @ 7m.

c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 104 F.

B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a nominal 258 Gallon fuel tank base, incorporating prepainted aluminum construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed to provide the specified level of sound attenuation.

C. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.

D. The enclosure shall include flexible coolant and lubricating oil drain lines, that extend to the exterior of the enclosure with internal drain valves.

E. External radiator fill provision must be provided.

F. Doors shall be recessed, lockable with retainers to hold doors open for easy access.

G. Inlet of enclosure shall be provided with rodent barriers.

2.12 SUBBASE FUEL TANK

A. Provide a sub-base nominal 258 gallon fuel tank for the generator set. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:

1. Emergency tank and basin vents.

2. Mechanical level gauge.

3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.

4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.

5. Low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.

6. Basin drain.

7. Integral lifting provisions.

PART 3 - EXECUTION

3.1 ACCEPTANCE

A. Equipment shall be initially started and operated by representatives of the manufacturer.

B. 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 final testing of the system.

3.2 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility owner.

3.3 DEMONSTRATION

A. Provide systems demonstration. Electric Contractor shall provide fuel for testing and shall fill tank complete after all testing is done and before turning over to Owner.

B. Describe loads connected to standby system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 26 36 00

AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes automatic transfer switches rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.

2. Single-Line Diagram: Show connections between transfer switch, power sources, and load.

1.3 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For transfer switches, accessories, and components, from manufacturer.

B. Source quality control reports.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS – ASCO 300 SERIES

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 99.

D. Comply with NFPA 110.

E. Comply with UL 1008 unless requirements of these Specifications are stricter.

F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

K. Service-Rated Transfer Switch:

1. Comply with UL 869A and UL 489.

2. Provide terminals for bonding the grounding electrode conductor to the grounded service conductor.

3. In systems with a neutral, the bonding connection shall be on the neutral bus.

4. Provide removable link for temporary separation of the service and load grounded conductors.

5. Service Disconnecting Means: Externally operated, manual, mechanically actuated.

L. Neutral Terminal: Solid and fully rated unless otherwise indicated.

M. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.

N. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable with printed markers at terminations. Color-coding and wire and cable markers are specified in Section 26 05 53 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.

2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.

3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

4. Accessible via front access.

O. Enclosures: General-purpose NEMA 250, Type 3R complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.

2. Switch Action: Double throw; mechanically held in both directions.

3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.

4. Conductor Connectors: Suitable for use with conductor material and sizes.

5. Material: Hard-drawn copper, 98 percent conductivity.

6. Main and Neutral Lugs: Compression type.

7. Ground Lugs and Bus-Configured Terminators: Compression type.

8. Ground bar.

9. Connectors shall be marked for conductor size and type according to UL 1008..

C. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.

1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.

D. Automatic Transfer-Switch Controller Features:

1. Controller operates through a period of loss of control power.

2. Undervoltage Sensing for Each Phase of Normal and Alternate Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

5. Test Switch: Simulate normal-source failure.

6. Switch-Position Pilot Lights: Indicate source to which load is connected.

7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods

shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.

b. Push-button programming control with digital display of settings.

c. Integral battery operation of time switch when normal control power is unavailable.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

B. Prepare test and inspection reports.

1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems, include results of test for the following conditions:

a. Overvoltage.

b. Undervoltage.

c. Loss of supply voltage.

d. Reduction of supply voltage.

e. Alternative supply voltage or frequency is at minimum acceptable values.

f. Temperature rise.

g. Dielectric voltage-withstand; before and after short-circuit test.

h. Overload.

i. Contact opening.

j. Endurance.

k. Short circuit.

l. Short-time current capability.

m. Receptacle withstand capability.

n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Annunciator and Control Panel Mounting: Surface on wall unless otherwise indicated.

B. Identify components according to Section 26 05 53 "Identification for Electrical Systems."

C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

D. Comply with NECA 1.

3.2 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, motor controls, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

D. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

E. Connect twisted pair cable according to Section 271513 "Communications Copper Horizontal Cabling."

F. Route and brace conductors according to manufacturer's written instructions. Do not obscure manufacturer's markings and labels.

G. Brace and support equipment according to Section 26 05 48.16 "Seismic Controls for Electrical Systems."

H. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches (457 mm) in length.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual and Mechanical Inspection:

a. Compare equipment nameplate data with Drawings and Specifications.

b. Inspect physical and mechanical condition.

c. Inspect anchorage, alignment, grounding, and required clearances.

d. Verify that the unit is clean.

e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

f. Verify that manual transfer warnings are attached and visible.

g. Verify tightness of all control connections.

h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

1) Use of low-resistance ohmmeter.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

i. Perform manual transfer operation.

j. Verify positive mechanical interlocking between normal and alternate sources.

k. Perform visual and mechanical inspection of surge arresters.

l. Inspect control power transformers.

1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.

3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

2. Electrical Tests:

a. Perform insulation-resistance tests on all control wiring with respect to ground.

b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.

c. Verify settings and operation of control devices.

d. Calibrate and set all relays and timers.

e. Verify phase rotation, phasing, and synchronized operation.

f. Perform automatic transfer tests.

g. Verify correct operation and timing of the following functions:

1) Normal source voltage-sensing and frequency-sensing relays.

2) Engine start sequence.

3) Time delay on transfer.

4) Alternative source voltage-sensing and frequency-sensing relays.

5) Automatic transfer operation.

6) Interlocks and limit switch function.

7) Time delay and retransfer on normal power restoration.

8) Engine cool-down and shutdown feature.

3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.

b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

c. Verify that manual transfer warnings are properly placed.

d. Perform manual transfer operation.

4. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.

b. Simulate loss of phase-to-ground voltage for each phase of normal source.

c. Verify time-delay settings.

d. Verify pickup and dropout voltages by data readout or inspection of control settings.

e. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.

f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

B. Coordinate tests with tests of generator and run them concurrently.

C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

D. Transfer switches will be considered defective if they do not pass tests and inspections.

E. Remove and replace malfunctioning units and retest as specified above.

F. Prepare test and inspection reports.

G. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Coordinate this training with that for generator equipment.

END OF SECTION

SECTION 32 34 13

FABRICATED PEDESTRIAN BRIDGES

PART 1 - GENERAL

1.1 SPECIFICATION SCOPE FOR GLUED LAMINATED TIMBER SUPERSTRUCTURES

A. The work to be done under this Contract includes the furnishing of all permits, materials, labor, equipment, and appurtenances necessary for the construction of the fabricated pedestrian bridges at Blue Mountain Reservation. This specification provides a standard for fabrication of glued laminated wood used in the bridge superstructure installation.

1.2 DEFINITIONS AND ABBREVIATIONS

A. STRUCTURAL GLUED LAMINATED TIMBER (WOOD): An engineered stress-rated product of a timber laminating plant, comprised of wood laminations bonded together with adhesives. The grains of all laminations are approximately parallel longitudinally. See AITC 117 for a more detailed explanation.

B. GLULAM: Structural glued laminated timber (wood)

C. AITC: American Institute of Timber Construction

D. APA/EWS: Trademark appears on products manufactured by APA - The Engineered Wood Association members

E. AWPA: American Wood Protection Association

F. AASHTO: American Association of State Highway and Transportation Officials

G. WWPI: Western Wood Preservers Institute

1.3 QUALIFICATIONS OF FABRICATOR

A. The glulam manufacturer shall be a qualified licensee of the AITC or APA/EWS.

B. All Glued laminated timber shall be factory fabricated (as far as practical). This shall include cutting drilling and other fabrication as shown on shop drawings.

C. Manufacturers offering prefabricated superstructures which meet the basic geometric requirements indicated on the Contract Plans (span, width and camber) must be a company specializing in the design and fabrication of timber bridges,

with a minimum of (5) years documented experience. manufacturer of design basis:Laminated Concepts Inc. PO Box 369 Big Flats, NY 14814 (607) 562-81104. Contractor may propose approved equals that meet or exceed the requirements set forth in these specifications.

1.4 CODES AND STANDARDS

A. In addition to complying with all pertinent codes and regulations, material and installation procedures shall comply with the following:

1. AASHTO. 2010. LRFD Standard Specifications for Highway Bridges, 5th edition.

2. American National Standard for Wood Products-Structural Glued Laminated Timber ANSI A190. 1- (Latest edition)

3. AITC 117-2010 Standard Specifications for Structural Glued Laminated Timber of Softwood Species.

4. AWPA Book of Standards (Latest Edition)

5. WWPI Best Management Practice for Treating Wood in Aquatic Environment

1.5 CERTIFICATIONS

A. Certifications required by the laminator: The laminator shall provide an AITC or APA/EWS Certificate of Conformance to AITC/ANSI A190.1-2007

B. Preservative treatment certification required (if applicable). A Certificate of treatment shall be furnished by a certified AWPA treating facility. The treating certification shall list the identification of job, species of materials, type and retention preservative provided, as well as the AWPA standard used as the guide for treating. In the event treated timber originates from more than one treating facility then certification shall be furnished from each facility providing timber for this project.

1.6 STRUCTURAL DESIGN

A. A professional engineer shall be engaged to design and detail the prefabricated bridge superstructure. These services shall include any required consultation for interpreting the plans and for the resolution of problems which may arise during the performance of the work.

The design of the structure(s) described above shall meet the loading requirements specified on the Contract Plans.

The Load Rating shall be determined in accordance with the current AASHTO bridge specifications with all interim provisions in effect. Load ratings shall also be computed by the Load and Resistance Factor Rating (LRFR) method. The load ratings shall be shown on the Production Note Sheet of the shop drawings. The contractor shall include all load rating computations in the design. The manufacture shall be regularly engaged in the production of the specified product(s) or item(s) and be able to furnish independent records or references of competence and satisfaction of this fact upon the request of the Engineer-In-Charge (EiC) and Owner.

The bridges will be subject to equestrian loading and the Equestrian Design Guidebook guidance on loading shall be considered in design. Other applicable standards include but not limited too: New York State Department of Transportation LRFD Bridge Design Specifications, the AASHTO LRFD Guide Specification for Design of Pedestrian Bridges, and the Americans with Disabilities Act.

Span length and clear width between face of rails shall be as indicated on the Contract Plans. The superstructure depth from the bridge deck surface to bottom of glulam shall be configured to maintain the minimum vertical clearance indicated on the Contract Plans.

All "field" connections for the truss and floor system shall be completed through the use of high strength bolts.

Vertical truss members shall be perpendicular to the bottom chord after the bridge is erected and the truss has deflected under all dead load or as specified in the Contract Plans.

Railing heights shall be in accordance with the same specification, or as specified in the Contract Plans.

Bearings shall be designed in accordance with the NYSDOT LFRD Bridge Design Specifications and the New York State Bridge Manual. Details shall be shown in the shop drawings and submitted to the EiC for approval.

Anchor bolts shall be designed to resist all longitudinal, horizontal, and uplift forces present under the standard AASHTO load cases, transferred by the superstructure to the supporting foundations. Anchor bolts shall be fully threaded A449 bolts, and may be either drilled and grouted, or cast-in-place. When cast in place with a plate, they shall be set a minimum of 6 inches into the concrete.

When drilled and grouted, they shall be embedded a minimum of 12 inches into the concrete. Slotted holes in masonry base plates are allowed only at expansion bearings.

Unless shown on the Contract Plans, the design of the deck joint system shall be the responsibility of the Fabricator. This joint system capable of handling the design expansion and shall be designed and supplied by the bridge manufacturer.

1. Dead Load (timber 50 PCF)

2. Live Load 100 PSF, 20 PSF snow load

3. Wet-Stress design values shall be used when applicable

4. Live Load deflection (L/425)

5. Overall length of span 33 (ft)

6. Overall Roadway width 8 (ft)

7. Skew 0 (degrees)

1.7 SUBMITTALS

A. DESIGN CALCULATIONS

Two copies of design calculations shall be submitted concurrently with the shop drawings for review by the Engineer-in- Charge (EiC). The design calculations shall be signed and sealed by a professional engineer licensed in the State of New York. The calculations shall include, but not be limited to, the following:

1. Analysis and code check with appropriate member connectivity and end conditions. A diagram showing joint coordinates and member indices shall be included.

2. Half-thru truss or u-frame stiffness checks (when design does not include top lateral bracing).

3. Member forces and stress checks.

4. Deflection checks.

5. End post and floorbeam design checks.

6. Wind bracing design.

7. Welded connection design (if applicable).

8. Bolted field splice design (when used)

9. Bearing and anchor bolt design.

10. Deck design.

11. Railing system design.

12. Vibration design check including fundamental frequency calculations.

B. SHOP DRAWINGS

Shop drawings shall be submitted prior to bridge superstructures fabrication. All shop drawings shall be signed and sealed by a professional engineer licensed in the State of New York. The EiC comments will be indicated on the returned copies. Should the proposed design not be approved, the reasons will be indicated with the return of the material. The Contractor shall then submit a revised design and drawings for approval, subject to the same terms as the first submission. Resubmission will not be considered legitimate reason to request an extension of time under NYSDOT Standard Specification Subsection I 08-04, Extension of Time.

Final drawings shall be furnished to the EiC. All work shall be done in accordance with the approved shop drawings. The Contractor shall have approved shop drawings prior to the start of any superstructure fabrication. The Contractor shall bear all cost damages which may result From the ordering of any materials or equipment, or the use of any preparatory labor prior to the approval of the design and shop drawings.

All connections shall be clearly shown, in detail, on shop drawings. The connection details shown on the drawings shall be consistent with the end condition assumptions made in the design. Any substitutions to the details shown in the Contract Plans shall be submitted to the EiC for review prior to shop drawing submission. Submitted substitutions must be clearly identified and noted as such. Reviewed substitutions, modifications and necessary changes in related portions of the work shall be coordinated by the fabricator and shall be accomplished at no additional cost to the County.

Provide drawings, templates and directions for installation and setting of anchor bolts and bearing plate assemblies to be installed by others. Each prefabricated bridge superstructure shall include all hardware necessary for complete installation including bearing devices and joint systems.

C. ERECTION DRAWINGS

Erection drawings, as applicable, shall be submitted to the EiC a minimum of 30 days prior to erection.

PART 2 - PRODUCTS

2.1 TIMBER MATERIALS

A. Lumber-intended for glulam production shall be visually or mechanically graded in conformance with accepted standards for LRFD unit stresses (See AASHTO Section 8) and with the National Design Specifications for Wood Construction.

B. Glulam members shall be finished to Industrial Appearance Grade as per

C. AITC 110-2001

D. All lumber utilized in these standards shall be either Coastal Douglas Fir or Southern Pine.

2.2 PRESERVATIVE TREATMENT

A. All timber to be treated with the following oil type preservatives in accordance with AASHTO Material Standards, M133 and M168 and shall conform to the AWPA Use Code Standards

1. Pentachlorophenol or Copper Naphthenate in Type A, heavy oil conforming to AWPA Standard UC4B, P-8 & P9. Retention level shall be 0.6 PCF

2. Coal Tar Creosote conforming to AWPA Standard UC4B & P-1/P-13. Retention level shall be 12 PCF.

3. Incising shall be required for all Douglas Fir materials as per AWPA specifications.

4. Timber pedestrian deck, curb and railings may be treated with the water borne preservative, CCA, to a net retention of 0.4 PCF conforming to AWPA Standard UC4B & P-5 or Pentachlorophenol in Type C, light oil conforming to AWPA Standard UC4B, P-8 & P9. Retention level shall be 0.3 PCF. Either treatment shall be performed prior to gluing. These treatments are limited to SP only.

5. All preservative treatments shall be applied in accordance with Best Management Practices for Wood Preservatives in Aquatic Environments.

6. AWPA Treatment Spec References:

AWPA M2 Inspection of Treated Timber Products

AWPA M4 Care of Preservative Treated Timber Products

AWPA P1/13 Coal Tar Creosote for Land and, Fresh Water and Marine (Coastal Water Use)

AWPA P5 Waterborne Preservatives

AWPA P8 Oil-borne Preservatives

AWPA P9 Standards for Solvents

AWPA P5 Standard for Waterborne Preservatives

2.3 HARDWARE

A. Fabricator shall provide all connection steel and hardware for joining wood members to each other and to their supports exclusive of anchoring embedded in concrete.

B. All fasteners, except prestressing bars, shall be galvanized (ASTM A-123) mild steel ASTM A307. Washers to be cast iron or malleable iron, timber type.

C. All steel plates and shapes to be galvanized (ASTM A-153) mild steel ASTM A-36

D. Aluminum deck brackets to be cast aluminum alloy 356

E. "C" Clips shall be galvanized (ASTM A-153) Cast iron Grade 30

F. Prestressing bars and nuts for stress-laminated decks shall be galvanized (ASTM-123) high strength steel ASTM A-722 Type II with an ultimate yield stress of 150 KSI

G. Hardware Specification References

1. AASHTO. 2011. Standard Specifications for Transportation Materials and Methods of Sampling and Testing. 31st Edition.

2. M111 Zinc (Hot-Dip Galvanized) Coatings for Iron and Steel Products

3. M232 Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4. ASTM. 2011.(American Society of Testing and Materials) Annual Book of Standards

5. ASTM A36 Standard Specification for Structural Steel

6. ASTM A722 Standard Specification for Uncoated, High-Strength Steel Bar for Prestressing Concrete

7. ANSI/ASME. B18.2.1 Square and Hex Bolts and Screws (Inch Series), American Society of Mechanical Engineers

2.4 BEARING PADS

A. Fabricator shall provide neoprene or elastomeric bearing pads in areas where glulam girder or longitudinal decking material rests on steel or concrete abutments. Width shall be sufficient to support bearing.

B. The durometer hardness shall be between 50 and 70, and shall have a minimum strength of 800 PSI.

PART 3 - EXECUTION

3.1 MATERIAL: DELIVERY, STORAGE AND HANDLING

A. Special care shall be taken for all materials required for the project. Shipping, storage and erection practices shall be in accordance with industry standards.

B. A Representative of the manufacturer of the prefabricated structure shall be present when the bridge is delivered, and installation commences to ensure proper installation.

END OF SECTION

SECTION 33 32 16

PACKAGED WASTEWATER GRINDER PUMP ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Under this Section, the Contractor shall furnish all labor, materials and equipment for installation and testing of Semi-Positive Displacement Grinder Pump Station, complete.

B. The manufacturer shall furnish complete factory-built and tested grinder pump unit(s), each consisting of a grinder pump core suitably mounted on an integral stand of stainless steel, NEMA 6P electrical quick disconnect (EQD), pump removal harness discharge assembly/shut-off valve, anti-siphon valve/check valve assembly, electrical alarm assembly and all necessary internal wiring and controls. The pump shall be semipositive displacement type grinder unit. For ease of serviceability, all pump motor/grinder units shall be of like type and horsepower and completely interchangeable.

1.2 REFERENCES

AICS, American Institute of Steel Construction

AISI American Iron and Steel Institute

ANSI, American National Standards Institute

ASTM, American Society of Testing and Materials

AWS, American Welding Society

HI, Hydraulic Institute

IBC, International Building Code

IEC, International Electric Code

IEEE, Institute of Electrical and Electronics Engineers

NEC, National Electrical Code

NEMA, National Electrical Manufacturers Association SWPA, Submersible Wastewater Pump Association Underwriters Laboratory (UL and cUL)

1.3 RELATED SECTIONS

A. Section 31 00 00, Earthwork

B. Division 33, Utilities.

C. Division 26, Electrical

1.4 SUBMITTALS

A. Work Schedule: Submit a schedule of work for the start-up of all new equipment items.

B. Submittals for equipment approval shall include the following items:

1. Compliance Statement: With each submittal, include a Compliance Statement listing each Specification Section and Part 1, 2, and 3 Sub-Sections, stating paragraph-paragraph, compliance with the Specifications, each minor nonconformity that is within the intent of the Specification and proposed nonconformities. Provide short descriptions of minor nonconformities, and detailed explanation and drawings of other nonconformities.

2. Detailed installation and user instructions for the product and evidence of an established service support program including parts list and service manual.

3. Description of factory testing program.

4. Certified agreement to the conditions of the warranty to cover all equipment supplied shall be supplied with the bid. Detail any exclusion from the warranty or additional cost items required to maintain the equipment in warrantable condition.

5. Certified shop drawings showing complete assembly and parts list, anchor bolt location and installation drawings, together with detailed specifications and data covering material used, motor and volute components, parts, devices and other accessories forming a part of the equipment furnished, shall be submitted. Shop Drawings shall include main layout, list of specifications and recommendations furnished by the equipment manufacturer.

6. Certified head/Capacity curves

7. Descriptive product literature.

8. Complete electrical and control schematic diagrams showing all remote devices shall be furnished along with a system one-line diagram and a

control panel outline and front view drawings. Complete manufacturer's data on control components, such as limit switches, timers, relays, and starters shall accompany the control drawings.

9. Complete motor and drive data.

10. The total weight of the equipment.

11. A complete bill of materials of all equipment.

12. List of manufacturer's recommended spare parts and special tools with prices including local supplier/representative with names and telephone numbers.

13. Submit necessary copies of the manufacturer's operation and maintenance instructions, including detailed operating and maintenance instructions and specifications relative to the assembly, alignment, checking, lubrication, placing in operation, adjustment, and maintenance of each unit of equipment and auxiliaries furnished under this Contract, together with complete parts lists and copies of dimension drawings.

1.5 QUALITY ASSURANCE

A. General: The grinder pump shall conform to requirements for materials, installation, and equipment approvals of State, local, Underwriters Laboratories, Inc., NEC, NEMA, ASTM, NSF, and other applicable codes.

B. In order to assure uniform quality, ease of maintenance and minimal parts storage, it is the intent of these Specifications that all equipment called for under this Section shall be supplied by a single manufacturer. The equipment manufacturer shall, in addition to the CONTRACTOR, assume the responsibility for proper installation and functioning of the equipment.

C. Naming a Manufacturer in paragraph 2.8.1 does not relieve them from complying with the performance requirements and salient features of the Contract Documents. The Contract Documents represent the minimum acceptable standards for the mechanical bar screen equipment for this project. All equipment shall conform fully in every respect to the requirements of the respective parts and sections of the drawings and specifications. Equipment that is a "standard product" with the manufacturer shall be modified, redesigned from the standard mode, and shall be furnished with special features, accessories, materials of construction or finishes as may be necessary to conform to the quality mandated by the technical and performance requirements of the specification.

D. The equipment furnished hereunder shall be the product of a company experienced in the design and manufacture of grinder pumps specifically intended for use in low pressure systems. All manufacturers proposing equipment for this project shall have at least ten years' experience in the design and manufacture of

units of identical size and performance to the specified units. All manufacturers proposing equipment for this project must also have not less than five hundred (300) successful installations of low pressure sewer systems utilizing grinder pumps of like type to the grinder pumps specified herein. An installation is defined as a minimum of twenty-five (25) pumps discharging into a common force main forming a low pressure sewer system. Furthermore, the manufacturer shall submit detailed installation and user instructions for its product, and provide evidence of an established service support program including complete parts lists and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts. The manufacturer shall also submit an installation list with contact person and phone number and date of installation.

1.6 WARRANTY

A. The manufacturer shall warrant, in writing that all equipment supplied by them shall be free from defects in material and workmanship, for a period of twelve (12) months from the date of Substantial Completion or twenty-four (24) months from acceptance and/or beneficial occupancy by the Owner, whichever occurs first.

B. The Manufacturer shall guarantee that the equipment furnished is suitable for the purpose intended and free from defects in design, materials and workmanship. In the event that the equipment fails to perform as specified the Manufacturer shall, at his option, promptly repair, modify or replace the defective equipment.

PART 2 - PRODUCTS

2.1 PACKAGE GRINDER PUMP STATION MANUFACTURERS

A. The materials and equipment covered by this Specification are intended to be standard materials and equipment of demonstrated successful performance, as manufactured by reputable concerns. Equipment shall be designed and constructed in accordance with the highest standards of the industry and shall be installed in accordance with the manufacturer’s recommendations and the Contract Documents. The Specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.

2.2 ACCEPTABLE MANUFACTURER

A. The grinder pump shall be the upgrade model as manufactured by:

1. Environment One Corporation

a. Trail Lodge Model: DH-152.

b. Maintenance Garage Model: DH-152.

c. Private Residence Model: DH-151.

2. Approved equal.

2.3 MATERIALS

A. Iron casings, shapes and bars: ASTM A159 Class 30.

B. Other Materials: Applicable ASTM specifications, unless otherwise specified.

C. Corrosion Protection: All materials exposed to wastewater shall have inherent corrosion resistance or protection: i.e., cast iron, HDPE, stainless steel, PVC.

2.4 EQUIPMENT TYPE AND DESIGN

A. Include all equipment, control, accessories and appurtenances necessary to make complete systems. Complete, factory built, NSF and UL listed, package lift station consisting of:

B. The self-contained "pump core assembly" unit which contains the semi-positive displacement pump, electrical quick disconnect, wiring, level sensors, all controls necessary to operate the pump unit, pump removal system, electrical quick disconnect, anti-siphon valve, and check valve.

2.5 PUMP CORE ASSEMBLY

A. Each grinder pump station shall have an easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

B. Pump: The pump shall be a custom designed, an integral, motor driven, vertical rotor, solids handling, grinder pump of the progressing cavity type provided with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. It shall be specifically designed for pressure sewer service. To prevent motor head misalignment that would result in grinder striking and binding, the pump shall be housed in a cast iron housing fully epoxy coated to 8-10 mil nominal dry thickness, wet applied.

C. The pump rotor shall be through-hardened, highly polished, precipitation hardened stainless steel.

D. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator

material because it does not exhibit the properties as outlined above and required for wastewater service.

E. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

F. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 - 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wear and corrosive resistant properties. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

1. The grinder shall be positioned in such a way that solids are fed in an up-flow direction.

2. To minimize jamming, the maximum flow rate through the cutting mechanism must not exceed 4 feet per second.

3. The inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.

4. The impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

5. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of sewage solids such as paper, sanitary napkins, disposable diapers, wood, plastic, glass, rubber,

and the like to finely divided particles which will pass freely through the passages of the pump and the 1-1/4-inch diameter stainless steel discharge piping.

G. The electric motor shall be a 1 HP, 1725 RPM, 120 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted. The wet portion of the motor armature must be 300 Series stainless.

H. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

I. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable due to their limited sealing capacity in slurry applications.

J. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

K. Discharge Piping: Discharge piping shall be SCH 80 PVC

L. Level Controls:

1. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating the motor starting controls in a plastic enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.

2. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.

3. All fasteners throughout the assembly shall be 304 Series stainless steel. High- level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a factory installed NEMA 6P EQD half attached to it.

M. The grinder pump core shall include a factory-installed NEMA 6P electrical quick disconnect (EQD) for all power and control functions. The contractor shall

determine the length of electrical supply cable (ESC) to connect to the alarm panel. The EQD shall require no tools for assembly, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug- type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. Junction boxes are not acceptable due to the large number of potential leak points. The EQD shall be so designed to be conductive to field wiring as required.

N. Serviceability: The grinder pump core unit, including level sensor assembly, shall have two lifting eyes complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature shall be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

O. All maintenance tasks for the grinder pump station must be possible without entry of the grinder pump station (as required by OSHA 1910.146 Permit required confined spaces). “Entry” means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.

P. Maintenance: It is the intent of this Specification that the pump station and associated appurtenances require no periodic or scheduled maintenance. This would include items that are commonly recommended by manufacturers or accepted as standards of industrial practice, such as periodic or scheduled changing of motor or seal oil or cleaning of level control components. This is not meant to include maintenance that is required due to component failure or wear.

Q. The grinder pump station shall be provided by the manufacturer to the Contractor with the electrical cable already connected to the grinder pump. The standard grinder pump station provided by the manufacturer shall include 50 linear feet of electrical cable. Should additional electrical cable be needed, the Contractor shall notify the manufacturer of the length and quantity. The manufacturer can provide grinder pump stations with electrical cable at 50, 75, 100, and 150 foot lengths. The Contractor shall review the plans to determine whether additional cable lengths are required beyond the standard length prior to ordering. The contractor will also be responsible for furnishing and installing longer lengths of factory electrical cable if required due to field conditions that require them at no additional cost. Due to voltage drop issues, the maximum length of electrical cable connected to the grinder pump shall not exceed 150 feet. Splicing of multiple electrical cables will not be allowed.

2.6 ALARM PANEL

A. Each grinder pump station shall include a NEMA 4X; UL listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance, and shall be UV stabilized for outdoor use. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The enclosure shall not exceed 10.5” W x 14” H x 7” D.

B. For each core, the alarm panel shall contain one (1) 15 amp, double pole circuit breaker for the pump core power circuit and one (1) 15 amp single pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

C. The Alarm Panel shall include the following features: external audio and visual alarm; push-to-run switch, push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the pressure switch activate, audio and visual alarms are activated, and the redundant pump starting system shall be energized.

2. The audio alarm shall be silenced by means of the externally mounted, push-to- silence button.

3. Visual alarm shall remain illuminated until the sewage level in the wet well drops below the “off” setting of the alarm pressure switch.

D. The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating.

E. The audio alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audio alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

F. The entire Alarm Panel, as manufactured shall be listed by Underwriters Laboratories, Inc.

2.7 ELECTRICAL WIRING

A. All power and control wiring as necessary for a complete and fully functional grinder pump station shall be completed in accordance with the Division 26 - Electrical Technical Specifications. Work shall be done by an experienced electrician with experience in similar installations.

PART 3 - EXECUTION

3.1 GENERAL

A. The equipment furnished shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with approved drawings, specifications, engineering data, and/or recommendations furnished by the equipment manufacturer.

B. Safety: The grinder pump shall be free from electrical and fire hazards as required in a residential environment. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station in its tank shall be listed by Underwriters Laboratories, Inc., to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable. The grinder pump shall meet New York State standards for plumbing equipment for use in or near residences, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure sewer system applications. As evidence of compliance with this requirement, the grinder pumps shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

3.2 ANCHORS

A. Anchors shall be Type 316 stainless steel, minimum diameter of 1/2".All bolts, nuts, washers, and fasteners shall also be of T316 stainless steel. An anti-seize compound shall be applied to all field installed nuts and bolts.

3.3 FACTORY TESTING

A. Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the antisiphon valve, check valve, discharge assembly and each unit’s dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps shall not be acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

B. The Engineer reserves the right to inspect such testing procedures with representatives of the Owner, at the grinder pump manufacturer’s facility.

3.4 DELIVERY AND STORAGE

A. The Positive Displacement Grinder Pump shall be appropriately crated and delivered to protect against damage during shipment.

B. All grinder pump core units shall be delivered to the job site with the level controls completely assembled/attached and integrated with the pump core including wiring and factory testing. Level controls not assembled/factory wired to the pump core will not be accepted due to the potential workmanship issues that are associated with field assembly and associated wire connections. Grinder pump cores must also be boxed for ease of handling.

C. An authorized representative of the Contractor shall inspect the Positive Displacement Grinder Pump on delivery to the jobsite and shall report any damage or missing components to the Manufacturer and the Engineer within 72 hours of receipt of the shipment.

3.5 ERECTION AND INITIAL OPERATION SUPERVISION

A. Equipment shall be installed in accordance with the manufacturer's recommendations and the Contract Documents. Installation procedure shall not be modified without prior approval from the Engineer. The internal wiring of the grinder pump and level sensor shall be installed by the manufacturer, and the Contractor shall be responsible for all other wiring.

B. The installation of the pumping equipment controls shall be inspected by the Contractor and manufacturer's representative.

C. A startup test report shall be issued by the Manufacturer's Representative for each pump station, which shall present results for the following startup tests:

1. power cable insulation test (meg Ohms);

2. amperage reading;

3. rated voltage/actual voltage;

4. visual inspection of station and panel; and

5. any noted issue(s) must be corrected by the Contractor before final acceptance is granted.

3.6 FACTORY TRAINED REPRESENTATIVE

A. The Manufacturer shall provide the services of qualified and experienced factory technician(s) to instruct the Owner and his agents on the proper installation and wiring of the grinder pump systems prior to construction. The manufacturer shall allow two (2) eight-hour days for this instruction. The manufacturer shall provide transportation, lodging and meals for the representatives as necessary. Transportation shall not be included in the 8 hour training period.

B. Upon completion of the installation, the authorized factory technicians shall perform the following test on each station:

1. Make certain the discharge shut-off valve is fully open. This valve must not be closed when the pump is operating.

2. Turn ON the alarm power circuit and verify the alarm is functioning properly.

3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.

4. Turn ON pump power circuit. Initiate pump operations to verify automatic "on/off" controls are operative. Pump should immediately turn ON. [Within one (1) minute alarm light shall turn OFF. Within three (3) minutes the pump shall turn OFF.]

3.7 TRAINING

A. In addition to startup time, on site services of the Manufacturer's Representative shall be furnished in (1/2) day increments as requested (with reasonable notice to the representative) by the Owner. A minimum of (2) (1/2) day visits comprised of two separate trips, not within the same week shall be provided for the purpose of informing and training the Owner's staff for a total of (8) hours. Startup time shall not count toward training.

END OF SECTION

NO TEXT ON THIS PAGE

ABBREVIATIONS

A.B.	ANCHOR BOLT
A.C.	ASBESTOS CEMENT PIPE
ADD'L	ADDITIONAL
AFF	ABOVE FINISHED FLOOR
ALUM	ALUMINUM
ARCH	ARCHITECTURAL
B,BOT	BOTTOM
B.C.	BRICK COURSE
BLK	BLOCK
BM	BEAM
BU	BUTTERFLY VALVE
BV	BALL VALVE
CB	CATCH BASIN
C.I.	CAST IRON
CHK'D	CHECKERED
CJ	CONSTRUCTION JOINT
CL.	CLEARANCE
CMU	CONCRETE MASONRY UNIT
C.O.	CLEAN OUT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONT	CONTINUE,CONTINUOUS
CTR	CENTER
CU.	COPPER
CV	CHECK VALVE
CW	COLD WATER
DET	DETAIL
DMH	DRAIN MANHOLE
D.I.	DUCTILE IRON
DIA./ø	DIAMETER
DIM(S)	DIMENSION(S)
DWG(S)	DRAWING(S)
DWLS	DOWELS
"E"	EXISTING
EA	EACH
EC	ELECTRICAL CONTRACTOR
EF	EACH FACE
EL,ELEV	ELEVATION
EMH	ELECTRICAL MANHOLE
EQ	EQUAL
EQUIP	EQUIPMENT
ES	EACH SIDE
EW	EACH WAY
EXP	EXPANSION
EXT	EXTERIOR
FD	FLOOR DRAIN
FDN	FOUNDATION
FIN	FINISH(ED)
FIN. FL.	FINISHED FLOOR
FL.	FLOOR
FM	FORCE MAIN
FOW	FACE OF WALL
FTG	FOOTING
FL	FIRE EXTINGUISHER
GA	GAUGE
GB	GLOBE VALVE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GM	GAS MAIN
GPS	GRINDER PUMP STATION
GS	GALVANIZED STEEL OR GAS SERVICE
GV	GATE VALVE
HB	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HGR	HANGER
HORIZ,H	HORIZONTAL
HR	HANDRAIL
HP	HIGH POINT
HW	HOT WATER
HYD	HYDRANT
ID	INSIDE DIAMETER
INSUL.	INSULATION
INT	INTERIOR
INV. EL./I.E.	INVERT ELEVATION
JT	JOINT
LBS	POUNDS
LF	LINEAR FEET
LG	LONG
L.H.	LEFT HAND
LP	LOW POINT
LLV	LONG LEG VERTICAL
LW	LONG WAY
MAX	MAXIMUM
MECH	MECHANICAL
MFG	MANUFACTURING
MFTR	MANUFACTURER
MIN	MINIMUM
MH	MANHOLE
MO	MASONRY OPENING
NO/#	NUMBER
NP	NON-POTABLE WATER
NTS	NOT TO SCALE
OC	ON CENTER
OF	OVERFLOW
OH	OVER HEAD ELECTRICAL
OPNG	OPENING
OPP	OPPOSITE
PC	PRECAST
PI	PRESSURE INDICATOR
℄	PROPERTY LINE
PLATF	PLATFORM
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PST	PRIMARY SETTLING TANK
PV	PLUG VALVE
PVB	PRESSURE VACUUM BREAKER
PVC	POLYVINYL CHLORIDE PIPE
RD	ROOF DRAIN
REF	REFERENCE
REINF	REINFORCE,REINFORCING
REQ'D	REQUIRED
RFG	ROOFING
R.H.	RIGHT HAND
ROW	RIGHT OF WAY
RPZ	REDUCED PRESSURE
SCH	SCHEDULE
SECT	SECTION
SAN	SANITARY DRAIN
SIM	SIMILAR
SL	SLAB
SLV	SHORT LEG VERTICAL
SPECS	SPECIFICATIONS
SQ.	SQUARE
SSx	SOLID SENSOR No.
SS	STAINLESS STEEL
STD	STANDARD
STP	SEWAGE TREATMENT PLANT
STIFF	STIFFENER
STRUCT	STRUCTURAL
SW	SHORT WAY
T&B	TOP AND BOTTOM
TOD	TOP OF DUCT
TOL	TOP OF LOUVER
TOS	TOP OF STEEL
TOW	TOP OF WALL
T/L	TRAFFIC LOOP
TYP	TYPICAL
U.G.	UNDERGROUND
UNO,UON	UNLESS NOTED OTHERWISE
UP	UTILITY POLE
VB	VACUUM BREAKER
VCP	VITRIFIED CLAY PIPE
VD	VOLUME DAMPER
VERT,V	VERTICAL
VTR	VENT THROUGH ROOF
WC	WATER CLOSET
WM	WATER MAIN
WS	WATER STOP OR WATER SERVICE
WV	WATER VALVE
WVB	WATER VALVE BOX
WWF	WELDED WIRE FABRIC
SQ. FT.	SQUARE FEET

SYMBOLS

CIVIL EXISTING

- SIGN
- LIGHT POLE
- UTILITY POLE
- GUY WIRE
- BOLLARD
- SQUARE CATCH BASIN
- GAS VALVE
- CATCH BASIN CURB INLET
- WATER FOUNTAIN
- ELECTRIC MANHOLE
- DRAINAGE MANHOLE
- SEWER MANHOLE
- UTILITY POLE
- WATER VALVE
- HYDRANT
- BENCHMARK SET OR FOUND
- CONTOUR (100)
- WETLANDS LINE
- WIRE FENCE
- CHAIN LINK FENCE
- POST AND RAIL FENCE
- WOODEN GUIDE RAIL
- PICKET FENCE
- HEDGE OR TREE ROW
- UNDERGROUND DRAINAGE PIPE
- STONE MASONRY WALL
- STONE RETAINING WALL
- STONE WALL REMAINS
- STONE WALL
- U.G. GAS LINE (G)
- U.G. SANITARY SEWER LINE (S)
- U.G. WATER LINE (W)
- FORCE MAIN (FM)
- ELECTRIC LINE (E)

CIVIL NEW

- SIGN
- LIGHT POLE
- UTILITY POLE
- GUY WIRE
- BOLLARD
- GAS VALVE
- WATER FOUNTAIN (WF)
- ELECTRIC MANHOLE (E)
- DRAINAGE MANHOLE (D)
- SEWER MANHOLE (S)
- AIR RELEASE MANHOLE (AR)
- WYE CLEANOUT (CO)
- GRINDER PUMP STATION (GP)
- UTILITY POLE (UP)
- WATER VALVE
- HYDRANT
- BENCHMARK SET OR FOUND
- DOUBLE CHECK VALVE (DC)
- NEW WORK
- U.G. GAS LINE (G)
- U.G. SANITARY SEWER LINE (S)
- U.G. WATER LINE (W)
- FORCE MAIN (FM)
- ELECTRIC LINE (E)
- CONTOUR (100)
- SAW CUT
- PRESERVE AND PROTECT TREES
- LIMIT OF DISTURBANCE
- PROPOSED PAVEMENT

GENERAL NOTES:

1. ALL DIMENSIONS INDICATED ON THE DRAWINGS ARE APPROXIMATE AND SUBJECT TO REVISIONS AS PER ACTUAL FIELD CONDITIONS.

2. CONTRACTOR SHALL COMPLY WITH ALL NYSDEC PERMIT REQUIREMENTS AND ANY OTHER STATE, CITY, COUNTY OR TOWN AGENCY HAVING JURISDICTION. REFER TO THE CONTRACT SPECIFICATIONS, APPENDIX I, FOR PERMIT REQUIREMENTS.

3. CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO MAINTAIN SERVICE TO AND PROTECT THE EXISTING MONTROSE IMPROVEMENT DISTRICT 16" WATER MAIN. SHUTDOWNS OF THIS WATER MAIN ARE NOT PERMITTED. EXISTING CORPORATION STOPS AND VALVES SHALL BE THE TIE-IN POINTS FOR NEW SERVICE.

4. ANY UTILITIES SHOWN ON THE PLANS ARE FOR INFORMATION ONLY AND HAVE BEEN OBTAINED FROM AVAILABLE SOURCES. THE EXISTENCE AND LOCATION OF ANY UTILITIES INDICATED ON THE PLANS ARE NOT GUARANTEED AND SHALL BE INVESTIGATED AND VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE STARTING WORK. EXCAVATION IN THE VICINITY OF UNDERGROUND UTILITIES SHALL BE DUG BY HAND. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES. NO SEPARATE PAYMENT SHALL BE MADE FOR THIS WORK.

5. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE PRIVATE UTILITY MARKOUTS FOR ALL UTILITIES IN THE WORK AREAS. THE CONTRACTOR SHALL SUBMIT THE PROPOSED UTILITY SUB-CONTRACTOR FOR APPROVAL.

6. THE CONTRACTOR SHALL OBTAIN AND HAVE ON THE JOB SITE, AT ALL TIMES, ALL PERMITS AS REQUIRED BY THE STATE, COUNTY, TOWN/VILLAGE, OR ANY OTHER PERMITTING AGENCY. THE CONTRACTOR SHALL BEAR ALL COSTS OF OBTAINING THESE PERMITS.

7. CONTRACTOR SHALL REMOVE ALL DEBRIS AND EXCESS CONSTRUCTION MATERIALS TO THE SATISFACTION OF THE OWNER AND ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND LEGAL DISPOSAL OF ALL MATERIALS RESULTING FROM THIS CONTRACT.

8. CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE OWNER AND ENGINEER TO MINIMIZE INTERRUPTIONS TO NORMAL PARK OPERATIONS.

9. CONTRACTOR SHALL SUBMIT DETAILED WORK PLAN INCLUDING SEQUENCE OF OPERATIONS PRIOR TO COMMENCING WORK AND SHALL BE SUBJECT TO APPROVAL OF THE OWNER.

10. THE CONTRACTOR SHALL AT ALL TIMES, PROVIDE CONVENIENT ACCESS WITH SAFE AND PROPER FACILITIES FOR THE INSPECTION OF ALL PARTS OF THE WORK. NO WORK, EXCEPT SUCH SHOP WORK AS MAY BE SO PERMITTED, SHALL BE DONE EXCEPT WITH THE CONSENT OF THE OWNER OR A REPRESENTATIVE THEREOF.

11. THE CONTRACTOR SHALL NOTIFY THE OWNER AND THE ENGINEER A MINIMUM OF SEVENTY-TWO (72) HOURS PRIOR TO THE START OF CONSTRUCTION. IN ADDITION, IF WORK SHOULD BE STOPPED AND RESTARTED FOR ANY REASON, THE CONTRACTOR SHALL GIVE THE ENGINEER A MINIMUM OF SEVENTY-TWO (72) HOURS NOTICE.

12. ITEMS SUSTAINING DAMAGE DURING CONSTRUCTION AS A RESULT OF THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AND/OR REPLACED TO THE SATISFACTION AND APPROVAL OF THE OWNER AT THE CONTRACTORS EXPENSE. ANY DAMAGE TO PAVEMENT OR GRASS AREAS SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.

13. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO PRESERVE THE MATERIAL BELOW AND BEYOND THE LINES OF ALL EXCAVATION IN THE SOUNDEST POSSIBLE CONDITION. ANY DAMAGE TO THE WORK DUE TO THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE EXPENSE OF AND BY THE CONTRACTOR.

14. NO MATERIALS OF ANY KIND SHALL BE USED UNTIL IT HAS BEEN INSPECTED AND ACCEPTED BY THE ENGINEER; ALL MATERIALS REJECTED SHALL BE IMMEDIATELY REMOVED FROM THE WORK SITE AND SHALL NOT BE OFFERED FOR INSPECTION AGAIN.

15. ANY MATERIALS OR WORKMANSHIP FOUND AT ANY TIME TO BE DEFECTIVE SHALL BE REMEDIED AT ONCE, REGARDLESS OF PREVIOUS INSPECTION. THE INSPECTION AND OBSERVATION OF WORK BY THE ENGINEER IS INTENDED TO AID THE CONTRACTOR IN APPLYING LABOR AND MATERIAL TO AND IN ACCORDANCE WITH THE SPECIFICATIONS, BUT SUCH INSPECTION SHALL NOT RELEASE THE CONTRACTOR FROM ANY CONTRACT OBLIGATIONS.

16. THE CONTRACTOR SHALL CONDUCT THE WORK IN A SAFE MANNER SO AS TO POSE NO DANGER OR HAZARDS TO PERSONS OR PROPERTY. WHERE NECESSARY, TEMPORARY SHIELDS OR OTHER PROTECTIVE DEVICES MUST BE UTILIZED. THE CONTRACTOR ASSUMES FULL RESPONSIBILITY AND EXPENSE OF ANY AND ALL SAFETY MEASURES. THE USE OF EXPLOSIVES IS STRICTLY PROHIBITED. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA AND NEW YORK STATE DEPARTMENT OF LABOR REQUIREMENTS.

17. RESEED ALL AREAS WHERE WORK HAS OCCURRED AND/OR WHERE CONTRACTOR HAS DAMAGED EXISTING GRASS, IN ACCORDANCE WITH THE SPECIFICATIONS. STAGING AREAS SHALL BE RESTORED TO ORIGINAL CONDITION AND SHALL BE SEEDED FOLLOWING COMPLETION OF ALL WORK.

18. THE CONTRACTOR SHALL HAVE A COMPETENT REPRESENTATIVE PRESENT WHO SHALL RESPOND TO ANY QUESTIONS OR REQUESTS OF THE ENGINEER IN THE PROSECUTION AND COMPLETION OF THE WORK IN CONFORMITY WITH THIS CONTRACT, AND SHALL HAVE FULL AUTHORITY TO SUPPLY LABOR AND MATERIAL IMMEDIATELY. THE CONTRACTOR SHALL ALSO HAVE A COMPETENT REPRESENTATIVE AVAILABLE TO RECEIVE TELEPHONE MESSAGES AND PROVIDE A REASONABLE REPLY AS SOON AS POSSIBLE, BUT NO LATER THAN 24 HOURS.

19. NEITHER THE OWNER OR ENGINEER SHALL BE RESPONSIBLE FOR THE MEANS AND METHODS CHOSEN BY THE CONTRACTOR TO COMPLETE THE WORK.

20. THE CONTRACTOR SHALL HAVE FULL RESPONSIBILITY FOR SITE SAFETY AND THE SAFETY OF THE CONTRACTOR'S WORK FORCE.

21. BACKFILL AT ALL EXCAVATIONS SHALL BE PLACED IN 6" LIFTS AND SHALL ACHIEVE A COMPACTION NOT LESS THAN 95 PERCENT OF STANDARD PROCTOR MAXIMUM DENSITY. UNDER THE TERMS OF THE CONTRACT, THE CONTRACTOR SHALL PERFORM FIELD TESTS BY AN APPROVED LABORATORY TO ASSURE THIS COMPACTION RATE AT VARYING DEPTHS. THE CONTRACTOR SHALL HAVE THE APPROVED LABORATORY REPRESENTATIVE ON SITE WHEN DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL BEAR ALL COSTS FOR TESTING AND ANY DELAYS THAT RESULT FROM SUCH TESTING.

22. THE CONTRACTOR SHALL ADJUST ALL MANHOLE FRAMES AND COVERS, VALVE COVERS, WATER VALVE BOXES, DRAINAGE INLETS, ETC. AS NECESSARY TO MEET THE SURFACE OF NEW PAVEMENT OR WALKWAY AS REQUIRED. NO SEPARATE PAYMENT WILL BE MADE FOR THIS WORK UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL COORDINATE THIS ACTIVITY WITH THE RELATED UTILITY COMPANIES, IF APPLICABLE. WARPING OF THE PAVEMENT SURFACE TO MEET THESE ITEMS SHALL NOT BE PERMITTED.

23. ALL EXISTING SIGNS IN THE CONTRACT AREA ARE TO REMAIN INTACT. SIGNS DAMAGED SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. ANY SIGNS THAT REQUIRE RESETTING SHALL BE PLACED IN A FINAL POSITION DETERMINED BY THE OWNER. NO SEPARATE PAYMENT SHALL BE MADE FOR THIS WORK. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR SIGNS DAMAGED BY HIS OPERATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO BURIED AND OVERHEAD UTILITIES LOCATED ON PUBLIC AND PRIVATE PROPERTY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO FACILITIES ON PUBLIC AND PRIVATE PROPERTY, SUCH AS, LANDSCAPING, DRIVEWAYS, CURBS, PAVEMENT, SIDEWALK, ETC.

24. CONTRACTOR IS RESPONSIBLE TO COORDINATE AND VERIFY THE EXTENT OF ALL DEMOLITION WITH THE ENGINEER PRIOR TO PERFORMING THE WORK.

25. CONTRACTOR SHALL RESTORE STAGING AREA BACK TO ITS ORIGINAL CONDITION INCLUDING GRADING, SEEDING, ETC. EXISTING TREES, UTILITIES, LIGHT POLES, STONE, SIDEWALK, CURB, ETC. SHALL BE PROTECTED AND REPLACED IF DAMAGED. (1)

26. ALL ELECTRICAL INFORMATION SHOWN WITHIN THE CIVIL PLANS ARE FOR COORDINATION PURPOSES ONLY AND NOT TO BE USED FOR CONSTRUCTION. REFER TO ELECTRICAL SHEETS E-01 THROUGH E-99 FOR ELECTRICAL PLANS AND DETAILS.

27. ALL FORCE MAIN SEWER PIPE WILL PROVIDE A MINIMUM 10 FOOT SEPARATION TO THE WATER MAIN AND RESIDENTIAL WATER SERVICES. (1)

D&B ENGINEERS AND ARCHITECTS, P.C.
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WHITE PLANES, NY,
10604
(914) 467-5300

CONSULTANT SEAL

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW.

IN CHARGE OF RAL
CHECKED BY MPF
MADE BY RJC

REVISION NUMBER	DATE	MADE BY	APP'D BY	REVISION
1	06/2021	MPF	RJC	ISSUED WITH BID ADDENDUM #3

RECORD DRAWING CERTIFICATION

☐ AS BUILT - CHANGES AS NOTED
☐ AS BUILT - NO CHANGES

CONTRACTOR
NAME
SIGNATURE
TITLE DATE

PROJECT COORDINATOR
NAME
SIGNATURE
TITLE DATE

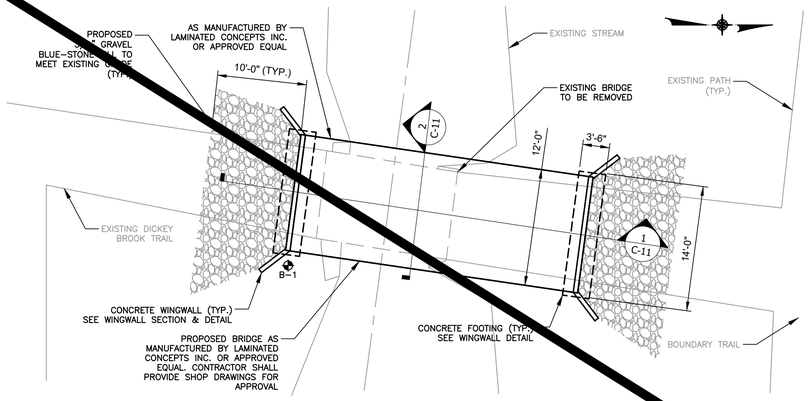
WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
GENERAL
SYMBOLS, ABBREVIATIONS, AND NOTES

CONTRACT NUMBER	SHEET NUMBER
17-519	G-02

SHEET NO. 2 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-5
REV. NO. 1

F:\3980 - Blue Mountain\DWG\Addendum 3\3980-G-SYMABB - ADDENDUM 3.dwg, G-02, 6/9/2021 5:54:31 PM, nferraro



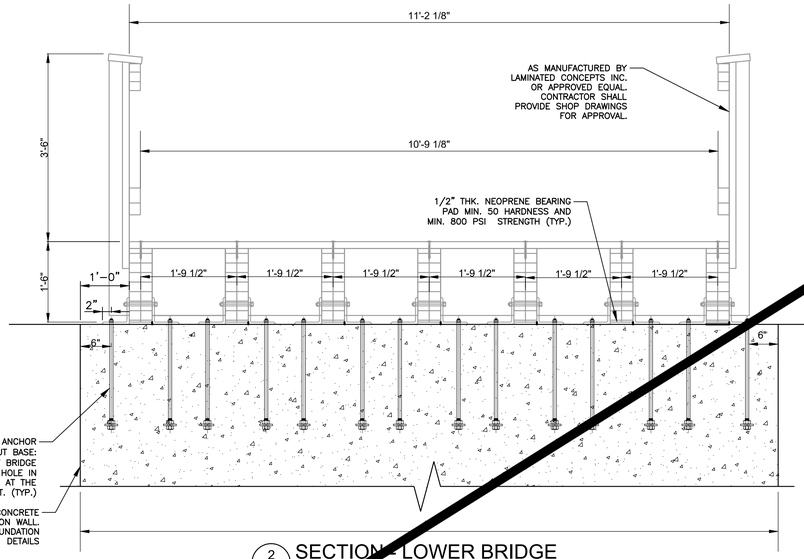
PLAN - LOWER BRIDGE

SCALE: 1"=10'

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value
1	1	SS	3-1-1-1	2
2				
3	2	SS	2-7-6-7	13
4				
5	3	SS	5-4-8-9	12
6				
7	4	SS	2-2-4-14	6
8				
9	5	SS	16-13-18-12	31
10				
11	6	SS	15-16-22-52	38
12				
13	7	SS	22-25-20-22	45
14				
15	8	SS	30-33-24-54	57
16				
17	9	SS	64-34-35-65	69
18				
19	10	SS	32-100/3.5	100+

BORING B-1 LOG

SCALE: N.T.S.



2 C-11 SECTION - LOWER BRIDGE

SCALE: 3/4"=1'

STANDARD NOTES FOR GLUED LAMINATED TIMBER BRIDGES

1. SPECIFICATION SCOPE FOR GLUED LAMINATED TIMBER SUPERSTRUCTURES PROVIDE A STANDARD FOR PRODUCTION OF GLUED LAMINATED WOOD USED IN THE BRIDGE SUPERSTRUCTURE INSTALLATION. SEE SPECIFICATION SECTION 32 34 13 FABRICATED PEDESTRIAN BRIDGES.

2. CODES AND STANDARDS

   IN ADDITION TO COMPLYING WITH ALL PERTINENT CODES AND REGULATIONS, MATERIAL AND INSTALLATION PROCEDURES SHALL COMPLY WITH THE FOLLOWING:

   2.1 AASHTO. 2010. LRFD STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 5TH EDITION.
   2.2 AMERICAN NATIONAL STANDARD FOR WOOD PRODUCTS–STRUCTURAL GLUED LAMINATED TIMBER ANSI A190. 1– (LATEST EDITION)
   2.3 AITC 117–2010 STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER OF SOFTWOOD SPECIES.
   2.4 AWPA BOOK OF STANDARDS (LATEST EDITION)
   2.5 WWPI BEST MANAGEMENT PRACTICE FOR TREATING WOOD IN AQUATIC ENVIRONMENT

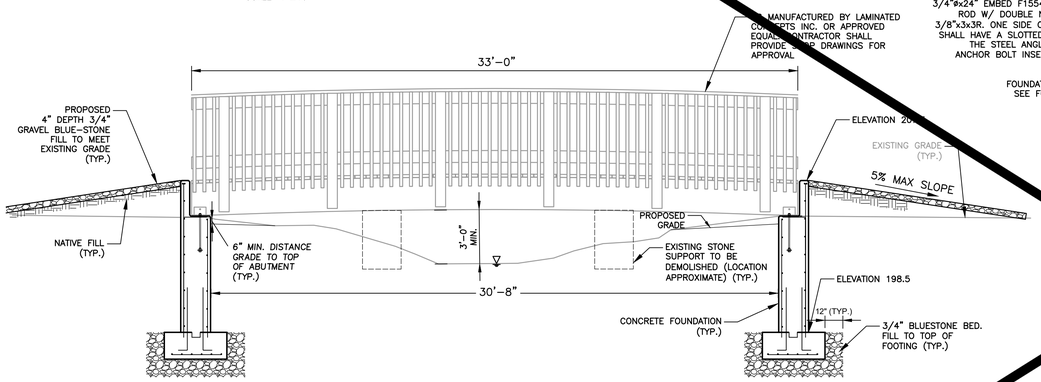
3. CERTIFICATIONS

   3.1 PRESERVATIVE TREATMENT CERTIFICATION IS REQUIRED AND SHALL BE FURNISHED BY A CERTIFIED AWPA TREATING FACILITY.

4. STRUCTURAL DESIGN

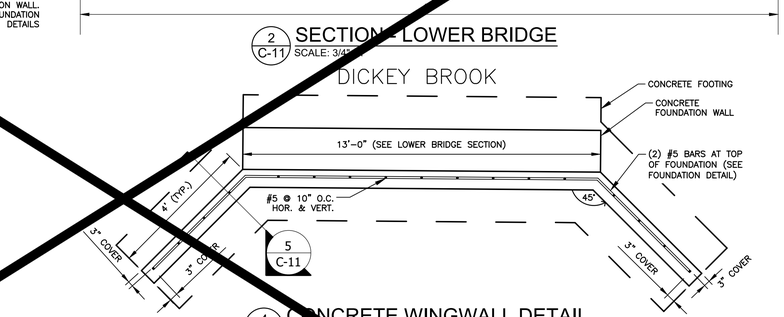
   THE BRIDGE SHALL BE DESIGNED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AS ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).

   4.1 THE STRUCTURE SHALL BE DESIGNED FOR THE FOLLOWNG LOADS AND DIMENSIONS:
   - 4.1.1 DEAD LOAD (TIMBER 50 PCF)
   - 4.1.2 LIVE LOAD 100 PSF, 20 PSF SNOW LOAD)
   - 4.1.3 WET–STRESS DESIGN VALUES SHALL BE USED WHEN APPLICABLE
   - 4.1.4 LIVE LOAD DEFLECTION (L/425)
   - 4.1.5 OVERALL LENGTH OF SPAN BRIDGE: 33'–0"(FT)
   - 4.1.6 OVERALL ROADWAY WIDTH BRIDGE: 12'–0"(FT)
   - 4.1.7 SKEW 0 (DEGREES)



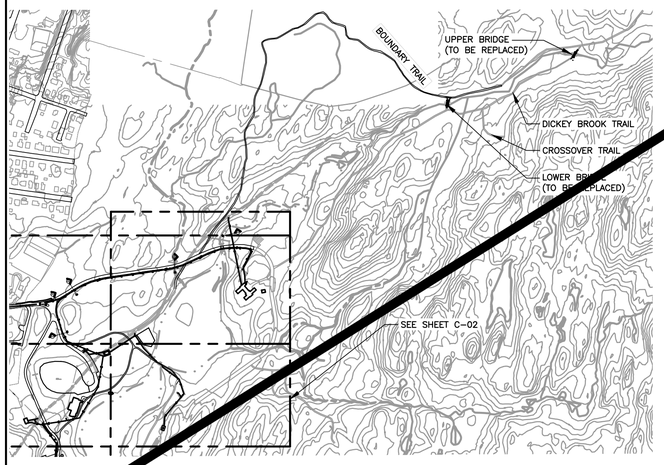
1 C-11 SECTION - LOWER BRIDGE

SCALE: 1"=4'



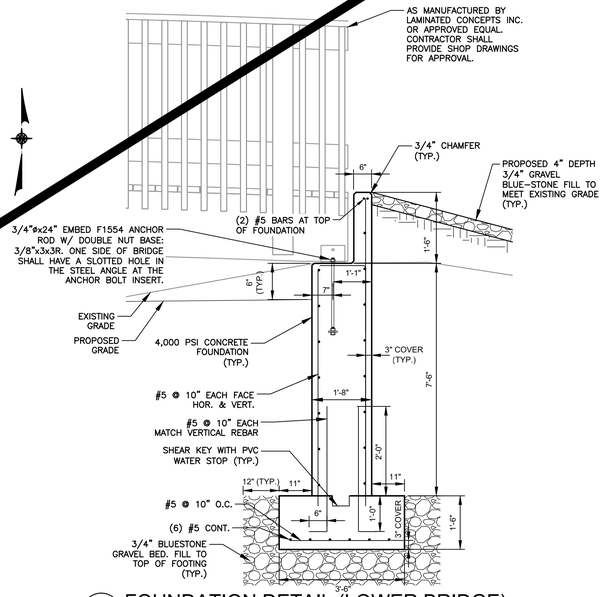
4 C-11 CONCRETE WINGWALL DETAIL

SCALE: N.T.S



BRIDGE LOCATION MAP

SCALE: NTS

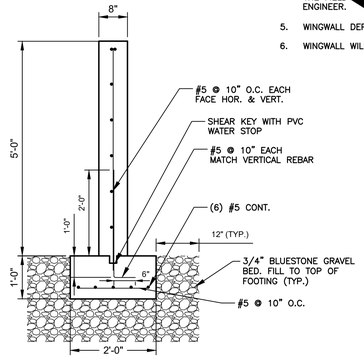


3 C-11 FOUNDATION DETAIL (LOWER BRIDGE)

SCALE: 1"=25'

FOUNDATION WALL NOTES

1. ANCHOR BOLTS SHALL BE 6" MIN. FROM THE OUTER EDGE OF FOUNDATION
2. ONE SIDE OF BRIDGE SHALL HAVE A SLOTTED HOLE IN THE STEEL ANGLE AT THE ANCHOR BOLT INSERTS.
3. ANY VOIDS, OBSTACLES, OR ORGANIC MATERIAL ENCOUNTERED DURING EXCAVATION AND FOUNDATION INSTALLATION SHALL BE REMOVED AND REPLACED WITH COMPACTED SELECT FILL APPROVED BY THE ENGINEER.
4. ACTUAL LOCATION OF BRIDGE TO BE DETERMINED IN THE FIELD AS PER APPROVAL OF OWNER AND ENGINEER.
5. WINGWALL DEPTH WILL BE 4' BELOW GRADE.
6. WINGWALL WILL BE EMBEDDED IN VIRGIN SOIL.



5 C-11 CONCRETE WINGWALL SECTION

SCALE: N.T.S

1 ALTERNATE BID ITEM 1

NOT IN CONTRACT

D&B ENGINEERS AND ARCHITECTS, P.C.
4 WEST RED OAK LANE
WHITE PLANES, NY,
10604
(914) 467-5300

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1	06/09/2021	MPF	RJC	ADDENDUM #3

RECORD DRAWING CERTIFICATION

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☐ AS BUILT – NO CHANGES

CONTRACTOR
NAME
SIGNATURE
TITLE DATE

PROJECT COORDINATOR
NAME
SIGNATURE
TITLE DATE

WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
CIVIL
BRIDGE PLANS, SECTIONS AND DETAILS 1

CONTRACT NUMBER 17–519
SHEET NUMBER C–11
SHEET NO. 15 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24–86–G–18
REV. NO. 1

F:\3980 - Blue Mountain\DWG\Addendum 3\3980 C-11 to C-12 BRIDGE FOUNDATIONS - ADDENDUM 3.dwg, C-11, 6/11/2021 2:26:52 PM, mferraro

STANDARD NOTES FOR GLUED LAMINATED TIMBER BRIDGES

1. SPECIFICATION SCOPE FOR GLUED LAMINATED TIMBER SUPERSTRUCTURES
   PROVIDE A STANDARD FOR PRODUCTION OF GLUED LAMINATED WOOD USED IN THE BRIDGE SUPERSTRUCTURE INSTALLATION. SEE SPECIFICATION SECTION 32 34 13 FABRICATED PEDESTRIAN BRIDGES.

2. CODES AND STANDARDS

   IN ADDITION TO COMPLYING WITH ALL PERTINENT CODES AND REGULATIONS, MATERIAL AND INSTALLATION PROCEDURES SHALL COMPLY WITH THE FOLLOWING:

   2.1 AASHTO. 2010. LRFD STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 5TH EDITION.
   2.2 AMERICAN NATIONAL STANDARD FOR WOOD PRODUCTS–STRUCTURAL GLUED LAMINATED TIMBER ANSI A190. 1– (LATEST EDITION)
   2.3 AITC 117–2010 STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER OF SOFTWOOD SPECIES.
   2.4 AWPA BOOK OF STANDARDS (LATEST EDITION)
   2.5 WWPI BEST MANAGEMENT PRACTICE FOR TREATING WOOD IN AQUATIC ENVIRONMENT

3. CERTIFICATIONS

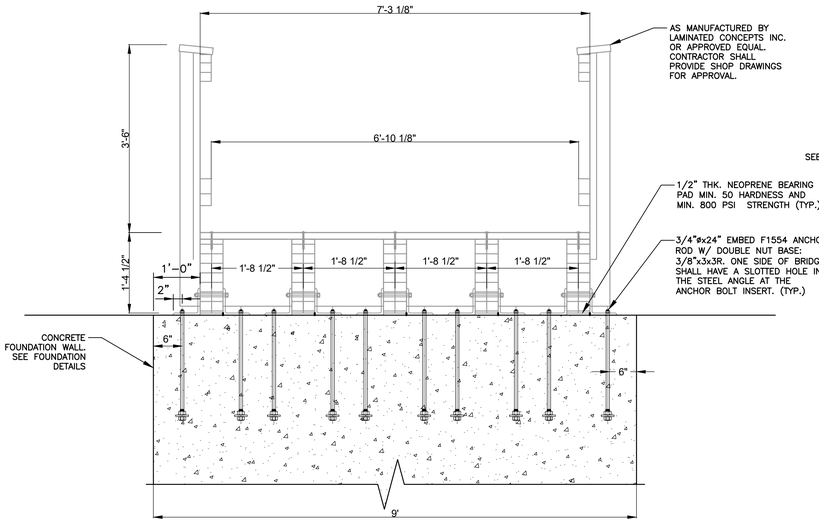
   3.1 PRESERVATIVE TREATMENT CERTIFICATION IS REQUIRED AND SHALL BE FURNISHED BY A CERTIFIED AWPA TREATING FACILITY.

4. STRUCTURAL DESIGN

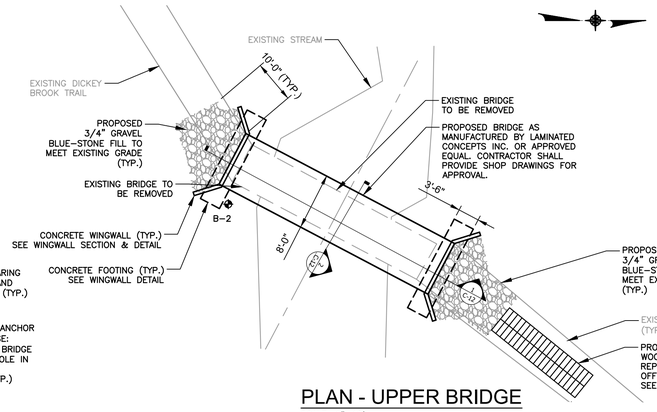
   THE BRIDGE SHALL BE DESIGNED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AS ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO).

   4.1 THE STRUCTURE SHALL BE DESIGNED FOR THE FOLLOWING LOADS AND DIMENSIONS:
   - 4.1.1 DEAD LOAD (TIMBER 50 PCF)
   - 4.1.2 LIVE LOAD 100 PSF, 20 PSF SNOW LOAD
   - 4.1.3 WET–STRESS DESIGN VALUES SHALL BE USED WHEN APPLICABLE
   - 4.1.4 LIVE LOAD DEFLECTION (L/425)
   - 4.1.5 OVERALL LENGTH OF SPAN BRIDGE: 33'–0"(FT)
   - 4.1.6 OVERALL ROADWAY WIDTH BRIDGE: 8'–0"(FT)
   - 4.1.7 SKEW 0 (DEGREES)

1



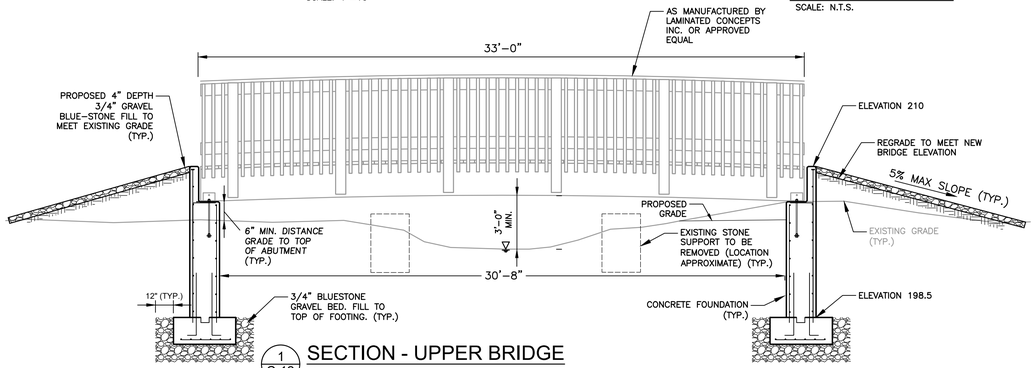
2 C-12 SECTION - UPPER BRIDGE
SCALE: 3/4"= 1'



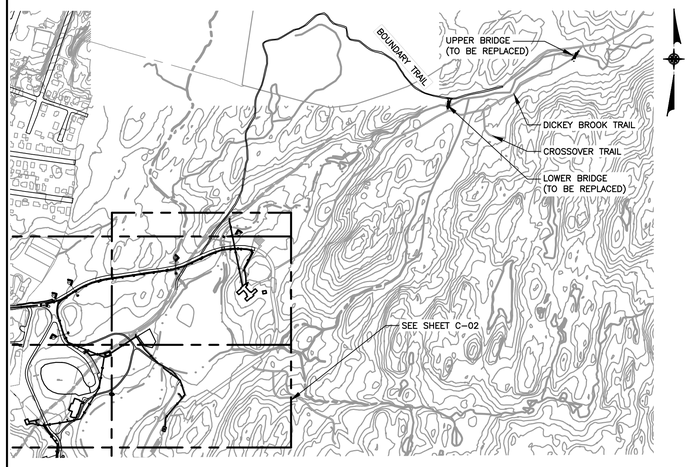
PLAN - UPPER BRIDGE
SCALE: 1"=10'

DEPTH	Sample Number	Sample Type	BLOW COUNTS per 6 inches	"N" Value
1	1	SS	WOH	WOH
2				
3	2	SS	6-2-4-3	6
4				
5	3	SS	4-6-9-12	15
6				
7	4	SS	7-15-7-3	22
8				
9	5	SS	3-2-1-2	3
10				
11	6	SS	10-8-6-4	14
12				
13	7	SS	4-4-10-12	14
14				
15	8	SS	18-7-5-3	12
16				
17	9	SS	6-30-54-58	84
18				
19	10	SS	44-40-7-4	47
20				

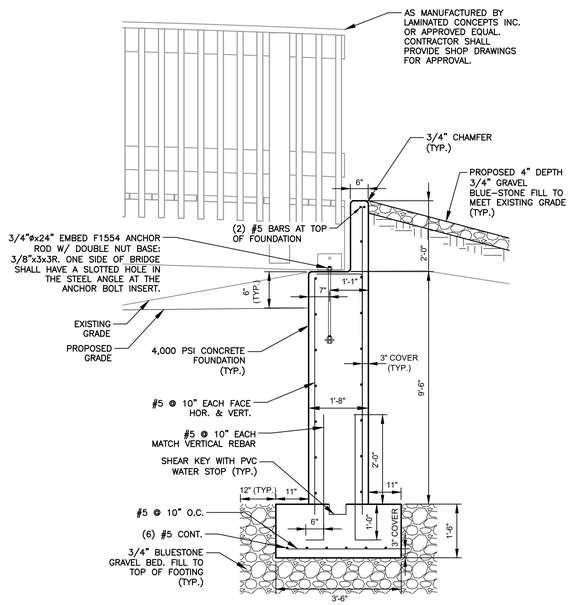
BORING B-2 LOG
SCALE: N.T.S.



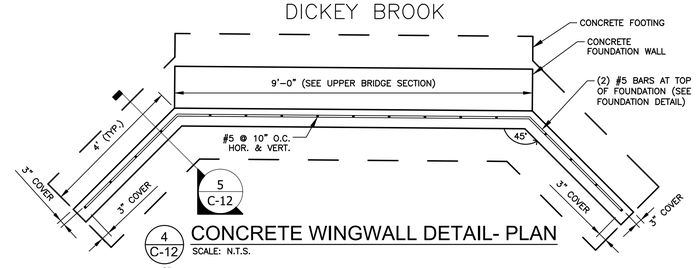
1 C-12 SECTION - UPPER BRIDGE
SCALE: 1"=4'



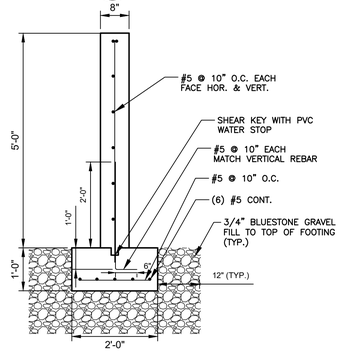
BRIDGE LOCATION MAP
SCALE: NTS



3 C-12 FOUNDATION DETAIL (UPPER BRIDGE)
SCALE: 1"=25'



4 C-12 CONCRETE WINGWALL DETAIL- PLAN
SCALE: N.T.S.



5 C-12 CONCRETE WINGWALL SECTION
SCALE: N.T.S.

FOUNDATION WALL NOTES
1. ANCHOR BOLTS SHALL BE INSTALLED 6" MIN. FROM THE OUTER EDGE OF FOUNDATION
2. ONE SIDE OF BRIDGE SHALL HAVE A SLOTTED HOLE IN THE STEEL ANGLE AT THE ANCHOR BOLT INSERTS.
3. ANY VOIDS, OBSTACLES, OR ORGANIC MATERIAL ENCOUNTERED DURING EXCAVATION AND FOUNDATION INSTALLATION SHALL BE REMOVED AND REPLACED WITH COMPACTED SELECT FILL APPROVED BY THE ENGINEER.
4. ACTUAL LOCATION OF BRIDGE TO BE DETERMINED IN THE FIELD AS PER APPROVAL OF OWNER AND ENGINEER.
5. WINGWALL DEPTH WILL BE 4' BELOW GRADE.
6. WINGWALL WILL BE EMBEDDED IN VIRGIN SOIL.

ALTERNATE BID ITEM 2

D&B ENGINEERS AND ARCHITECTS, P.C.
4 WEST RED OAK LANE
WHITE PLANES, NY, 10604
(914) 467–5300

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BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
CIVIL
BRIDGE PLANS, SECTIONS AND DETAILS 2

CONTRACT NUMBER 17–519
SHEET NUMBER C–12
SHEET NO. 16 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24–86–G–19
REV. NO. 1

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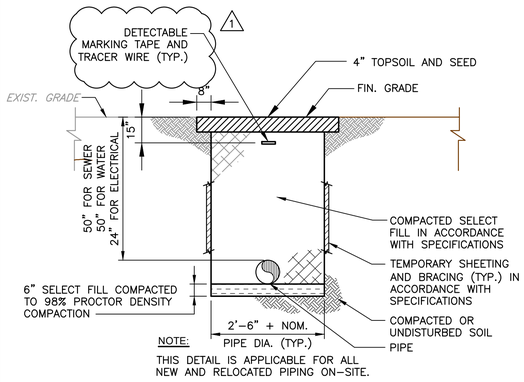
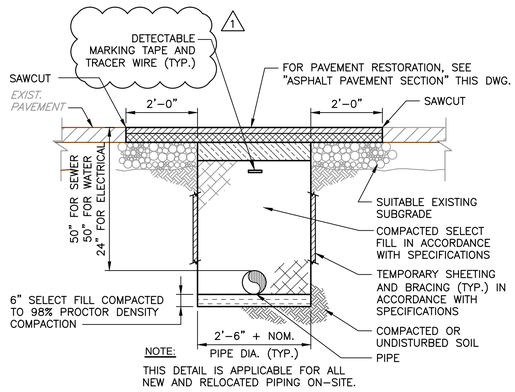
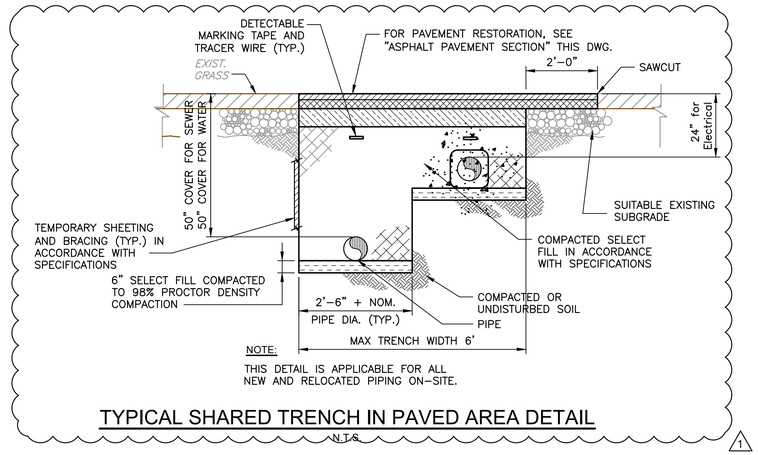


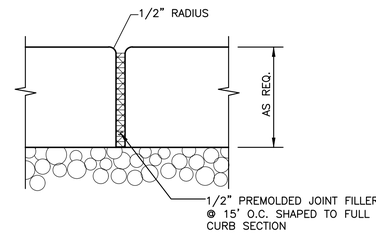
TYPICAL TRENCH DETAIL
N.T.S.



TYPICAL TRENCH IN PAVED AREA DETAIL
N.T.S.



TYPICAL SHARED TRENCH IN PAVED AREA DETAIL
N.T.S.



EXPANSION JOINT DETAIL
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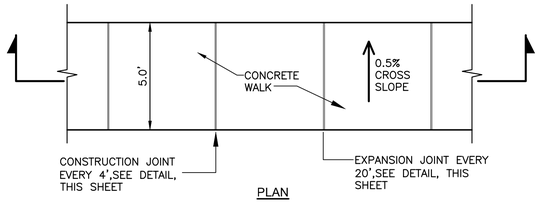
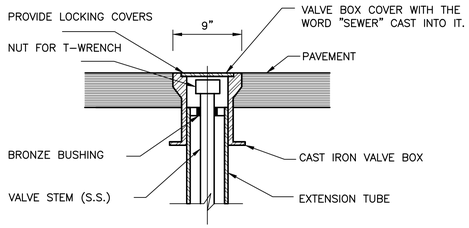


CONCRETE SIDEWALK DETAIL
N.T.S.



VALVE BOX COVER IN PAVEMENT
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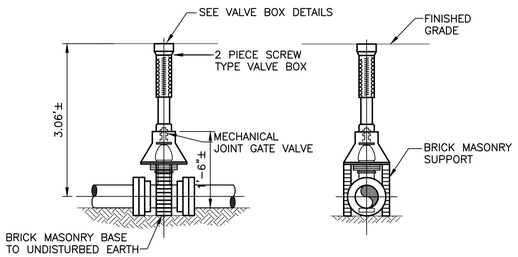

TYPICAL BURIED GATE VALVE DETAIL
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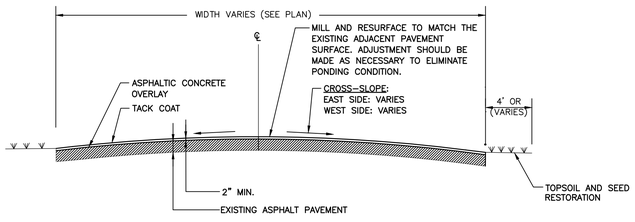
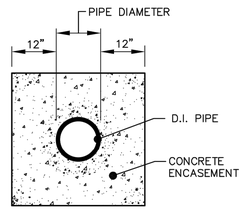
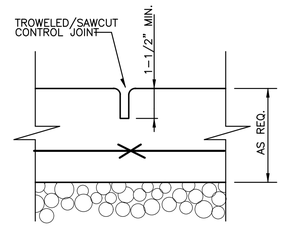


TYPICAL ASPHALT PAVEMENT RESURFACING SECTION
N.T.S.



END VIEW



CONSTRUCTION JOINT
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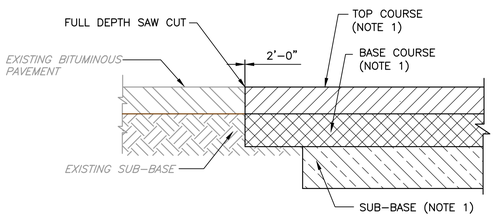
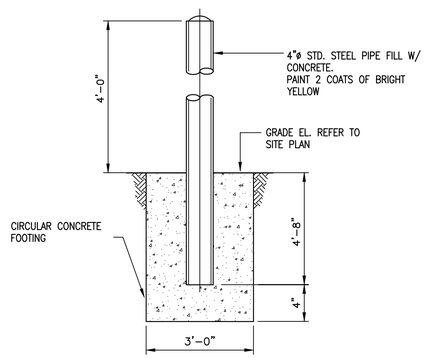
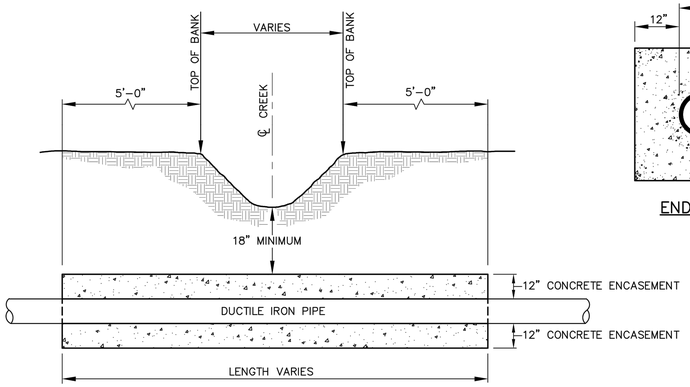


NOTE:
1. SEE ASPHALT PAVEMENT SECTION.

PAVING ADJACENT TO EXISTING PAVEMENT
N.T.S.



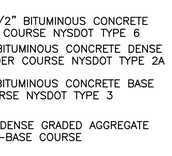
4"Ø BOLLARD DETAIL
N.T.S.



CROSS SECTION

NOTES:
1. CONCRETE SHALL BE 3000 P.S.I.
2. CONCRETE ENCASEMENT NOT REQUIRED WHEN PIPE IS AT LEAST THREE (3) FEET UNDER CENTERLINE OF CREEK BOTTOM

TYPICAL CONCRETE ENCASEMENT FOR STREAM CROSSING
N.T.S.



ASPHALT PAVEMENT SECTION
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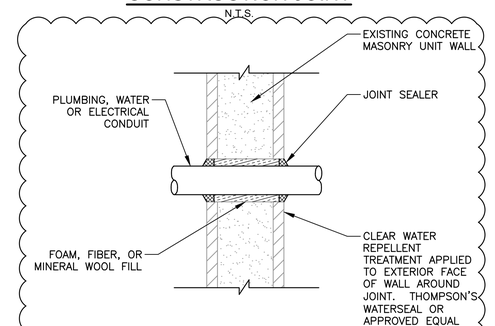

CMU WALL PENETRATION DETAIL
N.T.S.

1

D&B ENGINEERS AND ARCHITECTS, P.C.
4 WEST RED OAK LANE
WHITE PLAINS, NY, 10604
(914) 467-5300

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DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
CIVIL
SITE DETAILS NO. 1

CONTRACT NUMBER	SHEET NUMBER
17-519	C-14

SHEET NO. 18 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-21
REV. NO. 1

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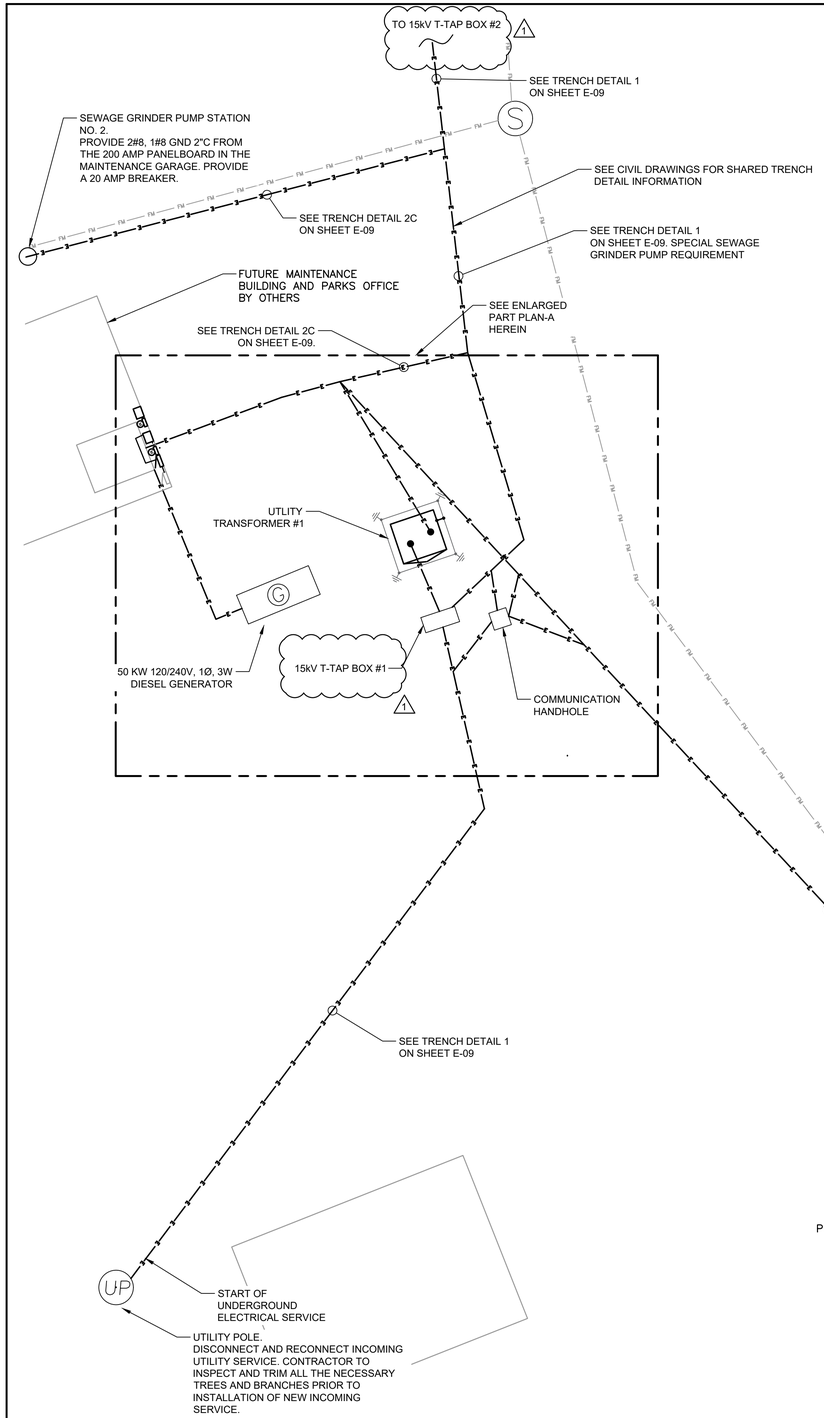
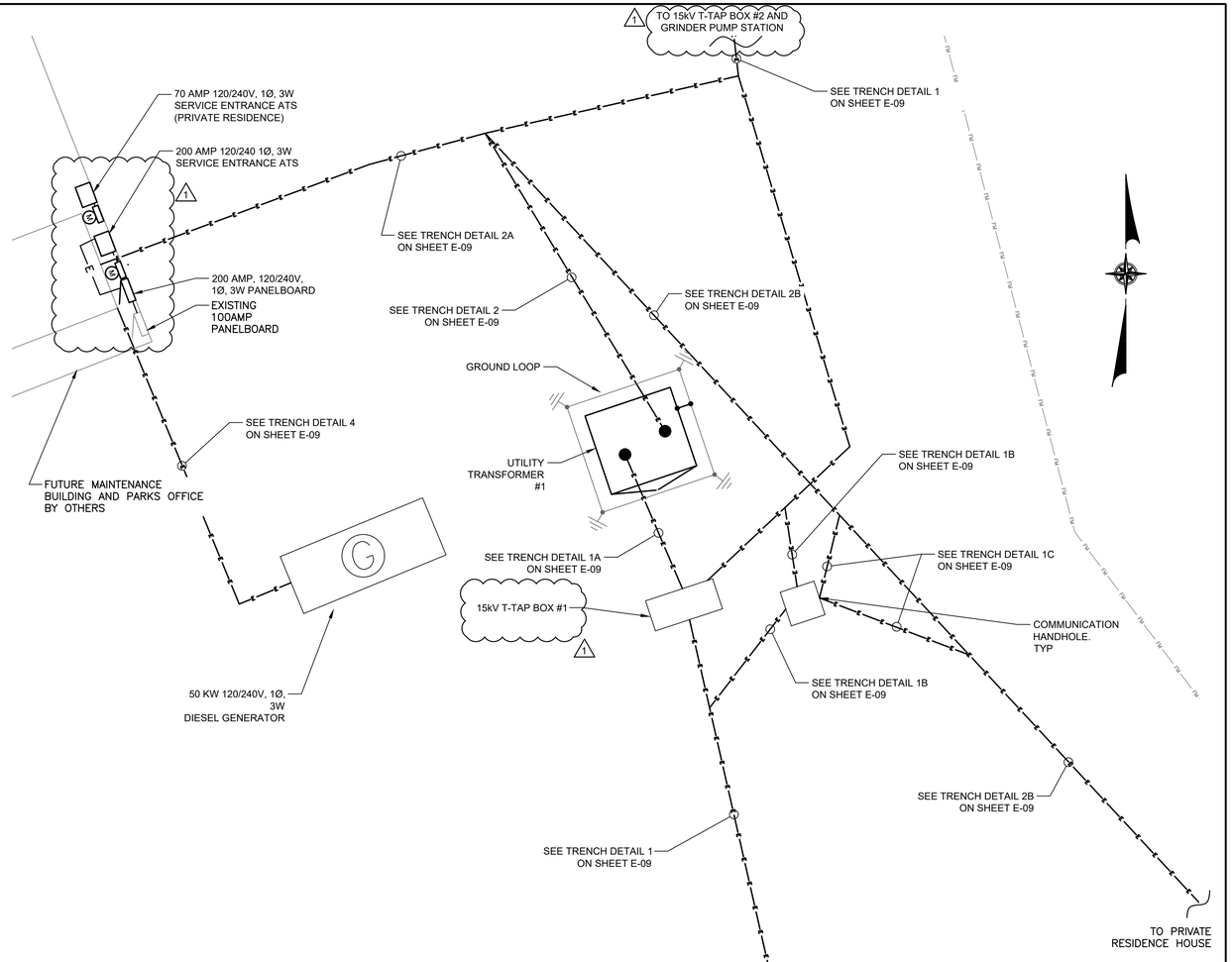


MAINTENANCE GARAGE AND PRIVATE RESIDENCE POWER PLAN

SCALE: 1" = 10'-0"



MAINTENANCE GARAGE POWER PART PLAN -A

SCALE: 1" = 5'-0"

10 0 10 20
SCALE IN FEET
(1"=10')

5 0 5 10
SCALE IN FEET
(1"=5')

LYNSTAAR
ENGINEERING, P.C.
CIVIL - PLUMBING - ELECTRICAL - MECHANICAL
12 Water Street Suite 202, White Plains, New York 10601
914-741-1290 (tel) 914-741-1253 (fax) www.lynstaar.com

CONSULTANT SEAL
STATE OF NEW YORK
GARRY R. LYNCH
55526
LICENSED PROFESSIONAL ENGINEER

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MADE BY GD

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1	06/09/2021	GD	LSE	ISSUED WITH BID ADDENDUM #3

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☐ AS BUILT – NO CHANGES

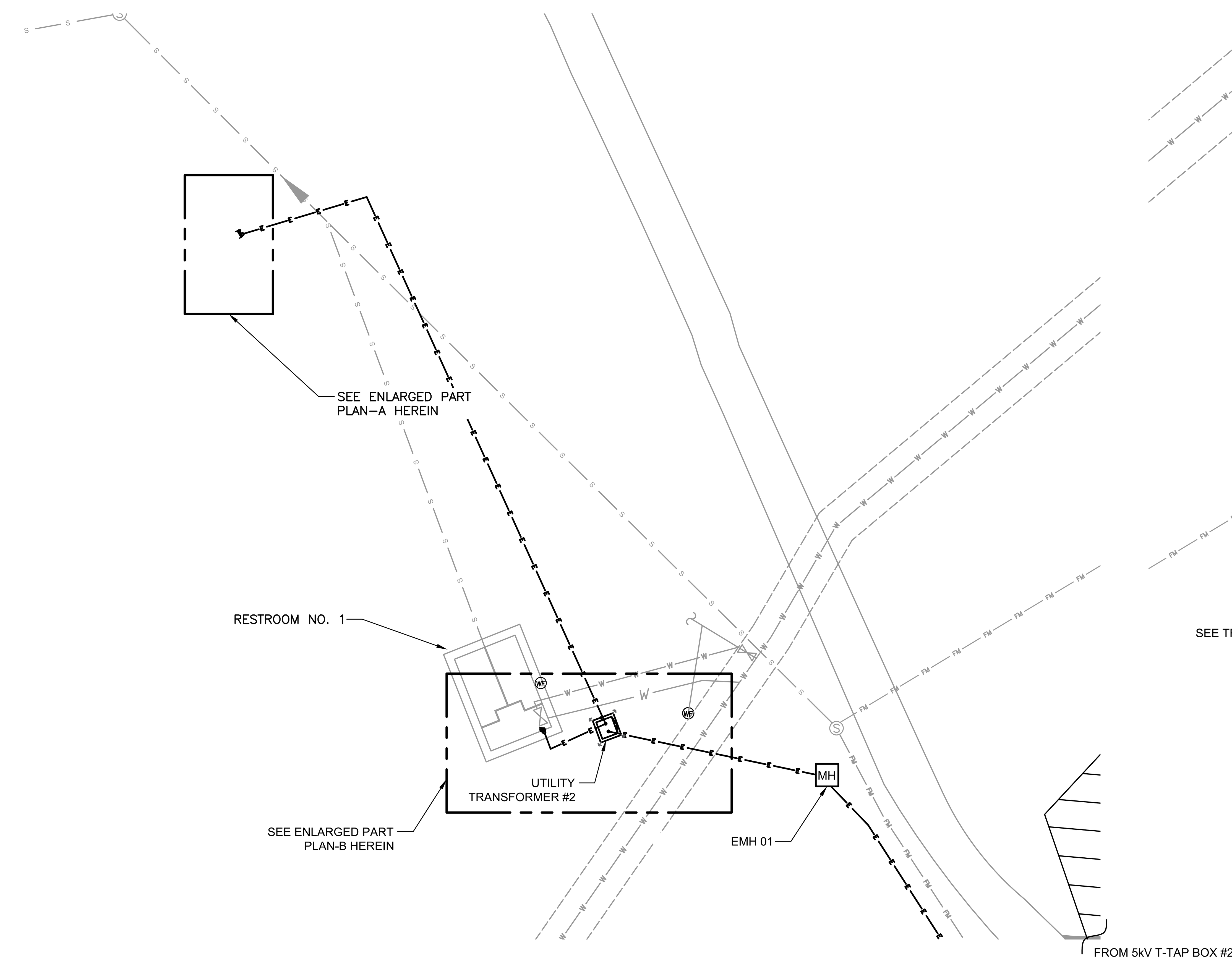
CONTRACTOR
NAME
SIGNATURE
TITLE DATE

PROJECT COORDINATOR
NAME
SIGNATURE
TITLE DATE

WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

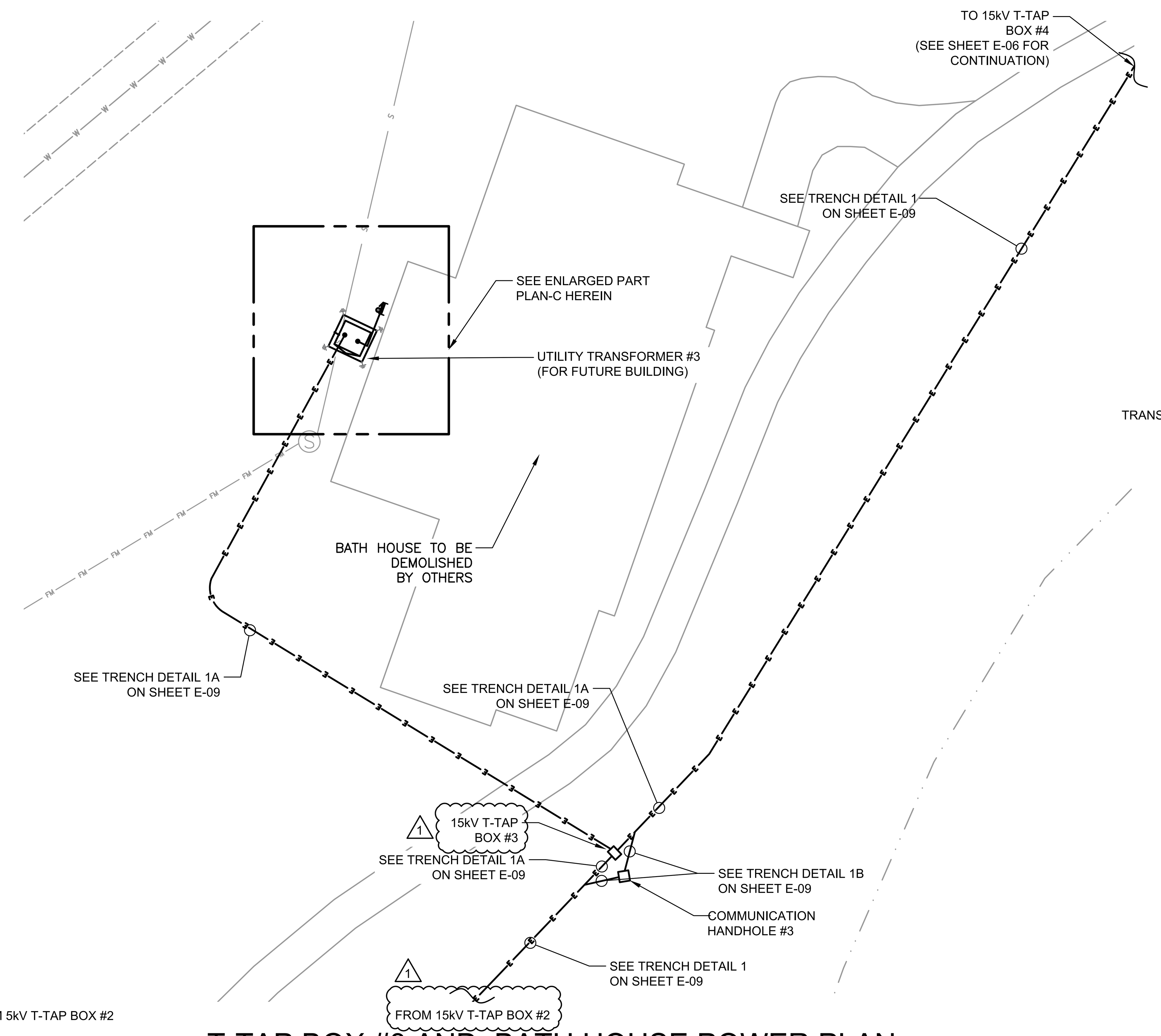
BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
MAINTENANCE GARAGE AND RESIDENCE AND POWER PLANS

CONTRACT NUMBER 17-519
SHEET NUMBER E-04
SHEET NO. 25 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-28
REV. NO. 1



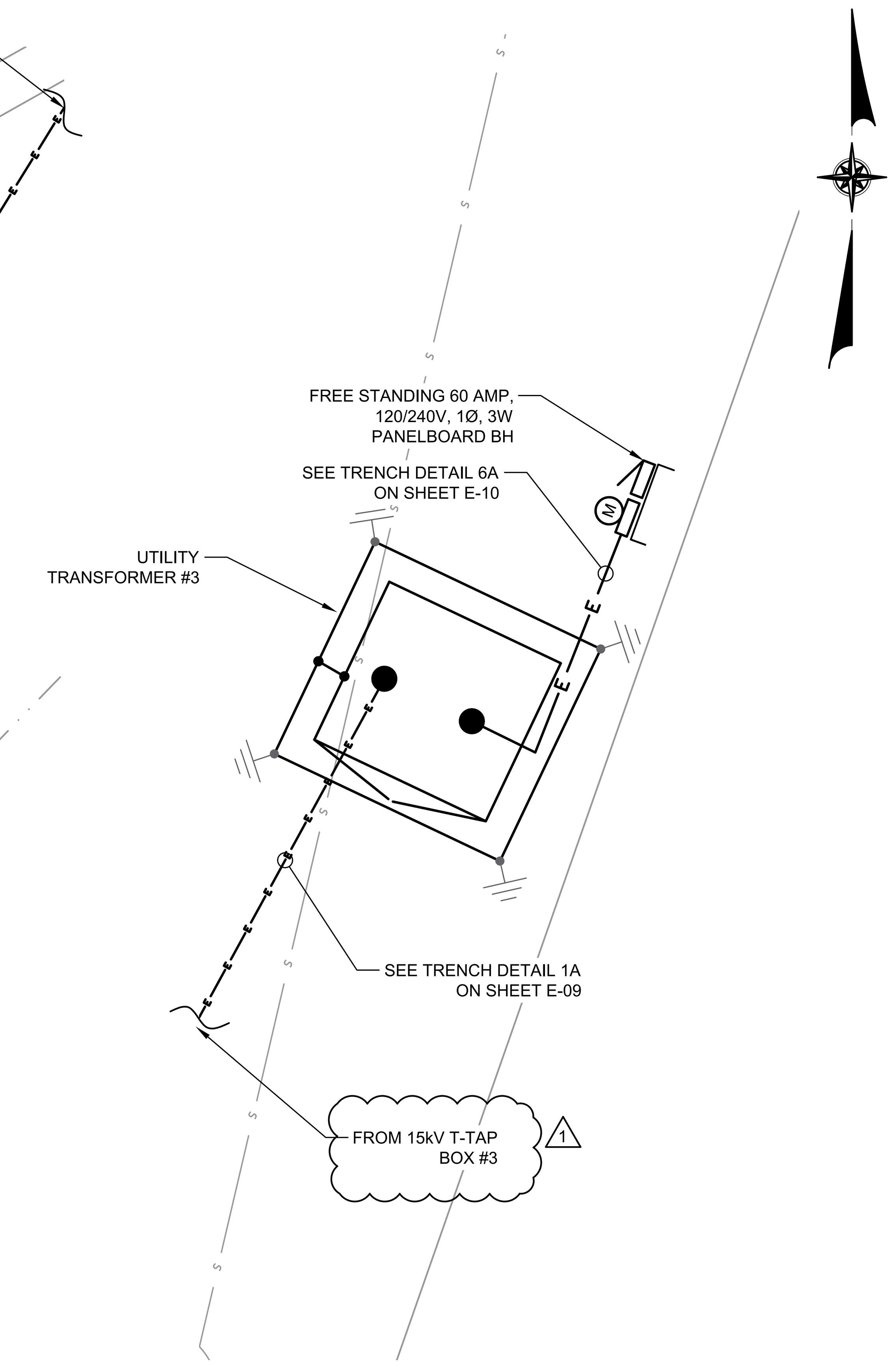
RESTROOM NO.1 POWER PLAN

SCALE: 1" = 20'-0"



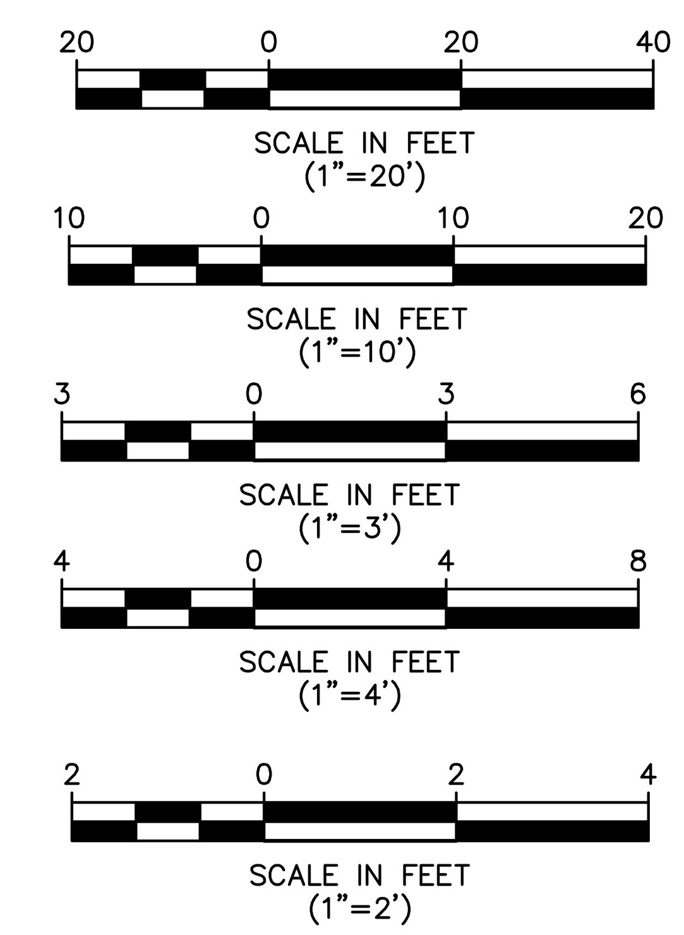
T-TAP BOX #3 AND BATH HOUSE POWER PLAN

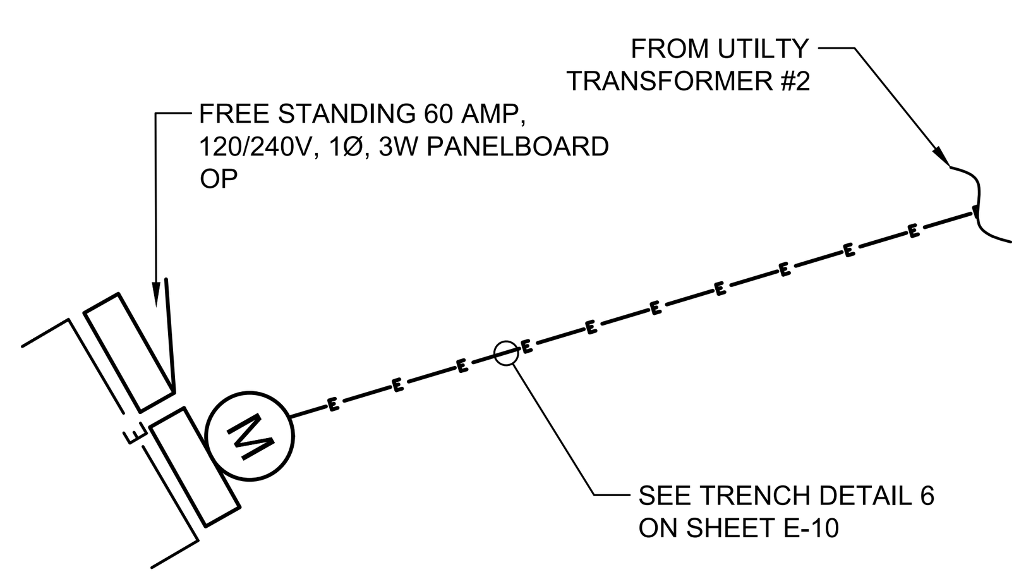
SCALE: 1" = 10'-0"



BATH HOUSE POWER PART PLAN-C

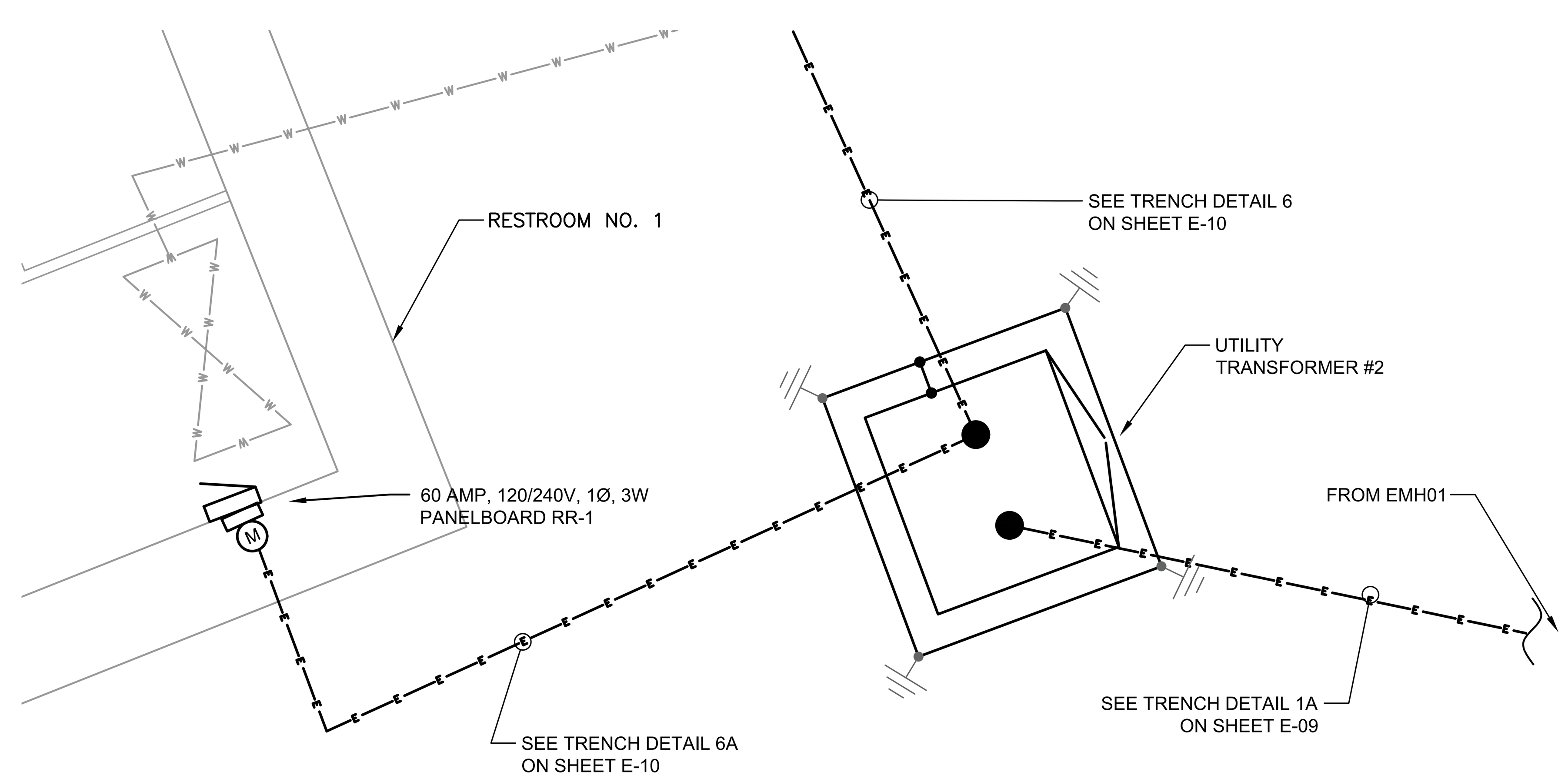
SCALE: 1" = 4'-0"





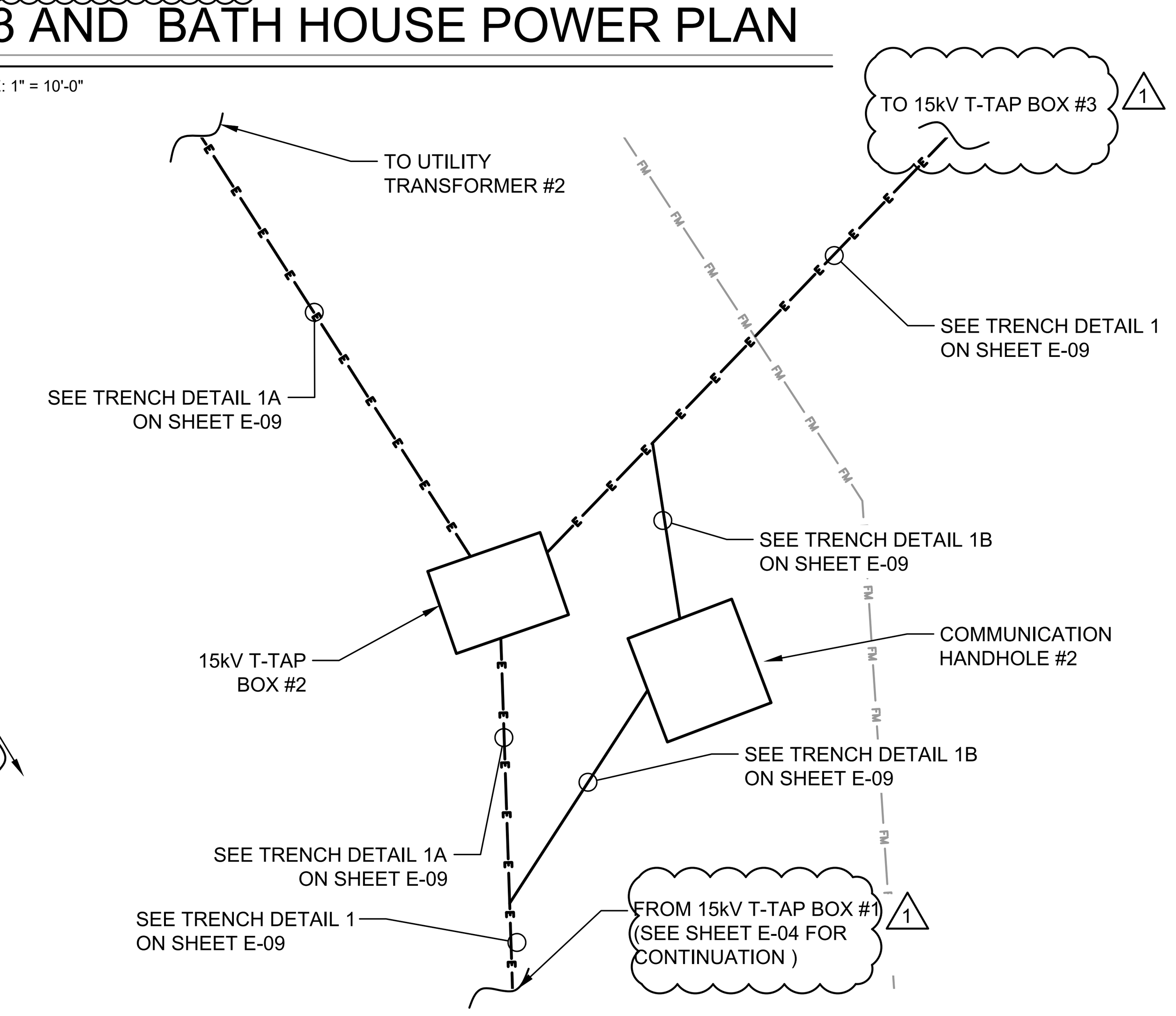
OPEN FIELD POWER PART PLAN-A

SCALE: 1" = 2'-0"



RESTROOM NO.1 POWER PART PLAN-B

SCALE: 1" = 4'-0"



T-TAP BOX #2 POWER PART

SCALE: 1" = 3'-0"

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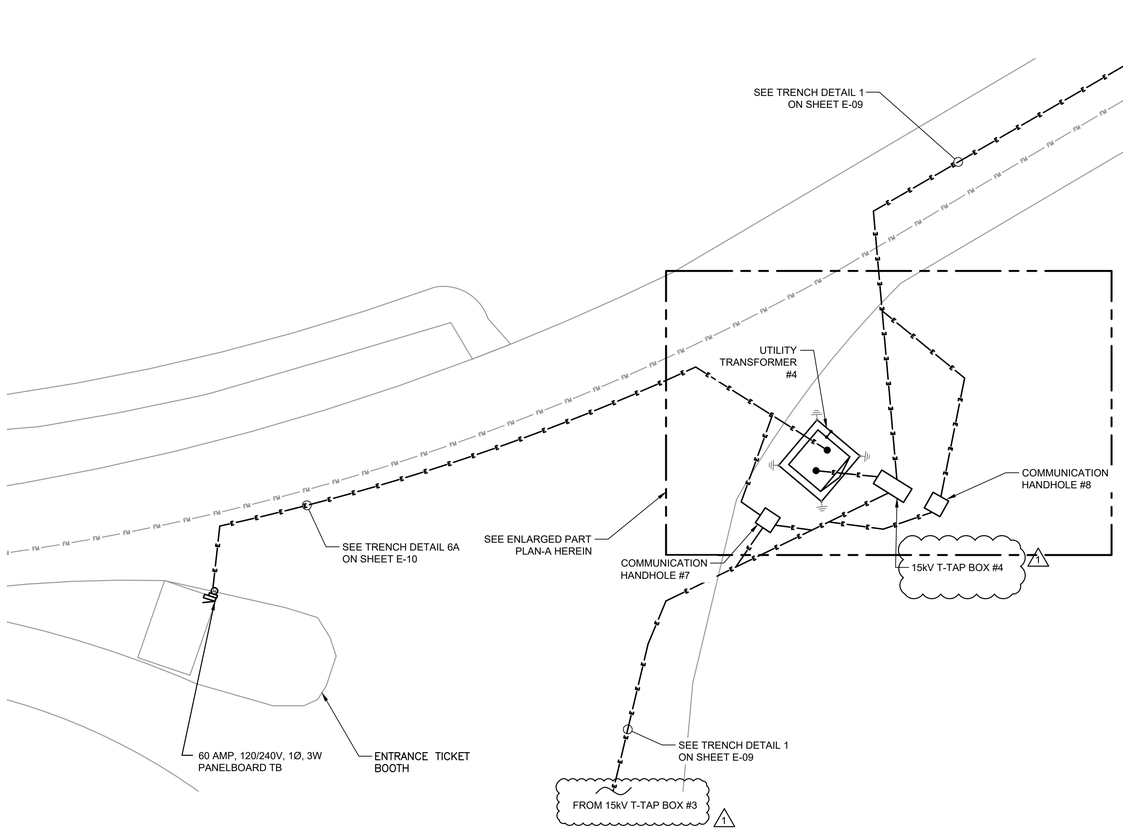
CONTRACTOR	PROJECT COORDINATOR
NAME	NAME
SIGNATURE	SIGNATURE
TITLE DATE	TITLE DATE

WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

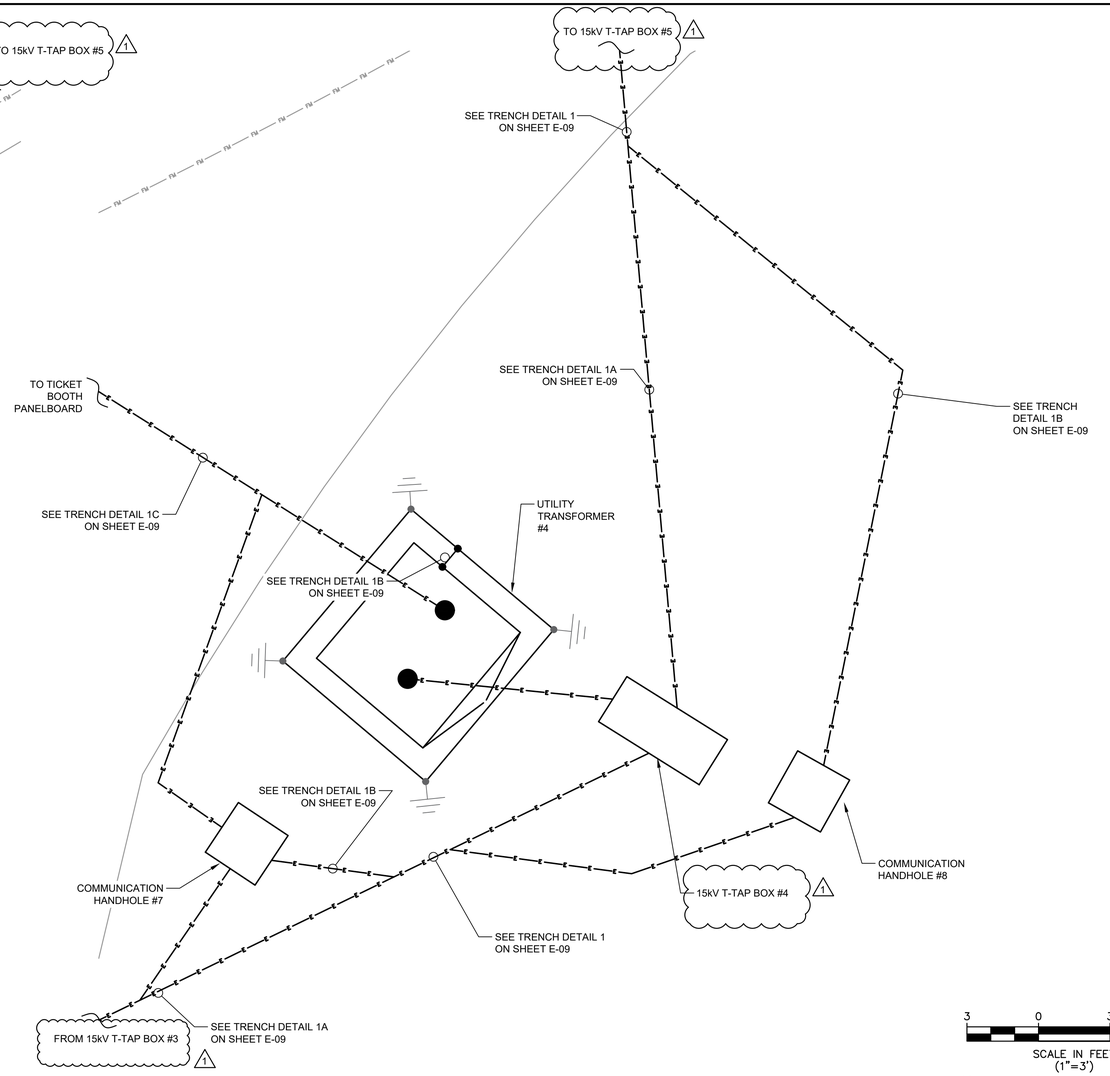
BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
RESTROOM NO. 1 AND BATH HOUSE POWER PLANS

CONTRACT NUMBER 17-519
SHEET NUMBER E-05
SHEET NO. 26 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-29
REV. NO. 1



ENTRANCE TICKET BOOTH POWER PLAN

SCALE: 1" = 10'-0"



TRANSFORMER #4 AND T-TAP #4 BOX POWER PART PLAN-A

SCALE: 1" = 3'-0"

3 0 3 6
SCALE IN FEET
(1"=3')

10 0 10 20
SCALE IN FEET
(1"=10')

10 0 10 20
SCALE IN FEET
(1"=10')

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STATE OF NEW YORK
GARRY A. LYNCH
2005
LICENSED PROFESSIONAL ENGINEER

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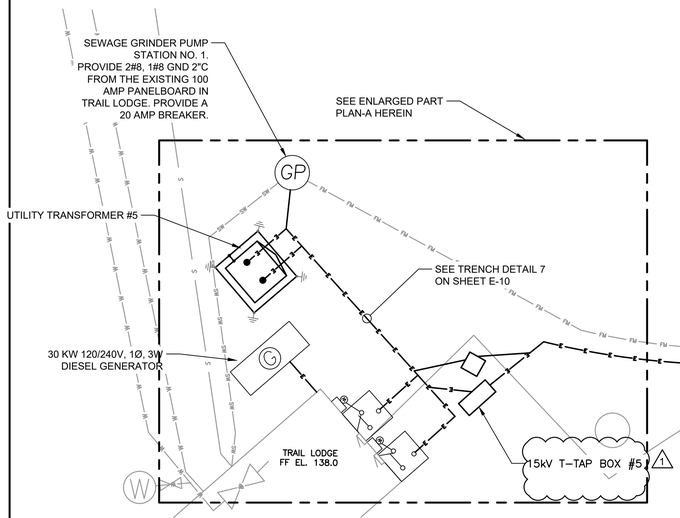
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

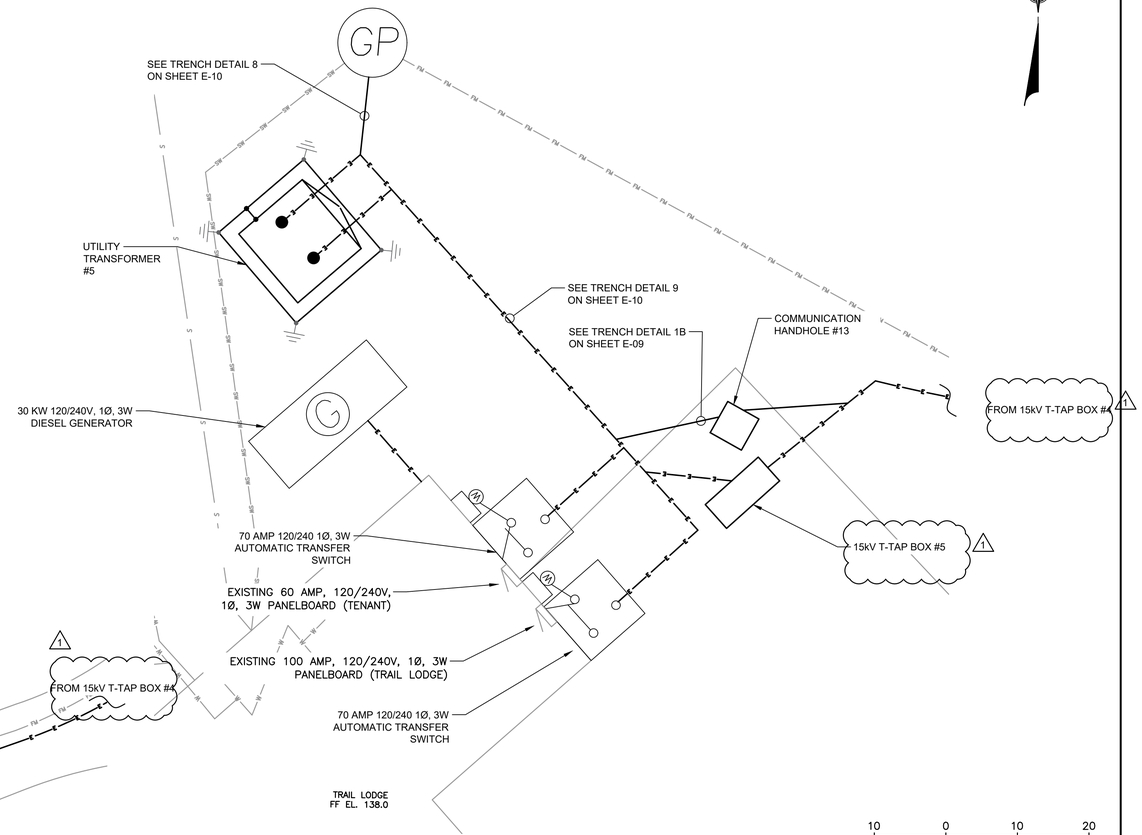
BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
ENTRANCE TICKET BOOTH POWER PLANS

CONTRACT NUMBER	SHEET NUMBER
17-519	E-06
SHEET NO. 27 OF 35	
SCALE: AS NOTED DATE: APRIL 2021	
DPW FILE NO. 24-86-G-30	REV. NO. 1



TRAIL LODGE POWER PLAN

SCALE: 1" = 10'-0"



TRAIL LODGE POWER PART PLAN-A

SCALE: 1" = 5-0"

10 0 10 20
SCALE IN FEET (1"=10')

5 0 5 10
SCALE IN FEET (1"=5')

10 0 10 20
SCALE IN FEET (1"=10')

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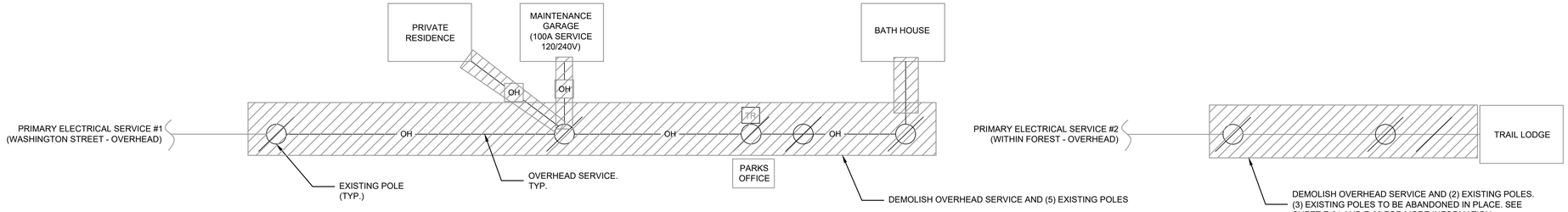
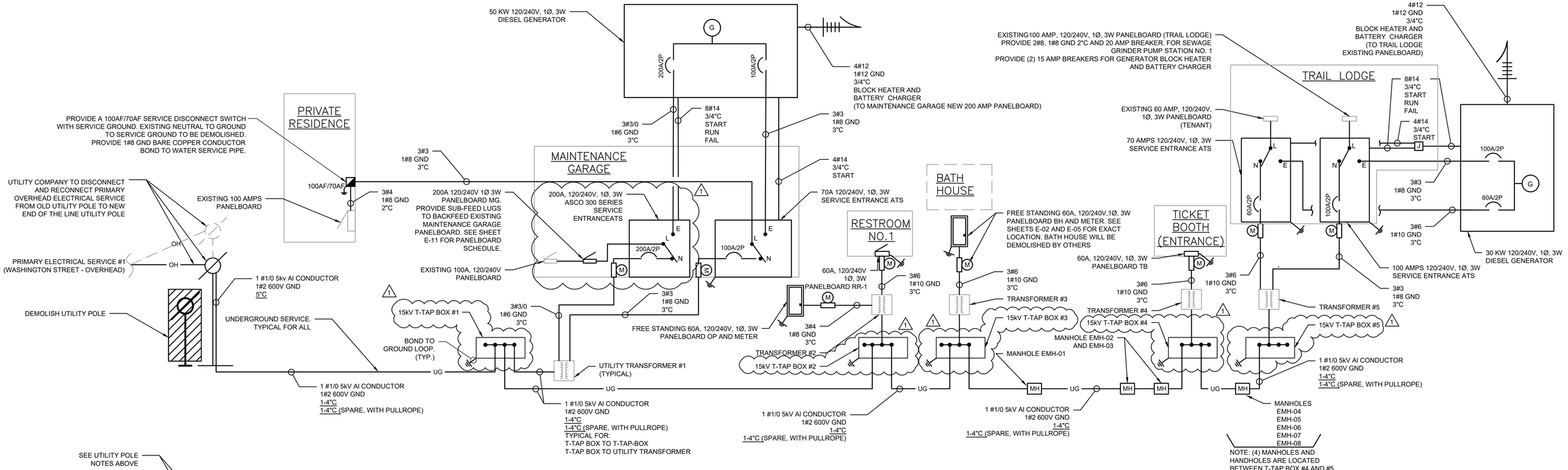
BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
TRAIL LODGE POWER PLAN

CONTRACT NUMBER 17–519
SHEET NUMBER E–07
SHEET NO. 28 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24–86–G–31
REV. NO. 1



EXISTING POWER SINGLE LINE DIAGRAM

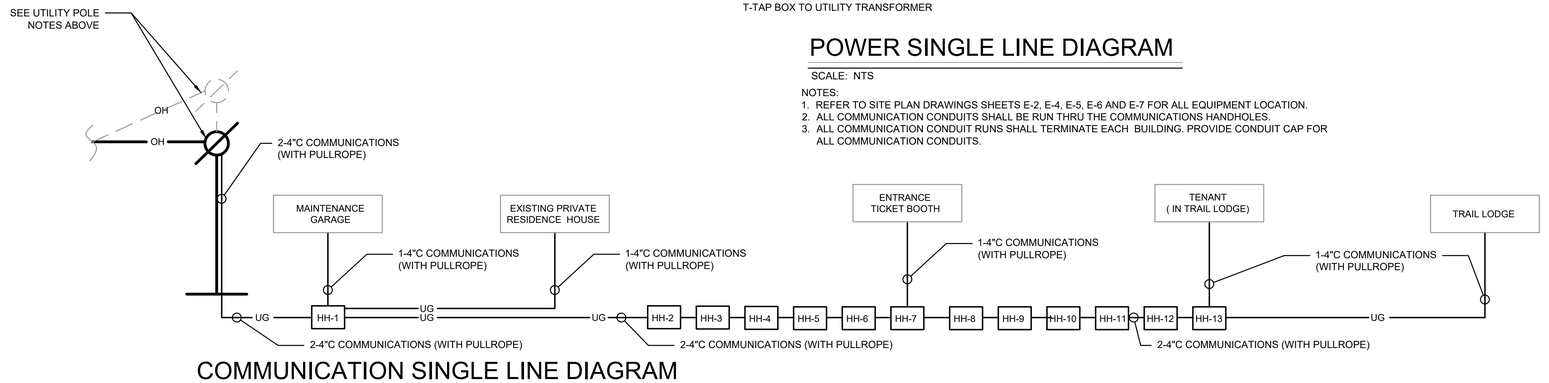
SCALE: NTS



POWER SINGLE LINE DIAGRAM

SCALE: NTS

NOTES:
1. REFER TO SITE PLAN DRAWINGS SHEETS E-2, E-4, E-5, E-6 AND E-7 FOR ALL EQUIPMENT LOCATION.
2. ALL COMMUNICATION CONDUITS SHALL BE RUN THRU THE COMMUNICATIONS HANDHOLES.
3. ALL COMMUNICATION CONDUIT RUNS SHALL TERMINATE EACH BUILDING. PROVIDE CONDUIT CAP FOR ALL COMMUNICATION CONDUITS.



COMMUNICATION SINGLE LINE DIAGRAM

SCALE: NTS

NOTES:
1. ALL COMMUNICATION CONDUITS SHALL BE RUN THRU THE COMMUNICATIONS HANDHOLES.
2. ALL COMMUNICATION CONDUIT RUNS SHALL TERMINATE EACH BUILDING. PROVIDE CONDUIT CAP FOR ALL COMMUNICATION CONDUITS.

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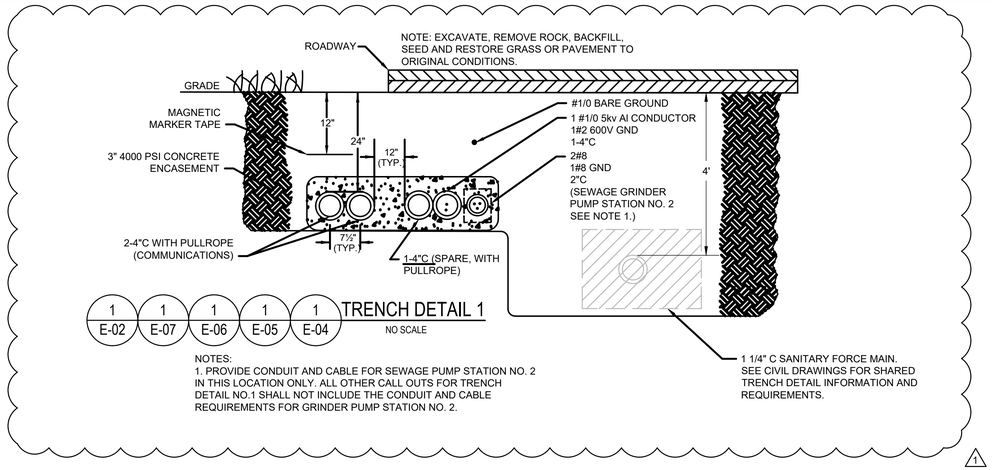
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
POWER AND COMMUNICATION SINGLE LINE DIAGRAM

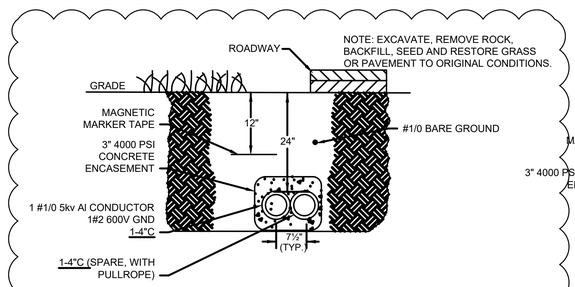
CONTRACT NUMBER 17-519
SHEET NUMBER E-08
SHEET NO. 29 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-32
REV. NO. 1



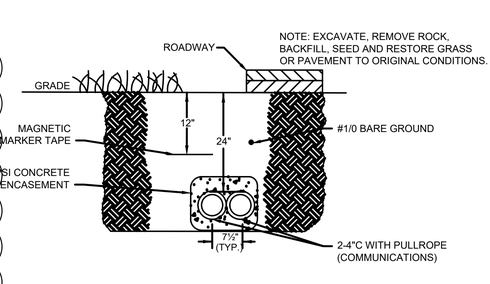
1 E-02 | 1 E-07 | 1 E-06 | 1 E-05 | 1 E-04 — TRENCH DETAIL 1 — NO SCALE

NOTES:
1. PROVIDE CONDUIT AND CABLE FOR SEWAGE PUMP STATION NO. 2 IN THIS LOCATION ONLY. ALL OTHER CALL OUTS FOR TRENCH DETAIL NO.1 SHALL NOT INCLUDE THE CONDUIT AND CABLE REQUIREMENTS FOR GRINDER PUMP STATION NO. 2.

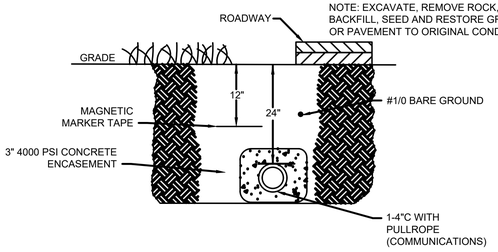
1



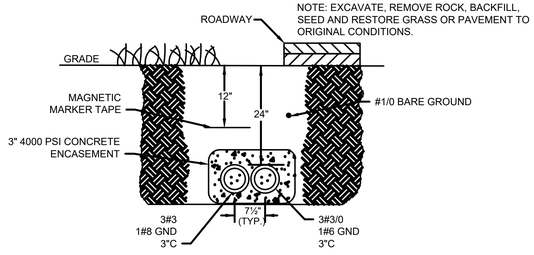
1A E-04 — TRENCH DETAIL 1A — NO SCALE



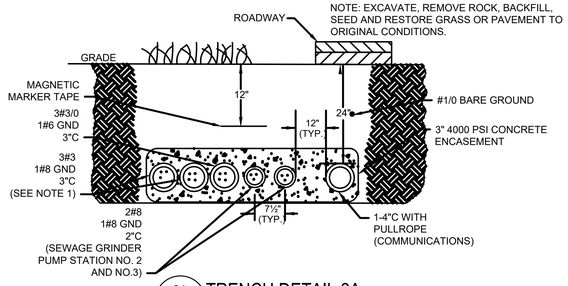
1B E-04 — TRENCH DETAIL 1B — NO SCALE



1C E-04 — TRENCH DETAIL1C — NO SCALE

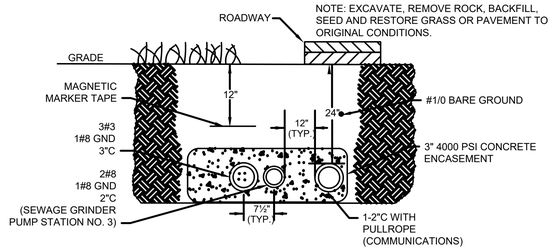


2 E-04 — TRENCH DETAIL 2 — NO SCALE

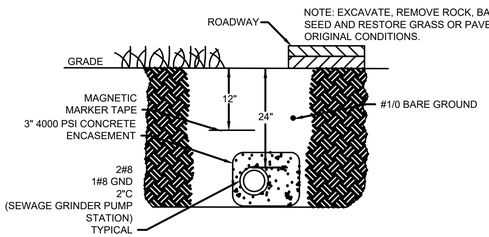


2A E-04 — TRENCH DETAIL 2A — NO SCALE

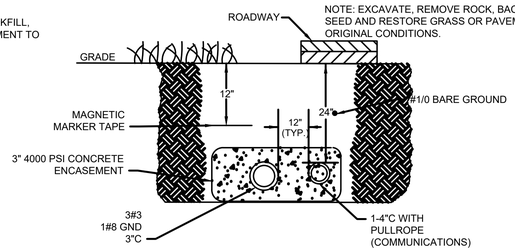
NOTES:
1. ONE 3" CONDUIT IS FROM THE UTILITY TRANSFORMER #1 TO METER AND THE OTHER 3" CONDUIT IS FROM ATS LOAD SIDE TO PRIVATE RESIDENCE.



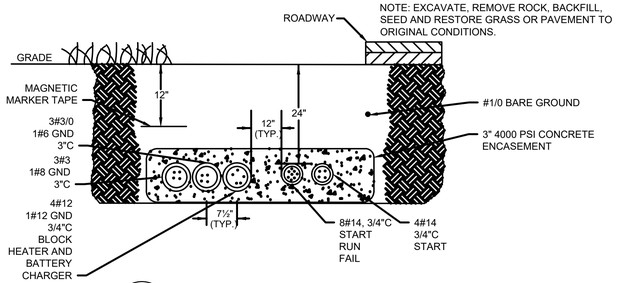
2B E-04 — TRENCH DETAIL 2B — NO SCALE



2C E-04 — TRENCH DETAIL 2C — NO SCALE



3 E-04 — TRENCH DETAIL 3 — NO SCALE



4 E-04 — TRENCH DETAIL 4 — NO SCALE

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WESTCHESTER COUNTY, NEW YORK
DEPARTMENT OF PUBLIC WORKS & TRANSPORTATION
DIVISION OF ENGINEERING

BLUE MOUNTAIN RESERVATION SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT, CITY OF PEEKSKILL, NY
ELECTRICAL
TRENCH DETAILS I

CONTRACT NUMBER 17-519
SHEET NUMBER E-09
SHEET NO. 30 OF 35
SCALE: AS NOTED
DATE: APRIL 2021
DPW FILE NO. 24-86-G-33
REV. NO. 1

BIDDER QUESTIONS AND RESPONSES

COUNTY OF WESTCHESTER
NEW YORK

DIVISION OF ENGINEERING

CONTRACT NO. 17-519

BLUE MOUNTAIN RESERVATION
SITE WORK IMPROVEMENTS
TOWN OF CORTLANDT AND CITY OF PEEKSKILL, NEW YORK

The attention of all bidders is directed to the following responses to questions with regards to the above referenced Contract. These responses are presented for information purposes only and are not intended to modify the Contract. All provisions of the Contract remain in full force and effect. Where modification is required, the bidder's attention is directed to the addenda.

QUESTION NUMBER	QUESTION	RESPONSE
1	QUESTION: Could ConEd's service layout be provided in order to verify the location of the new service pole?	ConEd Service layout shall be provided once received from ConEd. Case has been submitted.
2	QUESTION: Could a cut sheet or model number be provided for the ConEd provided transformers in order to verify dimensions for the pad layout?	ConEd to provide transformer size information once service layout is completed.
3	QUESTION: Is the spare 4" Conduit that is to be installed with the primary conduit also a 4" HDPE conduit?	Yes, 4"C spare shall be HDPE. It is considered as a service rated spare conduit for future upgrades to service. See specification Section 26 05 10-3.03(C).
4	QUESTION: I see the contractor is to have 540 consecutive calendar days to complete the work, but I have not seen the liquidated damages amount. Could we be provided with the amount per day?	There are no liquidated damages included in the contract.
5	QUESTION: For Sewer MH03, strictly the pumps are being replaced in the existing wet well and connected to the existing piping? There are no other upgrades to the pump station required as of now?	Yes, only the pumps will be replaced in Sewer MH03.
6	QUESTION: Could you provide the model number of E one pumps that will be approved for the project?	The E/One pump model numbers have been added to the revised specification Section 33 32 16.
7	QUESTION: When the water fountains are relocated, are the water service lines they are connected to going to come from the plumbing on the inside of the restrooms?	Yes, the contractor shall tee off the existing exposed water service inside the restrooms and penetrate the wall. See the new "CMU wall penetration detail" on sheet C-14.
8	QUESTION: Is the spare 4" HDPE conduit required to be installed the entire length of underground electrical trench from the utility pole to the lodge?	Yes, the spare HDPE conduit is required to be installed throughout. See Spec Section 26 05 10-3.03(c). 5KV AL shall be used for service wiring.

9	QUESTION: The conduit from Transformer to meter is indicated as 3" which Con Edison requires to be HDPE. This material is not available in 3". Please advise what size conduit should be run?	3" HDPE is available from a variety of manufacturers and suppliers.
10	QUESTION: Are expansion fittings required to be installed in all rigid galvanized riser runs to the electrical meters?	Yes, expansion fittings are required in all rigid galvanized riser runs to the electrical meters. See Spec Section 26 05 33-3.2(L).
11	QUESTION: Please detail the 1/0 Bare Ground wire which is being installed in the trench connection points.	Refer to ConEd service layout, once provided.
12	QUESTION: Are driven grounds required at each new panel location?	Yes, driven grounds are required at each new service panel location, if water main is not available. Refer to sheet E-08 for ground rod locations.
13	QUESTION: Where is the ground wire from the transformer to the meter to be connected?	Refer to utility service layout standards once provided by ConEd. Provide (4) service rated A.T.S 200A. A.T.s in maintenance garage shall be replaced to match all service entrance transfer switches refer to drawing E-08.
14	QUESTION: Drawing C-07- Could you delineate the type of pavement to be restored, once the excavation for the electrical conduit & force main is performed?	See "Asphalt Pavement Section" on sheet C-14.
15	QUESTION: Drawing C-14 – Trench detail force main & electrical conduit, call for restore pavement up to 10' wide on the roadway. Some of the road are 12' to 18' wide. How can we maintain the integrity of the remaining asphalt with we are removing up to 80% of the existing asphalt?	See revised "Typical Shared Trench in Paved Area Detail" on sheet C-14.
16	QUESTION: Will a master plumber be required to perform the water connections?	Yes, a licensed master plumber will be required.
17	QUESTION: Will the name of the plumbing & Electrical sub need to be submitted with the bid on a separated envelope?	No
18	QUESTION: Drawing E-06– Could you clarify the trench Details for the trenches leading to Handhole # 7, #8 & Between Utility Transformer # 4 & 5kv Tap Box?	See Transformer #4 and T-Tap #4 box power part plan-A on sheet E-06 for routing of communication/power runs. Also refer to E-08.
19	QUESTION: Drawing E-07 – Could you clarify the trench Details for the trenches leading to Utility Transformer # 5, 30k Diesel Genset, Transfer Switch & 5KV Tap Box 5?	See Part plan on E-07 and refer to single line on E-08 for clarification.
20	QUESTION: Can the excavated material be reused as backfill?	Yes, if approved as suitable fill by the engineer, as stated in note 14 on sheet G-02.

21	QUESTION: Will the owner Allow the surplus excavated material to be left on the site?	Yes, please note the surplus excavated material stockpile location at the end of the Trail Lodge parking lot on sheet C-06.
22	QUESTION: Where the force main crosses the Stream; do we need to encase the 1-1/4 HDPE Pipe in DIP Pipe and Concrete? As per detail "typical Concrete Encasement for Stream Crossing "Drawing C-14)?	Yes.
23	QUESTION: After reviewing the specifications for the 30KW and 50KW generators for this project, it appears the specifications are also somewhat convoluted in the intent. The specifications are requesting to provide Tier 4 Generators; however, the specified generators are not Tier 4. The same specifications also state "the subtransient reactance not to exceed 7%" which is something that is not seen in the industry. Furthermore, the generator specifications exclusively request Cummings Power Generators with no other manufacturers listed, which would make Cummins Generators the sole source proprietary manufacturer for these units. The General Conditions of this project state that if a manufacturer is named it is to establish a level of standard. While we do not believe the intent was to make Cummins sole source and not violate the NYS Finance Laws, please advise what other Generator manufacturers and models were solicited and vetted by the Engineer of Record for this project in order to meet this spec, or please provide a specific allowance, which should be on the bid form, for the specified Cummins Genset units for all contractors to use for the basis of the bid.	See revised specification Sections 26 32 13 and 14.
24	QUESTION: The drawings state that the required design loading is to be the AASHTO HL93 highway loading. I am wondering if this is the load that they want on these structures?	The required design loading has been updated on the plan to match the specification. See revised note 4.1 on sheets C-11 and C-12.
25	QUESTION: Is an engineer's field office required? (It is referenced on plan, but not in specs.) If yes, please provide spec and indicate where paid.	An engineer's field office is not required, see revised note 25 on sheet G-02.

NOTE: Additional questions are still be evaluated by the County and will be responded to in a future addendum.

Also, please note that the deadline for questions was June 18th, 2021 and will not be extended further.