CITY OF PAWTUCKET

And

PAWTUCKET WATER SUPPLY BOARD

CONTRACT SPECIFICATIONS

BID No. 18-011
Well Field Electrical Power and Distribution System Upgrade

Table of Contents

Technical Specifications – Continued

Contents

CONTRACT SPECIFICATIONS

1.0 - Bid/Solicitation Information

Schedule

Pre-Bid/Proposal Conference: ***YES***
MAY 14, 2019 @ 10:00 AM

Location:
120 Mill Street (Project Site)
Cumberland, RI

Requests for Further Information Prior to:
MAY 17, 2019

Requests for information or clarification must be made electronically to the attention of: **CHARLES WASKIEWICZ**, Project Manager
E-mail: **cwaskiewicz@fando.com**

Please reference the Sealed Bid number on all correspondence. Answers to questions received, if any, will be posted on the internet as an addendum to this bid solicitation.

Sealed Bid Submission Deadline:
JUNE 13, 2019 at 10:00 AM
Late submittals will not be considered.

Publicly Opened on JUNE 13, 2019 at 4:00 PM

Sealed Bids must be mailed or hand-delivered in a sealed envelope **marked with the Sealed Bid # and Project Name** to:

Pawtucket City Hall - Purchasing Office
137 Roosevelt Avenue
Pawtucket, RI 02860

Bonds/Surety Required

Surety Bond: **YES**
Bidder is required to provide a bid surety in the form of a bid bond or certified check payable to the City of Pawtucket in an amount not less than ten percent (10%) of the bid price.

Fidelity Bond: **NO**

Performance Bond and Labor and Material Bond **YES**

The successful bidder will be required to furnish all insurance documentation as outlined in the specifications document.

Miscellaneous

The bid process and resulting contract are subject to the Rules and Regulations and General Terms and Conditions of Purchase. Submission of a bid in response to this solicitation is acknowledgement and acceptance of these Rules and Regulations and General Terms and Conditions of Purchase, contained in Appendix B of this document.

The City of Pawtucket reserves the right to award on the basis of cost alone, accept or reject any or all bids, and to act in its best interest including, but not limited to, directly negotiating with any vendor who submits a proposal in response to this Sealed Bid and to award a contract based upon the results of those negotiations alone. Proposals found to be technically or substantially non-responsive at any point in the evaluation process will be rejected and not considered further. The City of Pawtucket may, at its sole option, elect to require presentations(s) by bidders clearly in consideration for award.

2.0 - Instructions and Notifications to Bidders

- Bidding Documents will be available on the internet at http://www.pawtucketri.com/departments/purchasing on or after **May 9, 2019.**

- No interpretations as to meaning of the Plans, Specifications, or other Contract Documents will be made to any bidder orally. Every questions or request for such interpretations concerning this Request for Bids shall be in writing (or e- mailed) to the office of the Engineer, Fuss & O'Neill, 317 Iron Horse Way, Suite 204, Providence, RI 02908 at **cwaskiewicz@fando.com**) no later than **May 17, 2019** at 12:00 PM. Please reference the Contract Bid No. 18-011 on all correspondence. Any contract addendum, if issued, will be posted on the internet at: http://www.pawtucketri.com/departments/purchasing/. Failure of bidder to receive any such addendum or interpretations shall not relieve any bidder from obligation under this bid as submitted. All addenda so issued shall become part of the Contract Documents.

- The words "City of Pawtucket" when used, shall also mean the Pawtucket Water Supply Board acting through its Chairman.

- It is the vendor's responsibility to examine all specifications and conditions thoroughly, and comply fully with specifications and all attached terms and conditions. Vendors must comply with all Federal, State, and City laws, ordinances and regulations, and meet any and all registration requirements where required for contractors as set forth by the State of Rhode Island. Failure to make a complete submission as described herein may result in a rejection of the proposal.

- All costs associated with developing or submitting a proposal in response to this Request, or to provide oral or written clarification of its content shall be borne by the bidder. The City of Pawtucket assumes no responsibility for these costs.

- A submittal may be withdrawn by written request to the Purchasing Agent by the proposer prior to the stated Sealed Bid submission deadline.
- Prior to the proposal deadline established for this Sealed Bid, changes may be made to a proposal already received by the City if that vendor makes a request to the Purchasing Agent, in writing, to do so. No changes to a Bid Proposal shall be made following the deadline for Sealed Bids.

- Proposals are considered to be irrevocable for a period of not less than ninety (90) days following the opening date, and may not be withdrawn, except with the express written permission of the Purchasing Agent. Should any vendor object to this condition, the vendor must provide objection through a question and/or complaint to the Purchasing Agent prior to the proposal deadline.

- All pricing submitted will be considered to be firm and fixed unless otherwise indicated herein.

- The vendor has full responsibility to ensure that the proposal arrives at the Purchasing Division Office prior to the deadline set out herein. The City assumes no responsibility for delays caused by the U.S. Postal Service or any other delivery service. Postmarking by the due date will not substitute for actual receipt of response by the due date. Proposals arriving after the deadline may be returned, unopened, to the vendor, or may simply be declared non-responsive and not subject to evaluation, at the sole discretion of the Purchasing Agent. **For the purposes of this requirement, the official time and date shall be that of the time clock in the City of Pawtucket's Purchasing Office.**

- It is intended that an award pursuant to this Sealed Bid will be made to a prime contractor, who will assume responsibility for all aspects of the work. Joint venture and cooperative proposals will not be considered, but subcontracts are permitted, provided that their use is clearly indicated in the bidder's proposal, and the subcontractor(s) proposed to be used are identified in the bid proposal.

- Bidders are advised that all materials submitted to the City of Pawtucket for consideration in response to this Sealed Bid shall be considered to be public records as defined in Title 38 Chapter 2 of the Rhode Island General Laws, without exception, and may be released for inspection immediately upon request once an award has been made.

- Vendors are responsible for errors and omissions in their proposals. No such error or omission shall diminish the vendor's obligations to the City.

- The City reserves the right to reject any or all proposals, or portions thereof, at any time, with no penalty. The City also has the right to waive immaterial defects and minor irregularities in any submitted proposal at its sole discretion. All material submitted in response to this Sealed Bid shall become the property of the City of Pawtucket upon delivery to the Purchasing Agent.

3.0 - Overview

The City of Pawtucket desires to seek sealed bids for contract 18-011 for the Pawtucket Water Supply Board. This contract consists of the Well Field Electrical Power and Distribution System Upgrade at 120 Mill Street, Cumberland, Rhode Island.

4.0 - Scope of Work

1. Site Preparation
    a. Wattles
    b. Tree Protection
    c. Erosion Control
    d. Clearing and Grubbing
    e. Strip Topsoil
    f. Remove and stockpile Rip Rap
    g. Miscellaneous Demolition

2. Site Improvements
    a. 4” Loam and Seed
    b. Trench excavation and backfill
    c. Re-install railings
    d. Concrete Pads
    e. Gravel Borrow
    f. Wall Penetrations
    g. Concrete Sidewalk Repair
    h. Bituminous Base and Surface Course
    i. Replace Rip Rap
    j. 8’ High Chain link fence
    k. Fence Double gates and personnal gate
    l. Concrete Curb

3. 13.8 kV Underground Primary Looped Distribution System
4. Utility metering cubicle, Primary Switch and Transformers
5. Electric Service Pedestal for Aerators and Mixer
6. Electric Service to Abandoned Plant and each Well Pump Houses
7. Co-ordination with NGRID for new work and removal of existing.
8. Demolition

9. Permits – Note the Owner has secured the following permits/approvals:
    a. RIDEM Request for Preliminary Determination
    b. Town of Cumberland Soil Erosion and Sediment Control Plan Permit
    c. National Grid charges

5.0 - Insurance

Refer to “Specifications” document, Section 00 72 13, titled “General Conditions”, Article 30, titled “Insurances”.

6.0 - Acknowledgement of Risk & Hold Harmless Agreement

In addition to the indemnity provisions in the City of Pawtucket’s Terms and Conditions of Purchase and to the fullest extent permitted by law, the selected vendor, its officers, agents, servants, employees, parents, subsidiaries, partners, officers, directors, attorneys, insurers, and/or affiliates (Releasors) agree to release, waive, discharge and covenant not to sue the City of Pawtucket, its officers, agents, servants or employees (Releasees) from any and all liability, claims, cross-claims, rights in law or in equity, agreements, promises demands, actions and causes of action whatsoever arising out of or related to any loss, damage, expenses (including without limitation, all legal fees, expenses, interest and penalties) or injury (including death), of any type, kind or nature whatsoever, whether based in contract, tort, warranty, or other legal, statutory, or equitable theory of recovery, which relate to or arise out of the Releasors use of or presence in and/or on City of Pawtucket property. The Releasors agree to defend, indemnify and hold harmless the Releasees from (a) any and all claims, loss, liability, damages or costs by any person, firm, corporation or other entity claiming by, through or under Releasors in any capacity whatsoever, including all subrogation claims and/or claims for reimbursement, including any court costs and attorney’s fees, that may incur due to Releasors use of or presence in and on City of Pawtucket property; and (b) any and all legal actions, including third-party actions, cross-actions, and/or claims for contribution and/or indemnity with respect to any claims by any other persons, entities, parties, which relate to or arise out of Releasors use of or presence in and on City of Pawtucket property.

The Releasors acknowledge the risks that may be involved and hazards connected with use of or presence in and on City of Pawtucket property but elect to provide services under any contract with the City of Pawtucket with full knowledge of such risks. Releasors also acknowledge that any loss, damage, and/or injury sustained by Releasors is not covered by Releasees insurance. Releasors agree to become fully aware of any safety risks involved with the performance of services under any contract with the City of Pawtucket and any safety precautions that need to be followed and agree to take all such precautions.

The duty to indemnify and/or hold harmless the City of Pawtucket shall not be limited by the insurance required under the City of Pawtucket Terms and Conditions of Purchase.

7.0 - Additional Insurance Requirements

In addition to the insurance provisions in the City of Pawtucket Terms and Conditions of Purchase, the liability insurance coverage, except Professional Liability, Errors and Omissions or Workers' Compensation insurance required for performance of a contract with the City of Pawtucket shall include the City of Pawtucket, its divisions, officers and employees as Additional Insured but only with respect to the selected vendor's activities under the contract. The insurance required through a policy or endorsement shall include:

A. a Waiver of Subrogation waiving any right to recovery the insurance company may have against the City of Pawtucket; and

B. a provision that the selected vendor's insurance coverage shall be primary with respect to any insurance, self-insurance or self-retention maintained by the City of Pawtucket and that any insurance, self-insurance or self-retention maintained by the City of Pawtucket shall be in excess of the selected vendor's insurance and shall not contribute.

There shall be no cancellation, material change, potential exhaustion of aggregate limits or non-renewal without thirty (30) days written notice from the selected vendor or its insurer(s) to the City of Pawtucket's Purchasing Agent. Any failure to comply with the reporting provision of this clause shall be grounds for immediate termination of the contract with the City of Pawtucket.

Insurance coverage required under the contract shall be obtained from insurance companies acceptable to the City of Pawtucket. The selected vendor shall pay for all deductibles, self-insured retentions and/or self-insurance included hereunder.

The City of Pawtucket's Purchasing Agent reserves the right to consider and accept alternative forms and plans of insurance or to require additional or more extensive coverage for any individual requirement.

8.0 - Proposal Content and Organization

Pricing must include all costs as specified in this solicitation. Pricing for this proposal must be indicated on the Bid Form in Section 11.0 and must be submitted in a separate, sealed envelope marked with the words "Pricing Proposal".

All Bid Forms must be signed.

Vendors must include on the Bid Form a list of at least four (4) references with whom they have contracted to do similar work by including the company name, telephone number, contact person, and number of years they have served this customer. Preferably, references should be municipalities which are of approximate size as the City of Pawtucket, and a website address should be included if available.

Respondents must also include an overview of their company's experience including, but not limited to, the number of years the company has been providing these services, the

size of the company (including the number of employees and locations), a description of work undertaken that is similar to what is being requested in this Sealed Bid, and, if applicable, certifications that show a knowledge of equipment that would be serviced or provided under this contract.

If any subcontractors are to be used in the performance of any work contracted for under this Sealed Bid, please list their name(s), contractor license #, address and phone number, and specific description of the subcontract work to be performed.

Two (2) copies of your proposal, one (1) original and one (1) copy, must be submitted at the time of submission. Proposals must be comprised of the following:

10% Bid Bond
Bid Form
Anti-Kickback Acknowledgment

Please state any and all additions, deletions, and exceptions, if any, that you are taking to any portion of this proposal. If not addressed specifically, the City of Pawtucket assumes that the vendor will adhere to all terms and conditions listed in this Sealed Bid.

Submission of a proposal is acknowledgement and acceptance of the City of Pawtucket's Purchasing Rules and Regulations and General Terms and Conditions of Purchase.

9.0 - Evaluation Criteria

The evaluation of proposals will be conducted in a time frame convenient to the City.

The City of Pawtucket reserves the right to award on the basis of cost alone, accept or reject any or all proposals, and to otherwise act in its best interest including, but not limited to, directly negotiating with any Supplier who submits a proposal in response to this Sealed Bid and to award a contract based upon the results of those negotiations alone. Further, the City reserves the right to waive irregularities it may deem minor in its consideration of proposals.

Proposals found to be technically or substantially non-responsive at any point in the evaluation process will be rejected and not considered further. The City of Pawtucket may elect to require presentations(s) by vendors in consideration for award.

Contractor shall have performed a minimum of FIVE (5) similar projects.

Proposals will be evaluated in two (2) phases:

1. The first phase is an initial review to determine if the proposal, as submitted, is complete. To be complete, a proposal must meet all the requirements of this Sealed Bid.

2. The second phase is an in-depth analysis and review based on award to the lowest qualified bidder.

In the event that the City requires further information and/or a demonstration of any equipment or process offered in any proposal, all vendors asked for same will do so at no

cost to the City.

10.0 - Miscellaneous

Vendors shall at all times comply with all federal, state, and local laws, ordinances and regulations and shall defend, indemnify and save harmless the City of Pawtucket against any claims arising from the violation of any such laws, ordinances and regulations, including but not limited to challenges as to the legality of any and all vendor installations.

The City is exempt from the payment of the Rhode Island State Sales Tax under the 1956 General Laws of the State of Rhode Island, 44-18-30, Paragraph 1, as amended. Further, the City is also exempt from the payment of any excise or federal transportation taxes. The proposal prices submitted must be exclusive of same, and will be so construed.

The City of Pawtucket reserves the right to cancel an agreement with the Vendor with thirty (30) days written notice and to award the contract to the next highest evaluated bidder.

The City of Pawtucket reserves the right to renegotiate the terms of this contract with the Vendor for subsequent years provided the Vendor agrees to the contract terms for the renewal period.

The payment and performance of any obligations under this contract for years beyond the first fiscal year are subject to the availability of funds.

The words “City of Pawtucket” when used shall also mean the Pawtucket Water Supply Board acting through its Chairman.

All work under this Contract is subject to the prevailing wage rates of the State of Rhode Island and the Federal Davis Bacon requirement. Certified payrolls will be required to be submitted for all work under this contract.

Time of Completion and Liquated Damages: The bidder must agree to complete all work under this contract within **270 consecutive calendar days** of the Pawtucket Water Supply Board’s written "Notice to Proceed". There is a **$1,000.00 per day penalty** for each consecutive calendar day after the 270 day time of completion limit until actual completion.

11.0 – Bid Form

Bidder to submit completed “Bid Form” document. See Section 00 42 13.

Appendix A

ANTI-KICKBACK ACKNOWLEDGMENT

ALL BIDDERS/OFFERORS MUST ATTEST TO THE FOLLOWING:

The vendor acknowledges, under the pains and penalties of perjury, that he/she has not been offered, paid, or solicited for any contribution or compensation, nor has he/she been granted a gift, gratuity, or other consideration, either directly or indirectly by any officer, employee or member of the governing body of the City of Pawtucket who exercises any functions or responsibilities in connection with either the award or execution of the project to which this contract pertains.

Further, the vendor acknowledges, under the pains and penalties of perjury, that he/she has not offered, paid, or solicited by way of any contribution or compensation, nor has he/she granted a gift, gratuity or other consideration either directly or indirectly to any officer, employee, or member of the governing body of the City of Pawtucket who exercises any functions or responsibilities in connection with either the award or execution of the project to which this project or contract pertains.

_____ _____

SIGNATURE OF OFFEROR DATE

_____

TITLE

_____

COMPANY

Title of RFP or Bid:

BID NO. 18-011
Well Field Electrical Power and
Distribution System Improvements

Appendix B

CITY OF PAWTUCKET
GENERAL TERMS AND CONDITIONS OF PURCHASE

Preamble

The City of Pawtucket's Purchasing Office may, from time to time, make amendments to the General Terms and Conditions when the City of Pawtucket's Purchasing Agent determines that such amendments are in the best interest of the City of Pawtucket. Amendments shall be made available for public inspection at the Purchasing Office located in Pawtucket City Hall but shall not require formal public notice and hearing. Copies of the Terms and Conditions shall be provided to any individual or firm requesting them. The words "City of Pawtucket" when used, shall also mean the Pawtucket Water Supply Board acting through its Chairman.

CITY OF PAWTUCKET'S PURCHASING OFFICE GENERAL CONDITIONS OF PURCHASE

All City of Pawtucket purchase orders, contracts, solicitations, delivery orders and service requests shall incorporate and be subject to the provisions of Rhode Island General Laws 8-15-4 and the City of Pawtucket purchasing rules and regulations adopted pursuant thereto, all other applicable provisions of the Rhode Island General Laws, the Pawtucket City Charter, specific requirements described in the Request or Contract, and the following General Conditions of Purchase:

1. GENERAL

   All purchase orders, contracts, solicitations, delivery orders, and service requests are for specified goods and services, in accordance with express terms and conditions of purchase, as defined herein. For the purposes of this document, the terms "bidder" and "contractor" refer to any individual, firm, corporation, or other entity presenting a proposal indicating a desire to enter into contracts with the City of Pawtucket, or with whom a contract is executed by the City of Pawtucket's Purchasing Agent, and the term "contractor" shall have the same meaning as "vendor".

2. ENTIRE AGREEMENT

   The City of Pawtucket's Purchase Order, or other City of Pawtucket contract endorsed by the City of Pawtucket Purchasing Office, shall constitute the entire and exclusive agreement between the City of Pawtucket and any contractor receiving an award. In the event any conflict between the bidder's standard terms of sale, these conditions or more specific provisions contained in the solicitation shall govern.

   All communication between the City of Pawtucket and any contractor pertaining to any award or contract shall be accomplished in writing.

   a. Each proposal will be received with the understanding that the acceptance, in writing, by contract or Purchase Order by the City of Pawtucket Purchasing Agent of the offer to do work or to furnish any or all the materials, equipment, supplies or services described therein shall constitute a contract between the bidder and the City of Pawtucket. This shall bind the bidder on his part to furnish and deliver at the prices and in accordance with the conditions of said accepted proposal and detailed specifications and the City of Pawtucket on its part to order from such contractor (except in case of emergency) and to pay for at the agreed prices, all materials, equipment, supplies or services specified and delivered. A contract shall be deemed executory only to the extent of funds available for payment of the amounts shown on Purchase Orders issued by the City of Pawtucket to the contractors.
   b. No alterations or variations of the terms of the contract shall be valid or binding upon the City of Pawtucket unless submitted in writing and accepted by the City of Pawtucket Purchasing Agent. All orders and changes thereof must emanate from the City of Pawtucket Purchasing Office: no oral agreement or arrangement made by a contractor with a department or employee will be considered to be binding on the City of Pawtucket Purchasing Agent, and may be disregarded.
   c. Contracts will remain in force for the contract period specified or until all articles or services ordered before date of termination shall have been satisfactorily delivered or rendered and accepted and thereafter until all terms and conditions have been met, unless:

1. terminated prior to expiration date by satisfactory delivery against orders of entire quantities, or
2. extended upon written authorization of the City of Pawtucket Purchasing Agent and accepted by the contractor, to permit ordering of the unordered balances or additional quantities at the contract price and in accordance with the contract terms, or
3. canceled by the City of Pawtucket in accordance with other provisions stated herein.

d. It is mutually understood and agreed that the contractor shall not assign, transfer, convey, sublet or otherwise dispose of this contract or his right, title or interest therein, or his power to execute such contract, to any other person, company or corporation, without the previous consent, in writing, of the City of Pawtucket Purchasing Agent.
e. If, subsequent to the submission of an offer or issuance of a purchase order or execution of a contract, the bidder or contractor shall merge with or be acquired by another entity, the contract may be terminated, except as a corporate resolution prepared by the contractor and the new entity ratifying acceptance of the original bid or contract terms, condition, and pricing is submitted to the City of Pawtucket Purchasing Office, and expressly accepted.
f. The contractor or bidder further warrants by submission of an offer or acceptance of a purchase order or other contract that he has no knowledge at the time of such action of any outstanding and delinquent or otherwise unsettled debt owed by him to the City of Pawtucket, and agrees that later discovery by the City of Pawtucket Purchasing Agent that this warranty was given in spite of such knowledge, except where the matter is pending in hearing or from any appeal therefrom, shall form reasonable grounds for termination of the contract.

3. SUBCONTRACTS

No subcontracts or collateral agreements shall be permitted, except with the City of Pawtucket's express written consent. Upon request, contractors must submit to the City of Pawtucket Purchasing Office a list of all subcontractors to be employed in the performance of any Purchase Order or other contract arising from this Request.

4. RELATIONSHIP OF PARTIES

The contractor or bidder warrants, by submission of an offer or acceptance of a purchase order or other contract, that he is not an employee, agent, or servant of the City of Pawtucket, and that he is fully qualified and capable in all material regards to provide the specified goods and services. Nothing herein shall be construed as creating any contractual relationship or obligation between the City of Pawtucket and any sub-bidder, subcontractor, supplier, or employee of the contractor or offeror.

5. COSTS OF PREPARATION

All costs associated with the preparation, development, or submission of bids or other offers will be borne by the offeror. The City of Pawtucket will not reimburse any offeror for such costs.

6. SPECIFIED QUANTITY REQUIREMENT

Except where expressly specified to the contrary, all solicitations and contracts are predicated on a specified quantity of goods or services, or for a specified level of funding.

a. The City of Pawtucket reserves the right to modify the quantity, scope of service, date of delivery or completion, or funding of any contract, with no penalty or charge, by written notice to the contractor, except where alternate terms have been expressly made a part of the contract.
b. The City of Pawtucket shall not accept quantities in excess of the specified quantity except where the item is normally sold by weight (where sold by weight, the City of Pawtucket will not accept quantities greater than ten per cent [10%] of the specified quantity), or where the Request or Contract provides for awards for other than exact quantities.
c. Purchase Orders or other contracts may be increased in quantity or extended in term without subsequent solicit with the mutual consent of the contractor and the City of Pawtucket, where determined by the City of Pawtucket Purchasing Agent to be in the City of Pawtucket's best interest.

7. TERM AND RENEWAL

Where offers have been requested or contracts awarded for terms exceeding periods of twelve (12) months, it is mutually understood and agreed that the City of Pawtucket's commitment is limited to a base term not to exceed twelve (12) months, subject to renewal annually at the City of Pawtucket's sole option for successive terms as otherwise described, except where expressly specified to the contrary. Purchase orders appearing to commit to obligations of funding or terms of performance may be executed for administrative convenience, but are otherwise subject to this provision, and in such cases the City of Pawtucket's renewal shall be deemed to be automatic, conditional on the continued availability of appropriated funds for the purpose, except as written notice of the City of Pawtucket's intent not to renew is served.

8. DELIVERY/COMPLETION

Delivery must be made as ordered and/or projects completed in accordance with the proposal. If delivery qualifications do not appear on the bidder's proposal, it will be interpreted to mean that goods are in stock and that shipment will be made within seven (7) calendar days. If the project completion date is not specified in the proposal, the date shall be determined by the City of Pawtucket Purchasing Agent. The decision of the City of Pawtucket Purchasing Agent, as to reasonable compliance with the delivery terms, and date of completion shall be final. Burden of proof of delay in receipt of order shall rest with the contractor. No delivery charges shall be added to invoices except when authorized on the Purchase Order.

9. FOREIGN CORPORATIONS

In accordance with Title 7 Chapter 1.1 (“Business Corporations”) of the General Laws of Rhode Island, no foreign corporation shall have the right to transact business in this state until it shall have procured a certificate of authority so to do from the Secretary of State.

10. PRICING

All pricing offered or extended to the City of Pawtucket is considered to be firm and fixed unless expressly provided for to the contrary. All prices shall be quoted F.O.B. Destination with freight costs included in the unit cost to be paid by the City of Pawtucket, except, where the Request or Contract permits, offers reflecting F.O.B. Shipping Point will be considered, and freight costs may then be prepaid and added to the invoice.

11. COLLUSION

Bidder or contractor warrants that he has not, directly or indirectly, entered into any agree participated in any collusion or otherwise taken any action in restraint of full competitive bidding. In special circumstances, an executed affidavit will be required as a part of the bid.

12. PROHIBITION AGAINST CONTINGENT FEES AND GRATUITIES

Bidder or contractor warrants that he has not paid, and agrees not to pay, any bonus, commission, fee, or gratuity to any employee or official of the City of Pawtucket for the purpose of obtaining any contract or award issued by the City of Pawtucket. Bidder or contractor further warrants that no commission or other payment has been or will be received from or paid to any third party contingent on the award of any contract by the City of Pawtucket, except as shall have been expressly communicated to the City of Pawtucket Purchasing Agent in writing prior to acceptance of the contract or award in question. Subsequent discovery by the City of Pawtucket of non-compliance with these provisions shall constitute sufficient cause for immediate termination of all outstanding contracts and suspension or debarment of the bidder(s) or contractor(s) involved.

13. AWARDS

Awards will be made with reasonable promptness and by written notice to the successful bidder (only); bids are considered to be irrevocable for a period of ninety (90) days following the bid opening unless expressly provided for to the contrary in the Request, and may not be withdrawn during this period without the express permission of the City of Pawtucket Purchasing Agent.

a. Awards shall be made to the bidder(s) whose offer(s) constitutes the lowest responsive price offer (or lowest responsive price offer on an evaluated basis) for the item(s) in question or for the Request as a whole, at the option of the City of Pawtucket. The City of Pawtucket

reserves the right to determine those offers which are responsive to the Request, or which otherwise serve its best interests.

b. The City of Pawtucket reserves the right, before making award, to initiate investigations as to whether or not the materials, equipment, supplies, qualifications or facilities offered by the bidder meet the requirements set forth in the proposal and specification, and are ample and sufficient to insure the proper performance of the contract in the event of award. If upon such examination it is found that the conditions of the proposal are not complied with or that articles or equipment proposed to be furnished do not meet the requirements called for, or that the qualifications or facilities are not satisfactory, the City of Pawtucket may reject such a bid. It is distinctly understood, however, that nothing in the foregoing shall mean or imply that it is obligatory upon the City of Pawtucket to make any examinations before awarding a contract; and it is further understood that if such examination is made, it in no way relieves the contractor from fulfilling all requirements and conditions of the contract.
c. Qualified or conditional offers which impose limitations of the bidder's liability or modify the requirements of the bid, offers for alternate specifications, or which are made subject to different terms and conditions than those specified by the City of Pawtucket may, at the option of the City of Pawtucket, be

    1. rejected as being non-responsive, or
    2. set aside in favor of the City of Pawtucket's terms and conditions (with the consent of the bidder), or
    3. accepted, where the City of Pawtucket Purchasing Agent determines that such acceptance best serves the interests of the City of Pawtucket.

    Acceptance or rejection of alternate or counter-offers by the City of Pawtucket shall not constitute a precedent which shall be considered to be binding on successive solicitations or procurements.
d. Bids submitted in pencil, or which do not bear an original signature, in ink, by an owner or authorized agent thereof, will not be accepted.
e. Bids must be extended in the unit of measure specified in the Request. In the event of any discrepancy between unit prices and their extensions, the unit price will govern.
f. The City of Pawtucket Purchasing Agent reserves the right to determine the responsibility of any bidder for a particular procurement.
g. The City of Pawtucket Purchasing Agent reserves the right to reject any and all bids in whole or in part, to waive technical defects, irregularities, and omissions, and to give consideration to past performance of the offerors where, in his judgment the best interests of the City of Pawtucket will be served by so doing.
h. The City of Pawtucket Purchasing Agent reserves the right to make awards by items, group of items or on the total low bid for all the items specified as indicated in the detailed specification, unless the bidder specifically indicates otherwise in his bid.
i. Preference may be given to bids on products raised or manufactured in the City of Pawtucket or State of Rhode Island, other things being equal.
j. The impact of discounted payment terms shall not be considered in evaluating responses to any Request.
k. The City of Pawtucket Purchasing Agent reserves the right to act in the City of Pawtucket's best interests regarding awards caused by clerical errors by the City of Pawtucket Purchasing Office.

14. SUSPENSION AND DEBARMENT

The City of Pawtucket Purchasing Agent may suspend or debar any vendor or potential bidder, for good cause shown:

a. A debarment or suspension against a part of a corporate entity constitutes debarment or suspension of all of its divisions and all other organizational elements, except where the action has been specifically limited in scope and application, and may include all known corporate affiliates of a contractor, when such offense or act occurred in connection with the affiliate's performance of duties for or on behalf of the contractor, or with the knowledge, approval, or acquiescence of the contractor or one or more of its principals or directors (or where the contractor otherwise participated in, knew of, or had reason to know of the acts).

b. The fraudulent, criminal or other serious improper conduct of any officer, director, shareholder, partner, employee, or any other individual associated with a contractor may be imputed to the contractor when the conduct occurred in connection with the individual's performance of duties for or on behalf of the contractor, or with the contractor's knowledge, approval or acquiescence. The contractor's acceptance of benefits derived from the conduct shall be evidence of such knowledge, approval, or acquiescence.
c. A vendor or contractor who knowingly engages as a subcontractor for a contract awarded by the City of Pawtucket to a vendor or contractor then under a ruling of suspension or debarment by the City of Pawtucket shall be subject to disallowance of cost, annulment or termination of award, issuance of a stop work order, or debarment or suspension, as may be judged to be appropriate by the City of Pawtucket's Purchasing Agent.

15. PUBLIC RECORDS

Contractors and bidders are advised that certain documents, correspondence, and other submissions to the City of Pawtucket's Purchasing Office may be voluntarily made public by the City of Pawtucket absent specific notice that portions of such submittals may contain confidential or proprietary information, such that public access to those items should be withheld.

16. PRODUCT EVALUATION

In all specifications, the words "or equal" are understood after each article when manufacturer's name or catalog are referenced. If bidding on items other than those specified, the bidder must, in every instance, give the trade designation of the article, manufacturer's name and detailed specifications of the item the bidder proposes to furnish; otherwise, the bid will be construed as submitted on the identical commodity described in the detailed specifications. The City of Pawtucket's Purchasing Agent reserves the right to determine whether or not the item submitted is the approved equal the detailed specifications.

a. Any objections to specifications must be filed by a bidder, in writing, with the City of Pawtucket's Purchasing Agent at least 96 hours before the time of bid opening to enable the City of Pawtucket's Purchasing Office to properly investigate the objections.
b. All standards are minimum standards except as otherwise provided for in the Request or Contract.
c. Samples must be submitted to the City of Pawtucket's Purchasing Office in accordance with the terms of the proposals and detailed specifications. Samples must be furnished free of charge and must be accompanied by descriptive memorandum invoices indicating whether or not the bidder desires their return and specifying the address to which they are to be returned (at the bidder's risk and expense), provided they have not been used or made useless by tests; and absent instructions, the samples shall be considered to be abandoned. Award samples may be held for comparison with deliveries.
d. All samples submitted are subject to test by any laboratory the City of Pawtucket's Purchasing Agent may designate.

17. PRODUCT ACCEPTANCE

All merchandise offered or otherwise provided shall be new, of prime manufacture, and of first quality unless otherwise specified by the City of Pawtucket. The City of Pawtucket reserves the right to reject all nonconforming goods, and to cause their return for credit or replacement, at the City of Pawtucket's option. Contract deliverables specified for procurements of services shall be construed to be work products, and subject to the provisions of this section.

a. Failure by the City of Pawtucket to discover latent defect(s) or concealed damage or non-conformance shall not foreclose the City of Pawtucket's right to subsequently reject the goods in question.
b. Formal or informal acceptance by the City of Pawtucket of non-conforming goods shall not constitute a precedent for successive receipts or procurements.
c. Where the contractor fails to promptly cure the defect or replace the goods, the City of Pawtucket reserves the right to cancel the Purchase Order, contract with a different contractor, and to invoice the original contractor for any differential in price over the original contract price.
d. When materials, equipment or supplies are rejected, the same must be removed by the contractor from the premises of the City of Pawtucket within forty-eight (48) hours of

notification. Rejected items left longer than two days will be regarded as abandoned and the City of Pawtucket shall have the right to dispose of them as its own property.

18. PRODUCT WARRANTIES

All product or service warranties normally offered by the contractor or bidder shall accrue to the City of Pawtucket's benefit, in addition to any special requirements which may be imposed by the City of Pawtucket. Every unit delivered must be guaranteed against faulty material and workmanship for a period of one year unless otherwise specified, and the City of Pawtucket may, in the event of failure, order its replacement, repair, or return for full credit, at its sole option.

19. PAYMENT

Unless otherwise provided for by the Request or Contract, payment shall not be made until delivery has been made, or services performed, in full, and accepted. Payment shall not be due prior to thirty (30) working days following the latest of completion, acceptance, or the rendering of a properly submitted invoice.

a. Payment terms other than the foregoing may be rejected as being nonresponsive.
b. No partial shipments, or partial completion will be accepted, unless provided for by the Request or Contract.
c. Where a question of quality is involved, or failure to complete a project by the specified due date, payment in whole or part against which to charge back any adjustment required, shall be withheld at the direction of the City of Pawtucket Purchasing Agent. In the event a cash discount is stipulated, the withholding of payments, as herein described, will not deprive the City of Pawtucket from taking such discount.
d. Payments for used portion of inferior delivery or late delivery will be made by the City of Pawtucket on an adjusted price basis.
e. Payments on contracts under architectural or engineering supervision must be accompanied by a Certificate of Payment and Statement of Account signed by the architect or engineer and submitted to the City of Pawtucket Purchasing Office for approval.

20. THIRD PARTY PAYMENTS

The City of Pawtucket recognizes no assigned or collateral rights to any purchase agreement except as may be expressly provided for in the bid or contract documents, and will not accede to any request for third party or joint payment(s), except as provided for in specific orders by a court of competent jurisdiction, or by express written permission of the City of Pawtucket’s Purchasing Agent. Where an offer is contingent upon such payment(s), the offeror is obligated to serve affirmative notice in his bid submission.

21. SET-OFF AGAINST PAYMENTS

Payments due the contractor may be subject to reduction equal to the amount of unpaid and delinquent state taxes (or other just debt owed to the State), except where notice of delinquency has not been served or while the matter is pending in hearing or from any appeal therefrom.

22. CLAIMS

Any claim against a contractor may be deducted by the City of Pawtucket from any money due him in the same or other transactions. If no deduction is made in such fashion, the contractor shall pay the City of Pawtucket the amount of such claim on demand. Submission of a voucher and payment, thereof, by the City of Pawtucket shall not preclude the City of Pawtucket’s Purchasing Agent from demanding a price adjustment in any case when the commodity delivered is later found to deviate from the specifications and proposal.

a. The City of Pawtucket’s Purchasing Agent may assess dollar damages against a vendor or contractor determined to be non-performing or otherwise in default of their contractual obligations equal to the cost of remedy incurred by the City of Pawtucket, and make payment of such damages a condition for consideration for any subsequent award. Failure by the vendor or contractor to pay such damages shall constitute just cause for disqualification and rejection, suspension, or debarment.

23. CERTIFICATION OF FUNDING

The Director of Finance shall provide certification as to the availability of funds to support the procurement for the current fiscal year ending June 30th only. Where delivery or service requirements extend beyond the end of the current fiscal year, such extensions are subject to both the availability of appropriated funds and a determination of continued need.

24. UNUSED BALANCES

Unless otherwise specified, all unused Blanket Order quantities and/or unexpended funds shall be automatically canceled on the expiration of the specified term. Similarly, for orders encompassing more than one fiscal year, unexpended balances of funding allotted for an individual fiscal year may be liquidated at the close of that fiscal year, at the City of Pawtucket's sole option.

25. MINORITY BUSINESS ENTERPRISES

Pursuant to the provisions of Title 37 Chapter 14.1of the General Laws, the City of Pawtucket reserves the right to apply additional consideration to offers, and to direct awards to bidders other than the responsive bid representing the lowest price where:

a. the offer is fully responsive to the terms and conditions of the Request, and
b. the price offer is determined to be within a competitive range (not to exceed 5% higher than the lowest responsive price offer) for the product or service, and
c. the firm making the offer has been certified by the R.I. Department of Economic Development to be a small business concern meeting the criteria established to be considered a Minority Business Enterprise.

26. PREVAILING WAGE REQUIREMENT

In accordance with Title 37 Chapter 13 of the General Laws of Rhode Island, payment of the general prevailing rate of per diem wages and the general prevailing rate for regular, overtime and other working conditions existing in the locality for each craft, mechanic, teamster, or type of workman needed to execute this work is a requirement for both contractors and subcontractors for all public works.

27. EQUAL OPPORTUNITY COMPLIANCE, HANDICAPPED ACCESS AND AFFIRMATIVE ACTION

Contractors of the City of Pawtucket are required to demonstrate the same commitment to equal opportunity as prevails under federal contracts controlled by Federal Executive Orders 11246, 11625, 11375 and 11830, and Title 28 Chapter 5.1 of the General Laws of Rhode Island.
Affirmative action plans shall be submitted by the contractor for review by the State Equal Opportunity Office. A contractor's failure to abide by the rules, regulations, contract terms and compliance reporting provisions as established shall be grounds for forfeiture and penalties as shall be established, including but not limited to suspension.

28. DRUG-FREE WORKPLACE REQUIREMENT

Contractors who do business with the City of Pawtucket and their employees shall abide by the State's drug-free workplace policy and the contractor shall so attest by signing a certificate of compliance.

29. TAXES

The City of Pawtucket is exempt from payment of excise, transportation and sales tax imposed by the Federal or State Government. These taxes should not be included in the proposal price. Exemption Certificates will be furnished upon request.

30. INSURANCE

Refer to “Specifications” document, Section 00 72 13, titled “General Conditions”, Article 30, titled “Insurances”.

31. BID SURETY

When requested, a bidder must furnish a Bid Bond for 10% of his bid, or for the stated amount shown in the solicitation. Bid Bonds must be executed by a reliable Surety Company authorized to do business in the State of Rhode Island. Failure to provide Bid Surety with bid may be cause

for rejection of bid. The Bid Surety of any three bidders in contention will be held until an award has been made according to the specifications of each proposal. All others will be returned by mail within 48 hours following the bid opening. Upon award of a contract, the remaining sureties will be returned by mail unless instructed to do otherwise.

32. PERFORMANCE AND LABOR AND PAYMENT BONDS

A performance bond and labor and payment bond of up to 100% of an award may be required by the City of Pawtucket's Purchasing Agent. Bonds must meet the following requirements:

a. Corporation: The Bond must be signed by an official of the corporation above his/her official title and the corporate seal must be affixed over his/her signature.
b. Firm or Partnership: The Bond must be signed by all of the partners and must indicate that they are " Doing Business As (name of firm)."
c. Individual: The Bond must be signed by the individual owning the business and indicate "Owner."
d. The Surety Company executing the Bond must be licensed to do business in the State of Rhode Island or Bond must be countersigned by a company so licensed.
e. The Bond must be signed by an official of the Surety Company and the corporate seal must be affixed over his signature.
f. Signatures of two witnesses for both the principal and the Surety must appear on the Bond.
g. A Power of Attorney for the official signing of the Bond for the Surety Company must be submitted with the Bond.

33. SUSPENSION, DEFAULT AND TERMINATION

a. Suspension of a Contract by the City of Pawtucket: The City of Pawtucket reserves the right at any time and for any reason to suspend all or part of this contract, for a reasonable period, not to exceed sixty days, unless the parties agree to a longer period. The City of Pawtucket shall provide the contractor with written notice of the suspension order signed by the Purchasing Agent or his or her designee, which shall set forth the date upon which the suspension shall take effect, the date of its expiration, and all applicable instructions. Upon receipt of said order, the contractor shall immediately comply with the order and suspend all work under this contract as specified in the order. The contractor shall take all reasonable steps to mitigate costs and adverse impact to the work specified in the contract during the suspension period. Before the order expires, the City of Pawtucket shall either:

    1. cancel the suspension order;
    2. extend the suspension order for a specified time period not to exceed thirty (30) days; or
    3. terminate the contract as provided herein.

    The contractor shall resume performance once a suspension order issued under this section is canceled or expires. If as a result of the suspension of performance, there is a financial or schedule impact upon the contract, an appropriate adjustment may be made by, or with the approval of, the City of Pawtucket's Purchasing Agent. Any adjustment shall be set forth in writing. After a suspension order has been canceled or expires, the contractor shall provide any request for adjustment to the City of Pawtucket's Purchasing Agent within thirty (30) days after resuming work performance.

b. Termination of a Contract by the City of Pawtucket

    1. Termination for Default or Nonperformance: If, for any reason, the contractor breaches the contract by failing to satisfactorily fulfill or perform any obligations, promises, terms, or conditions, and having been given reasonable notice of and opportunity to cure such default, fails to take satisfactory corrective action within the time specified by the City of Pawtucket, the City of Pawtucket may terminate the contract, in whole or in part, the termination of all outstanding contracts or sub-contracts held by the contractor, and the suspension or debarment of the contractor from future procurements by giving written notice to the contractor specifying the date for termination. The City of Pawtucket shall endeavor to provide such notice at least seven (7) calendar days before the effective date of the termination.

A contractor who fails to commence within the time specified or complete an award made for repairs, alterations, construction, or any other service will be considered in default of contract. If contractor consistently fails to deliver quantities or otherwise perform as specified, the City of Pawtucket's Purchasing Agent reserves the right to terminate the contract and contract for completion of the work with another contractor and seek recourse from the defaulting contractor or his surety. In the event of a termination for default or nonperformance, in whole or in part, the City of Pawtucket may procure similar goods or services in a manner and upon terms it deems appropriate, and the contractor shall be liable for the excess costs incurred by the City of Pawtucket as a result of the contractor's default. The contractor, or its surety, agrees to promptly reimburse the City of Pawtucket for the excess costs, but shall have no claim to the difference should the replacement cost be less.

2. Termination Without Cause: The City of Pawtucket may terminate the contract in whole or in part without cause at any time by giving written notice to the contractor of such termination at least thirty (30) days before the effective date of such termination. The notice shall specify the part(s) of the contract being terminated and the effective termination date.

   Within thirty (30) days of the effective date of the termination of the contract the contractor shall compile and submit to the City of Pawtucket an accounting of the work performed up to the date of termination. The City of Pawtucket may consider the following claims in determining reasonable compensation owed to the contractor for work performed up to the date of termination:

   a. contract prices for goods or services accepted under the contract;
   b. costs incurred in preparing to perform and performing the terminated portion of the contract; or
   c. any other reasonable costs incurred by the contractor as a result of the termination.

   The total sum to be paid to the contractor shall not exceed the total contract price, less any payments previously made to the contractor, the proceeds from any sales of goods or manufacturing materials, and the contract price for work not terminated.

3. Contractor's Obligations in the Event of Termination: If the contract is terminated for any reason, or expires pursuant to its terms, the contractor shall transfer and deliver to the City of Pawtucket in the manner and to the extent directed by the City of Pawtucket:

   a. all finished or unfinished material prepared by the contractor; and
   b. all material, if any, provided to the contractor by the City of Pawtucket.

   For the purposes of the contract, "material" shall include, but is not limited to, goods, supplies, parts, tools, machinery, equipment, furniture, fixtures, information, data, reports, summaries, tables, maps, charts, photographs, studies, recommendations, files, audiotapes, videotapes, records, keys, security badges, and documents.

   If the contract is terminated for cause, the contractor shall not be relieved of liability to the City of Pawtucket for damages sustained because of any breach by the contractor. In such event, the City of Pawtucket may retain any amounts which may be due and owing to the contractor until such time as the exact amount of damages due the City of Pawtucket from the contractor has been determined by the City of Pawtucket Purchasing Agent. The City of Pawtucket may also set off any damages so determined against the amounts retained.

   Upon termination of the contract, the contractor shall stop performance on the date specified, terminate any outstanding orders and subcontracts applicable to the terminated portion of the contract, and shall incur no further commitments or obligations in connection with the terminated performance. The contractor shall settle all liabilities and claims arising out of the termination of subcontracts and order generating from the

terminated performance. The City of Pawtucket may direct the contractor to assign the contractor's right, title and interest under terminated orders or subcontracts to the City of Pawtucket or a third party.

Terminations of Purchase Order Contracts or Master Pricing Agreements shall require the signature of the City of Pawtucket Purchasing Agent or his designee. Notice of termination by either party shall be submitted in writing to the other party in accordance with the termination clause of the contract, or where no specific termination clause is included, written notice shall be provided no later than thirty (30) days before the expiration of the contract.

34. INDEMNITY

The contractor guarantees:

a. To save the City of Pawtucket, its agents and employees, harmless from any liability imposed upon the City of Pawtucket arising from the negligence, either active or passive, of the contractor, as well as for the use of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article or appliance furnished or used in the performance of the contract of which the contractor is not the patentee, assignee or licensee.
b. To pay for all permits, licenses and fees and give all notices and comply with all laws, ordinances, rules and regulations of the City of Pawtucket and of the State of Rhode Island.
c. That the equipment offered is standard new equipment, latest model of regular stock product with all parts regularly used with the type of equipment offered; also, that no attachment or part has been substituted or applied contrary to manufacturer's recommendations and standard practice.

35. CONTRACTOR'S OBLIGATIONS

In addition to the specific requirements of the contract, construction and building repair contractors bear the following standard responsibilities:

a. To furnish adequate protection from damage for all work and to repair damages of any kind, for which he or his workmen are responsible, to the building or equipment, to his own work, or to the work of other contractors;
b. The contractor, its subcontractor(s) and their employees and/or agents, shall protect and preserve property in the contractor or subcontractor's possessions in which the City of Pawtucket has an interest, and any and all materials provided to the contractor or subcontractor by the City of Pawtucket;
c. To clear and remove all debris and rubbish resulting from his work from time to time, as directed or required, a completion of the work leave the premises in a neat unobstructed condition, broom clean, and in satisfactory order and repair;
d. To store equipment, supplies, and material at the site only upon approval by the City of Pawtucket, and at his own risk;
e. To perform all work so as to cause the least inconvenience to the City of Pawtucket, and with proper consideration for the rights of other contractors and workmen;
f. To acquaint themselves with conditions to be found at the site, and to assume responsibility for the appropriate dispatching of equipment and supervision of his employees during the conduct of the work;
g. To ensure that his employees are instructed with respect to special regulations, policies, and procedures in effect for any City of Pawtucket facility or site, and that they comply with such rules, including but not limited to security policies or practices and/or criminal background checks for any employees and/or subcontractors;
h. The contractor shall ensure that its employees or agents are experienced and fully qualified to engage in the activities and services required under the contract;
i. The contractor shall ensure that at all times while services are being performed under this contract at least one of its employees or agents on the premises has a good command of the English language and can effectively communicate with the City of Pawtucket and its staff;

j. The contractor and contractor's employees or agents shall comply with all applicable licensing and operating requirements required by federal or state law and shall meet accreditation and other generally accepted standards of quality in the applicable field of activity;
k. The contractor shall secure and retain all employee-related insurance coverage for its employees and agents as required by law; and
l. The contractor, subcontractor, and his or her employees and agents shall not disclose any confidential information of the City of Pawtucket to a third party. Confidential information means:

(1) any information of a sensitive or proprietary nature, whether or not specially identified as confidential or proprietary; or
(2) any information about the City of Pawtucket gained during the performance of a contract that is not already lawfully in the public domain.

36. FORCE MAJEURE

All orders shall be filled by the contractor with reasonable promptness, but the contractor shall not be held responsible for any losses resulting if the fulfillment of the terms of the contract shall be delayed or prevented by wars, acts of public enemies, strikes, fires, floods, acts of God, or for any other acts not within the control of the contractor and which by the exercise of reasonable diligence, the contractor is unable to prevent.

SECTION 00 42 13 – BID FORM

TO:	City of Pawtucket Purchasing Department City Hall, 137 Roosevelt Avenue Pawtucket, Rhode Island 02860
PROJECT:	Well Field Electric Power and Distribution System Upgrade 120 Mill Street Cumberland, Rhode Island
DATE:	_____
SUBMITTED BY: (include address tel. no., and license no. as applicable)	_____ _____ _____ _____ _____

Bid (Proposal) of _____ (hereinafter called "Bidder")* a corporation, organized and existing under the laws of the State of _____,* a partnership, or an *individual doing business as _____

To the City of Pawtucket, Rhode Island, acting herein through its Pawtucket Water Supply Board (hereinafter called the "Owner").

Gentlemen:

The Bidder, in compliance with your Advertisement for Bids for the WELL FIELD ELECTRIC POWER AND DISTRIBUTION SYSTEM UPGRADES, CONTRACT 18-011 in the City of Pawtucket, Rhode Island, for the City of Pawtucket, Rhode Island, acting through the Pawtucket Water Supply Board, having examined the Drawings and Specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, supplies, and anything else required or necessary, and to construct the project in accordance with the Contract Documents, within the time set forth therein and at the prices stated in the Schedule of Bid Items, which are to cover all expenses incurred in performing the work required under the Contract Documents of which this bid is a part.

The Bidder hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within **270** consecutive calendar days thereafter as stipulated in the Specifications. Bidder further agrees to pay as liquidated damages, the sum of **$1,000.00** for each consecutive calendar day thereafter, as hereinafter provided in the Contract and General Conditions.

*Insert corporation, partnership, or individual as applicable.

1. BASE BID

Having examined the Site and all matters referred to in the Bid Information Sheet, the Instructions to Bidders and the Bidding Documents, we, the undersigned, hereby propose to enter into a Contract to perform the Work for the sum of:

(In case of discrepancy, the amount shown in words shall govern.) (Base Bid is to include all Provisional and Allowance items.)

1. PWSB - Well Field Electrical Power and Distribution System Improvements

Bid Item	Description	Estimated Quantity	Unit Bid	Unit Price	Total Price
1	Well Field Electrical Improvements, Complete In Place	1	LS	**$**	**$**
Total Price in Words:					
2	Provisional Item - Unsuitable Material	50	CY	**$ 25.00**	**$ 1,250.00**
Total Price in Words:	**One Thousand Two Hundred and Fifty Dollars**				
3	Provisional Item – Rock Excavation	50	CY	**$ 225.00**	**$ 11,250.00**
Total Price in Words:	**Eleven Thousand Two Hundred and Fifty Dollars**				
4	Allowance Item, as Authorized by Owner	1	LS	**$ 50,000.00**	**$ 50,000.00**
Total Price in Words:	**Fifty Thousand Dollars**				

Base Bid – PWSB Well Field Electrical and Power Distribution System Improvements (Bid Items 1 thru 4)	**$**
Sum Total In Words:	

The Bidder shall include in their Base Bid an allowance **of fifty thousand dollars ($50,000.00)** for additional work that may be required, directed and approved by Owner and Engineer. This additional work will be added to the scope of project work through a Field Work Directive issued by the Engineer. At the close out of the Contract, funds remaining in allowances will be credited to Owner by Change Order.

2. ADDENDUM

The Bidder acknowledges receipt of the following addendum (if issued). The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Base Bid and As Alternate items, as applicable.

Addendum No._____ Dated:_____

Addendum No._____ Dated:_____

Addendum No._____ Dated:_____

Addendum No._____ Dated: _____

3. ACCEPTANCE

This Bid shall be irrevocable for ninety (90) days from the bid closing date. If this Bid is accepted by the Owner within ninety (90) days, we will:

a. Execute an Agreement subject to compliance with required state regulatory agency approvals as described in the Instructions top Bidders;
b. Furnish the required bonds in compliance with the amended provisions of the Instructions to Bidders; and
c. Commence work within seven (7) days from the issuance date of the Purchase Order and / or Notice to Proceed for the project.

If we fail to comply with any of the above, we immediately forfeit the Bid Security while preserving any additional damages, remedies or rights available to the Owner at law.

In the event our Bid is not accepted within the ninety (90) day period, the Bid Security shall be returned to the undersigned in accordance with the Instructions to Bidders; unless a mutually satisfactory arrangement is made in writing for its retention and validity for an extended period of time.

4. Time of Completion

Substantial Completion: 210 days

Final Completion: 270 days

LICENSE NUMBER REQUIREMENT

As required by Section 5-65-23 of the Rhode Island General Laws my Rhode Island license number for the work to be performed by this firm as prime contractor is:

LICENSE NUMBER: _____

5. BID FORM SIGNATURES

Respectfully submitted,

_____
Name of Company*

By _____

Title _____

Business Address _____
_____
_____

Telephone No. _____

Email _____

(seal if bid is by corporation)

*Note: Insert bidder's name. If a corporation, give the State of incorporation using the phrase "A corporation organized under the laws of_____, composed of officers as follows:

_____
President

_____
Vice President

_____
Secretary

_____
Treasurer

If a partnership, give names of partners, using the phrase "copartners trading and doing business

under the Firm name and style of_____, composed of partners as follows:

_____

_____

_____

At a duly authorized meeting of the Board of Directors of the_____held on _
(name of corporation)

_____at which all the Directors were present or waived notice, it was voted that
(date)

_____
(name) (officer)

of this company be, and he hereby is, authorized to execute bidding documents, contracts and bonds in the name and on the behalf of said company, and affix its corporate seal thereto, and such execution of any such contract of obligation in this company's name on its behalf by such

_____
(officer)

under seal of the company shall be valid and binding upon this company.

A true copy

ATTEST_____
(clerk)

Place of Business _____

_____

I hereby certify that I am the clerk of the_____, that_____

is duly elected_____of said company, and that the above vote
(officer)

has not been amended or rescinded and remains in full force and effect as of the date of this contract.

Corporate Seal

DATE:_____ Clerk: _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned,_____,

_____as Principal, and_____,

_____as Surety, are hereby held and firmly bound unto the Pawtucket Water Supply Board, acting through its Chairman hereinafter called the Owner in the penal sum of _____ Dollars ($_____), for the payment of which will and truly be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

Signed this_____day of_____, 2019.

The CONDITION OF THE ABOVE OBLIGATION is such that whereas the Principal has submitted to the Pawtucket Water Supply Board, a certain bid attached hereto and hereby made a part hereof to enter into a contract in writing for Contract 18-011, in the City of Pawtucket for the Pawtucket Water Supply Board, City of Pawtucket, Rhode Island.

NOW THEREFORE,

(a) If said bill shall be rejected or in the alternate:

(b) If said bill shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said bid) and shall furnish a bond for his faithful performance of said contract and for the payment of all persons performing labor and furnishing materials in connection therewith and shall in all other respects perform the agreement created by the acceptance of said bid, then his obligation shall be void, otherwise the same shall remain if force and effect; it being expressly understood that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ SEAL
(Principal)

By_____

_____ SEAL
(Surety)

By_____

CITY OF PAWTUCKET
PURCHASING DEPARTMENT
CITY HALL, 137 ROOSEVELT AVENUE
PAWTUCKET, RHODE ISLAND

BID FOR: Contract 18-011, Well Field Electric Power and Distribution System Upgrade

The undersigned, as bidder, having fully informed himself regarding the accuracy of the statements made herein, certifies that:

1. No person or persons other than those named herein are interested in this Bid (Proposal), and that this bid has been made without collusion with any other person, firm or corporation;

2. No person or persons acting in any official capacity for the Owner is/are directly or indirectly interested in the proposed work or any portion of the profit thereof; and

3. The contents of the Bid have not been communicated by the bidder or his employees or agents to any person not an employee or agent of the bidder or his surety on any bond furnished with the Bid, and will not be communicated to any such person or persons prior to the official opening of the Bid.

The undersigned bidder further certifies that this statement is executed for the purposes of inducing the Pawtucket Water Supply Board to consider the bid and make an award in accordance therewith.

_____
Legal Name of Bidder

_____
Business Address

_____
Signature and Title of Person
Authorized to Sign

_____
Date

THE BIDDER SHALL STATE THE NAMES OF ALL
SUBCONTRACTORS THAT HE PROPOSES TO USE

PROPOSED SUBCONTRACTORS

If none, write "None" _____

---

* Description of Work _____

Proposed Subcontractor, Name _____

Address _____

---

* Description of Work _____

Proposed Subcontractor, Name _____

Address _____

---

* Description of Work _____

Proposed Subcontractor, Name _____

Address _____

---

* Description of Work _____

Proposed Subcontractor, Name _____

Address _____

---

*Insert description of work and subcontractors' names as may be required.

This is to certify that the names of the above-mentioned subcontractors are submitted with full knowledge and consent of the respective parties.

The bidder warrants that none of the subcontractors have any conflict of interest as respects this contract.

Bidder _____
(Fill in Name)

By _____
(Signature and Title)

CONTRACTOR'S QUALIFICATION STATEMENT

The Undersigned certifies under oath the truth and correctness of all statements and all answers to questions made hereinafter.

SUBMITTED TO: _____

SUBMITTED BY:

NAME: _____

ADDRESS: _____

PRINCIPAL OFFICE: _____

( ) Corporation
( ) Partnership
( ) Individual
( ) Joint Venture
( ) Other _____

(NOTE: Attach separate sheets as required)

1. How many years has your organization been in business as a General Contractor?

---

2. How many years has your organization been in business under its present name?

---

3. If a Corporation answer the following:

Date of Incorporation: _____

State of Incorporation: _____

President: _____

Vice-President: _____

Secretary: _____

Treasurer: _____

4. If a Partnership, answer the following:

Date of Organization: _____

Type of Partnership: _____
(General/Limited/Assoc.)

Name and address of all partners:

_____

_____

_____

5. If other than a corporation or partnership, describe Organization and name Principals:

_____

_____

_____

6. What percent of the work do you normally perform with your own forces?_____ List trades:

_____

_____

_____

7. Have you ever failed to complete any work awarded to you?
   If so, indicate when, where, and why:

_____

_____

8. Has any Officer or Partner of your Organization ever been an Officer or Partner of another Organization that failed to complete a construction contract? _____
   If so, state circumstances:

_____

_____

9. List major construction projects your Organization has under contract on this date:

   Project Name _____

   Owner _____

   Architect/Engineer _____

   Contract Amount_____ Contract Date _____

   Percent Complete_____ Scheduled Completion _____

10. List similar major construction projects your Organization has completed in the last ten years: **(Contractor must supply written evidence that he has at least ten years of experience with similar projects of equal size and scope and has successfully completed at least four of these projects in the last ten years)**

Project Name _____

Owner _____

Architect/Engineer _____

Contract Amount _____ Date Awarded _____

Date Completed _____ Percent With Own Forces _____

Project Name _____

Owner _____

Architect/Engineer _____

Contract Amount _____ Date Awarded _____

Date Completed _____ Percent With Own Forces _____

Project Name _____

Owner _____

Architect/Engineer _____

Contract Amount _____ Date Awarded _____

Date Completed _____ Percent With Own Forces _____

Project Name _____

Owner _____

Architect/Engineer _____

Contract Amount _____ Date Awarded _____

Date Completed _____ Percent With Own Forces _____

11. List of the plant and equipment available to properly and expeditiously perform the work:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

12. List the construction experience of the principal individuals in your Organization:

Individual's Name _____

Construction Experience-years _____

Present Position and Years Experience _____

Dollar Volume Responsibility _____

Previous Position and Years Experience _____

Individual's Name _____

Construction Experience-years _____

Present Position and Years Experience _____

Dollar Volume Responsibility _____

Previous Position and Years Experience _____

13. List states and categories in which your Organization is legally qualified to do business:

_____

14. Bank References

_____

_____

15. Trade References

_____

_____

_____

16. Name of Bonding and Insurance Companies and Name and Address of Agents:

_____

_____

_____

17. The undersigned agrees to furnish, upon request by the Owner, if being considered for award of contract for the project upon which a bid proposal has been submitted within 48 hours after the Bid Opening, a current Statement of Financial Conditions, including Contractor's latest regular financial statement or balance sheet which must contain the following items:

    Current Assets: (Cash, joint venture accounts, accounts receivable, notes receivable, accrued interest on notes, deposits, and materials and prepaid expenses), net fixed assets and other assets.

    Current Liabilities: (Accounts payable, notes payable, accrued interest on notes, provision for income taxes, advances received from owners, accrued salaries, accrued payroll taxes), other liabilities, and capital (capital stock, authorized and outstanding shares par values, earned surplus).

18. Dated at_____this_____day of_____2013.

    Name of Organization: _____

    By: _____

    Title: _____

19. NOTARIZATION:

State of_____County of_____M _____

being duly sworn deposes and says that he(she) is the

_____of _____

contractor(s) and that the foregoing questions and all statements therein contained are true and correct.

Subscribed and sworn before me this_____day of_____2019.

Notary Public: _____

My Commission Expires: _____

Appendix A

ANTI-KICKBACK ACKNOWLEDGMENT

ALL BIDDERS/OFFERORS MUST ATTEST TO THE FOLLOWING:

The vendor acknowledges, under the pains and penalties of perjury, that he/she has not been offered, paid, or solicited for any contribution or compensation, nor has he/she been granted a gift, gratuity, or other consideration, either directly or indirectly by any officer, employee or member of the governing body of the City of Pawtucket who exercises any functions or responsibilities in connection with either the award or execution of the project to which this contract pertains.

Further, the vendor acknowledges, under the pains and penalties of perjury, that he/she has not offered, paid, or solicited by way of any contribution or compensation, nor has he/she granted a gift, gratuity or other consideration either directly or indirectly to any officer, employee, or member of the governing body of the City of Pawtucket who exercises any functions or responsibilities in connection with either the award or execution of the project to which this project or contract pertains.

SIGNATURE OF OFFEROR DATE

_____
TITLE

_____
COMPANY

Title of Bid:

BID NO. 18-011
Well Field Electric Power and
Distribution System Upgrade
120 Mill Street, Cumberland, RI

SECTION 00 52 13 – FORM OF CONTRACT

1. CONTRACT

THIS AGREEMENT, made this_____day of_____, 2019 by and between

Pawtucket Water Supply Board, acting through its Chairman hereinafter called "Owner", and

_____doing business as (an individual),

or (a partnership), or (a Corporation), hereinafter called "Contractor."

WITNESSETH: That in consideration of the payments and agreements hereinafter mentioned:

1. The Contractor will commence and complete the construction of Well Field Electric Power and Distribution Upgrade CONTRACT 18-011 for the Pawtucket Water Supply Board.

2. The Contractor will furnish all of the material, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the Project described herein.

3. The Contractor will commence the work required by the Contract Documents on or before a date to be specified in a written Notice to Proceed, and will fully complete the Project within 270 consecutive calendar days unless the period for completion is extended otherwise by the Contract Documents. Bidder further agrees to pay as liquidated damages, the sum of $1,000.00 for each consecutive calendar day thereafter as provided in the General Conditions.

4. The Contractor agrees to perform all of the work described in the Contract Documents, and comply with the terms therein for the bid price of $_____and as shown in the Bid Schedule.

5. The term, Contract Documents, means and includes the following:
   a. Advertisement for Bids
   b. Information for Bidders
   c. Bid
   d. Bid Bond
   e. Non-Collusive Bid Statement
   f. Statement of Bidders Qualifications
   g. Notice of Award
   h. Contract
   i. Payment Bond
   j. Performance Bond
   k. Notice to Proceed
   l. General Conditions
   m. Supplemental General Conditions
   n. Special Conditions
   o. Drawings prepared by the Owner
   p. Technical Specifications
   q. Appendix "A"
   r. Change Order(s)

6. The Owner will pay to the Contractor in the manner and at such times as set forth in the General Conditions such amounts as required by the Contract Documents.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns. IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in Four (4) Copies, each of which shall be deemed an original, on the date first above written.

Signed and sealed in Presence

_____ By

Contractor (company name)

By_____

Signature and Title

PAWTUCKET WATER SUPPLY BOARD

By_____
William Masuck
Chairman

Approved by vote of the Pawtucket Water
Supply Board at a regularly scheduled
meeting held on_____.
(Date)

The undersigned, in compliance with the City of Pawtucket
By-Laws and the applicable Rhode Island General Laws
Certifies that an appropriation in the amount required
For this contract is available.

By_____.
Robert Benson
PWSB Chief Financial Officer

CORPORATE CERTIFICATION

During a regular meeting of the Board of Directors of the

held on the_____day of_____, 20___, at which a quorum was present, the following officers were duly elected and will serve until their successors shall be elected:

NAME	TITLE
_____	_____
_____	_____
_____	_____

Under the charter, constitution, by-laws, or other rules governing the transaction of all business of said organization, and pursuant to vote of the governing body of said organization that

_____
(Name)

holding the office of_____has full authority to sign
(Title)
this contract committing said corporation to the fulfillment of all aspects of such contract.

_____
(Signature)

_____
(Title)

Corporate "Seal"

I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

Contractor (company name)_____

_____*
Signature of Individual
or Corporate Name (Mandatory)

_____
By: Corporate Officer
(Mandatory, if applicable)

_____

** Social Security # (Voluntary)
or Federal Identification Number

*Approval of a contract or other agreement will not be granted unless this certification clause is signed by the applicant.

**Your social security number will be furnished to the Rhode Island Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed or extended.

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this CONTRACT has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

_____

(Name of person signing contract)

_____

(Name of company)

END OF SECTION

SECTION 00 61 13 – BONDS AND CERTIFICATES

1. BONDS AND CERTIFICATES

PERFORMANCE BOND

The Performance Bond shall be submitted utilizing an “Industry Standard” type form for such a contract document. An acceptable performance bond document to be furnished by the Contractor shall be AIA Document A312 (latest revision) or EJCDC Documents C-610 (latest revision).

POWER OF ATTORNEY

Attorney-in-fact who sign Contract Bonds must file with each Bond a certified copy of their power of attorney to sign said Bond.

LABOR AND MATERIAL BOND

The Labor and Material Bond shall be submitted utilizing an “Industry Standard” type form for such a contract document. An acceptable labor and material bond document to be furnished by the Contractor shall be AIA Document A312 (latest revision) or EJCDC Documents C-615 (latest revision).

POWER OF ATTORNEY

Attorney-in-fact who sign Contract Bonds must file with each Bond a certified copy of their power of attorney to sign said Bond.

CERTIFICATE OF OWNER'S ATTORNEY

I, Joseph A. Keough, Jr., the duly authorized and acting legal representative of the Pawtucket Water Supply Board, acting herein through its Chairman, do hereby certify as follows:

I have examined the foregoing Contract and Surety Bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties on behalf of the Pawtucket Water Supply Board acting through their duly authorized representatives, that said representatives of the Pawtucket Water Supply Board have full power and authority to execute said agreement on behalf of the Pawtucket Water Supply Board.

Joseph A. Keough, Jr.
KEOUGH & SWEENEY, LTD.
41 Mendon Avenue
Pawtucket, RI 02861
(401) 724-3600

DATE_____

END OF SECTION

SECTION 00 72 13 – GENERAL CONDITIONS

CONDITIONS OF THE CONTRACT

INDEX TO GENERAL CONDITIONS

22. PROTECTION OF PERSONS OR PROPERTY
23. PROTECTION OF WORK AND PROPERTY-EMERGENCY
24. WATER
25. SUPERINTENDENCE AND WORKMEN
26. INSPECTION
27. REPORTS, RECORDS AND DATA
28. WEATHER CONDITIONS
29. SUBLETTING
30. INSURANCES
31. CONTRACT SECURITY
32. SUBSTITUTE BOND
33. TIME FOR COMPLETION AND LIQUIDATED DAMAGES
34. MUTUAL RESPONSIBILITY OF CONTRACTORS
35. CORRECTION OF WORK
36. CHANGES IN PLANS AND SPECIFICATIONS
37. EXTRA WORK
38. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES
39. PAYMENTS BY CONTRACTOR
40. CONFORMANCE WITH DRAWINGS
41. CHANGES IN THE WORK
42. CHANGES IN CONTRACT PRICE
43. PAYMENTS TO CONTRACTOR
44. ASSIGNMENTS
45. ACCEPTANCE OF FINAL PAYMENT AS A RELEASE
46. FINAL CERTIFICATE AND PAYMENT
47. ACCEPTANCE OF FINAL CERTIFICATE
48. RIGHT TO WITHHOLD PAYMENTS

49. NOTICE OF WARNING
50. TERMINATION OF CONTRACT
51. PERMITS
52. LAWS AND ORDINANCES
53. RELEASE OF PAYMENT AND PERFORMANCE BONDS
54. RIGHT TO USE WORK
55. WORKING HOURS
56. PROVISIONS REQUIRED BY LAW DEEMED INSERTED
57. WAIVER
58. ADDRESS
59. USE OF PREMISES AND REMOVAL OF DEBRIS
60. ESTIMATED QUANTITIES
61. RIGHT-OF-WAY AND SUSPENSION OF WORK
62. MACHINERY AND EQUIPMENT
63. GENERAL GUARANTY
64. PROCEDURE IN CONSTRUCTION
65. OTHER PROHIBITED INTERESTS
66. OWNER'S AUTHORITY
67. OWNER MAY STOP WORK
68. LIENS
69. WORK SUBJECT TO CONTROL OF OWNER
70. OWNER'S CONTROL NOT LIMITED
71. CONTRACTOR'S OBLIGATIONS
72. ABBREVIATIONS
73. SAFETY AND HEALTH REGULATIONS
74. TAXES
75. WAGE RATES
76. ACCESS TO THE WORK
77. SUBSURFACE STRUCTURES AND UTILITIES
78. ARBITRATION

SECTION 00 72 13

GENERAL CONDITIONS

ARTICLE 1 CONTRACT AND CONTRACT DOCUMENTS

(a) The Drawings, the Specifications and the Addendum (or Addenda), the Advertisement for Bids, the Information for Bidders, and the Bid (Proposal) as accepted by the Owner as evidenced by the Owner's Notice of Award to the Contractor, which notice is made a part of this Contract, the General Conditions, and the Special Conditions, shall form a part of this Contract, and the provisions thereof shall be as binding upon the parties hereto as if they were herein fully set forth. The table of contents, titles, headings, running headlines and marginal references to various provisions of the Contract Documents are in no way to affect, limit or cast light on the interpretation of the provisions to which they refer. Whenever the term "Contract Documents" is used, it shall mean and include all items listed in this Contract.

(b) The Contractor hereby agrees to commence work under this Contract on or within ten (10) days after a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within the period specified in this Contract. The Contractor further agrees to pay, as liquidated damages, the sum specified for each consecutive calendar day thereafter.

ARTICLE 2 DEFINITIONS

(a) The word "Municipality" as used in the Contract Documents or in discussions concerning or appertaining to the work as a whole, shall mean the City of Pawtucket, Rhode Island. The words "City" or "Owner", when used, shall also mean the Pawtucket Water Supply Board acting herein through its Chairman.

(b) Whenever the word "Architect" is used in reference to the work or any part thereof or in the Contract Documents, it shall mean the Owner's duly authorized representative.

(c) Whenever the word "Bidder" is used in the Contract Documents, it shall mean any individual, partnership, firm or corporation submitting an approved proposal for the work contemplated.

(d) Whenever the word "Contractor" is used, it shall mean the person or persons or co-partnership or corporation contracting to perform the work to be done under the Contract Documents or the legal representatives of such party or parties.

(e) Whenever the word "Subcontractor" is used in the Contract Documents, it shall mean the person, firm or corporation supplying labor and materials or only labor for work at the site of the project for and under separate contract or agreement with the Contractor.

(f) Whenever the word "Surety" is used in the Contract Documents, it shall mean the corporate body which is Surety on the Contractor's bond for the payment of all debts for materials and labor used or employed in the execution of the contract and for the acceptable performance of the work.

(g) Whenever the words "City Solicitor" are used, they shall mean the City Solicitor of the City of Pawtucket, Rhode Island or the Attorney assigned by the city solicitor to perform legal services for the Pawtucket Water Supply Board.

(h) Whenever the word "Bid" is used in the Contract Documents, it shall mean the proposal submitted by the bidder and similarly the "Proposal" shall mean bid.

(i) Whenever the word "Plans" is used in the Contract Documents, it shall mean the drawings or reproductions of drawings pertaining to the construction of the work or to any structure connected therewith. The word "Drawings" may sometimes be used and it shall be understood to mean "Plans".

(j) Whenever the word "Specifications" is used in the Contract Documents, it shall mean the description, directions, provisions and requirements contained in the Contract Documents, together with all written agreements made or to be made pertaining to the method and manner of performing the work or to the quantities and qualities of materials to be furnished under this contract.

(k) Whenever the word "Addendum" is used in the Contract Documents, it shall mean any written interpretation, clarification, amendment or addition to the original Plans or Specifications issued by the Owner.

(l) Whenever the word "Project" is used, it shall mean the entire work to be executed under the contract.

(m) Whenever the word "Contract" is used in the Contract Documents, it shall mean the contract covering the performance of the work and the furnishing of materials required therefore as evidenced by the Contract Documents.

(n) For Definitions of Abbreviations, Refer to Article 72, "Abbreviations".

(o) Wherever in the specifications or upon the contract drawings the words directed, required, permitted, ordered, instructed, designated, considered necessary or words of like import are used, it shall be understood that the direction, requirement, permission, order, instruction, designation or decision of the Owner is intended; wherever the words as shown, as indicated, as detailed or words of similar import are used, it shall be understood that reference to the drawings accompanying these specifications is made unless otherwise stated; and similarly the words approved, acceptable, satisfactory or words of like import, shall mean approved by or acceptable to or satisfactory to the Owner. As used herein "provided" shall be understood to mean "Provided complete in place," that is "furnished and installed complete."

(p) Wherever the phrases "substantial completion" or "substantially complete" are used in the Contract Documents, they shall mean the completion of construction of all installations, completely tested and accepted and being sufficiently completed so that the project or specified part can be used for the purposes for which it is intended.

(q) Designation of Number and Gender: All words used in the singular number shall extend to and include the plural. All words used in the plural number shall extend to and include the singular. All words used in any gender shall extend to and include all genders.

ARTICLE 3 SCOPE OF WORK

(a) The Contractor shall furnish all labor, materials, equipment, power, water, light, heat, fuel, tools, appliances, supplies, traffic control coordination, incidentals, and all other means of construction necessary or proper for executing and completing the project; he shall do all work including extra and additional work and pay all costs connected therewith; restore to their original conditions all surfaces disturbed; pay cost of all insurance; bear all losses due to the nature of the work and costs incidental to suspension or discontinuance of the work except as otherwise provided; assume all responsibility of whatever nature of kind, indemnify the Owner from all claims; secure and pay for all permits unless otherwise provided; conform to all city, county, state, municipal or federal legislation and requirements; he shall do all work necessary to conform the project to the Contract Documents and shall leave intact the work of any adjoining contractors unless otherwise ordered by the Owner; perform and complete the work in a manner best calculated to permit rapid construction, consistent with safety of life and property and satisfactory to the Owner and in strict accordance with the Contract Documents; he shall protect the work

during construction, clean up the work during and after construction and maintain it until final acceptance, as hereinafter provided.

(b) The Contractor shall do all work and pay all costs of protecting, supporting, maintaining, repairing if damaged, relocating and restoring all surface, subsurface or overhead structures and all other property including pipes, conduits, ducts, tubes, chambers and appurtenances, public or private in the vicinity of the work, except as otherwise specified.

ARTICLE 4 DRAWINGS AND SPECIFICATIONS

(a) The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract Documents and all incidental work necessary to complete the Project in an acceptable manner ready for use, occupancy or operation by the Owner.

(b) In case of conflict between the Drawings and Specifications, the Specifications shall govern. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings.

(c) Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Owner in writing who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk and expense.

ARTICLE 5 ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

a. The Contractor may be furnished additional instructions and detail drawings by the Owner as necessary to carry out the Work required by the Contract Documents.

b. The additional drawings and instruction thus supplied will become a part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

ARTICLE 6 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

The Contractor shall keep at the site of the work at least one copy of the Drawings and Specifications, and shall at all times give the Owner and his representatives access thereto. Anything shown on the Drawings and not mentioned in the Specifications, or mentioned in the Specifications and not shown on the Drawings, shall have the same effect as if shown or mentioned in both.

ARTICLE 7 WORK TO BE ACCOMPLISHED IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS

The work, during its progress and at its completion, shall conform to: the lines and grades shown on the drawings, to the specifications, and to the directions given by the Owner from time to time, subject to such modifications or additions as he shall determine to be necessary during the execution of the work; and in no case will any work be paid for in excess of such requirements.

ARTICLE 8 SHOP OR SETTING DRAWINGS

(a) The Contractor shall submit promptly to the Owner five (5) copies of each shop or setting drawing prepared in accordance with the schedule predetermined as aforesaid. After examination of such drawings by the Owner and the return thereof, the Contractor shall make such corrections to the drawings as have been indicated and shall furnish the Owner with five corrected copies. If requested by the Owner the Contractor must furnish additional copies. Regardless of corrections made in or approval given to such drawings by the Owner, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the drawings and specifications, unless he notifies the Owner in writing of any deviations at the time he furnishes such drawings.

(b) Shop drawings of all fabricated work shall be submitted to the Owner for approval and no work shall be fabricated by the Contractor save at his own risk until approval has been given.

(c) The Contractor shall submit all shop and setting drawings on dates sufficiently in advance of requirements to enable the Owner ample time for checking same, including time for correcting, resubmission and recheck, if necessary, and no claim for delay will be granted the Contractor by reason of his failure in this respect.

(d) All shop drawings submitted must bear the stamp of approval of the Contractor and reference conformance to the applicable section of the specifications, as evidence that the drawings have been checked by the Contractor. Any drawings submitted without this stamp of approval will not be considered and will be returned to the Contractor for resubmission. If the shop drawings show variations from the requirements of the Contract Documents because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment; otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract Documents even though such shop drawings have been approved.

(e) Where shop drawings are submitted by the Contractor that indicate a departure from the contract which the Owner deems to be a minor adjustment in his interest and not involving a change in the contract price or extension of time, the Owner may approve the drawings, but the approval will contain, in substance, the following:

The modification shown on the attached drawings is approved in the interest of the Owner to effect an improvement for the project and is ordered with the understanding that it does not involve any change in the contract price or time; that it is subject generally to all contract stipulations and covenants and that it is without prejudice to any and all rights of the Owner under the contract and bond or bonds.

(f) The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for adherence to the contract nor shall it relieve him of the responsibility for any error which may exist.

(g) The Contractor agrees to hold the Architect and the Owner harmless and defend them against damages of claims for damages arising out of injury to others or property of third persons which result from errors on shop, working or setting drawings whether or not the same have been approved by the Architects and/or the Owner.

ARTICLE 9 INDEMNIFICATION

To the fullest extent permitted by law, the Subcontractor shall hold harmless and indemnify the City of Pawtucket and the Pawtucket Water Supply Board (PWSB), and any other party the City of Pawtucket and the PWSB is contractually required to indemnify, from an against any and all claims, suits, liability, judgments, settlements, expenses, defense costs and/or attorneys fees, due to injury (including injury to the Subcontractor's employees), loss of any sort, or damage to any property, occasioned in whole or in part by any act or omission of the Subcontractor, its employees, agents, invitees, subcontractors of any tier, vendors, or material suppliers,

regardless of whether or not it is contended that the party being indemnified contributed thereto by its own acts or omissions or was responsible therefore by reason of a non-delegable duty. Unless such indemnity is permitted by law, the obligation to indemnify shall not extend to that percentage of any judgment or settlement equal to the percentage of negligence found to be attributable to the party being indemnified; however, the Subcontractor shall indemnify for all remaining portions of any judgment or settlement.

To the fullest extent permitted by law, the Subcontractor shall defend each and every claim made against the City of Pawtucket and the PWSB and any other party the City of Pawtucket and the PWSB is contractually required to indemnify, for injury (including injury to the Subcontractor's employees), loss of any sort or damage to any property occasioned in whole or in part by any act or omission of the Subcontractor, its employees, agents, invitees, subcontractors of any tier, vendors, or material suppliers, regardless of whether or not it is contended that the party being indemnified contributed thereto by its own acts or omissions or was responsible therefore by reason of a non-delegable duty. The Subcontractor agrees to provide a defense to the City of Pawtucket and the PWSB and any other party the City of Pawtucket and the PWSB is contractually required to indemnify, with counsel of the defended party's choice, from the moment the claim is first asserted, regardless of whether the Subcontractor is ultimately required to indemnify the party under the preceding paragraph.

To the fullest extent permitted by law, the Subcontractor shall reimburse the City of Pawtucket and the PWSB and any other party the City of Pawtucket and the PWSB is contractually required to indemnify, for any cost or expenses, including but not limited to attorney's fees, expended in seeking the Subcontractor's compliance with the above stated duties to defend, indemnify and hold harmless.

ARTICLE 10 CONTRACTOR'S RESPONSIBILITY

(a) The Contractor shall be conclusively presumed to be acquainted with all existing conditions and to guarantee that all work and materials shall, upon final completion of the work, be turned over to the Owner in a complete and perfect condition and he shall be responsible for the proper care, maintenance and protection of all work and materials until his entire contract is completed and all work and materials found in good condition and accepted. The Contractor will be held responsible for the entire work until completed and accepted by the Architect and the Owner.

b) It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, plant, water, light, power, traffic control, transportation, superintendence, temporary construction of every nature and all other services and facilities of every nature whatsoever necessary to protect, execute and complete the project within the specified time.

ARTICLE 11 CONTRACTOR'S TITLE TO MATERIALS

No material, supplies or equipment for the work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor warrants good title to all material, supplies and equipment installed or incorporated in the work and further warrants upon completion of all work to deliver the premises together with all improvements and appurtenances constructed or placed thereon by him to the Owner free from any claims, liens or charges or encumbrances and further agrees that neither he nor any person, firm or corporation furnishing any material or labor for any work covered by this contract shall have right to a lien upon the premises or any improvement or appurtenance thereon.

ARTICLE 12 INSPECTION AND TESTING OF MATERIALS

(a) All materials and equipment used in the construction of the project shall be new and of current manufacture. Testing will be in accordance with accepted standards and as directed; the laboratory or inspection agency shall be selected by the Owner. Except as specified elsewhere in these specifications, the Contractor will pay for all testing and laboratory inspection.

(b) All materials and workmanship shall be subject to inspection, examination and test by the Owner

at any and all times during manufacture and/or construction and at any and all places where such manufacture and/or construction are carried on to establish conformance with these specifications and suitability for uses intended. Without additional charge, the Contractor shall furnish promptly all reasonable facilities, labor and materials necessary to make tests so required safe and convenient; he shall also furnish any mill, factory or such other tests based on the Standards and Tentative Standards of the American Society for Testing Materials as required by the Owner. Special full size and performance tests shall be as described in the specifications. A 7-day notification in writing stipulating the time and place where the manufacturing is to be done shall be given the Architect prior to the commencement of manufacture of any materials in order that a representative of the Owner may be present, if so desired, to observe and inspect the operations.

(c) It is expressly understood and agreed that the inspection of materials by the City and/or the Architect will in no way lessen the responsibility of the Contractor or release him for his obligation to perform and deliver to the City, sound and satisfactory materials, or supplies. The contractor agrees to pay the cost of all tests of defective material, or supplies or allow the cost to be deducted from any monies due him from the City.

ARTICLE 13 MATERIALS

(a) All materials furnished and used in the completed work shall be new, unless otherwise specified, and of the best quality, workmanship and design, and recognized as standard in good construction practices. Whenever a specification number or reference is given, the subsequent amendments (if any) shall be included. The standards set forth in the selection of materials and supplies are intended to conform with those standards adopted by the Owner. Preference in manufacture shall be given to adopted standards and the Contractor shall further familiarize himself with the requirements of the Owner when the occasion or choice of materials or supplies so demands.

(b) The materials used in construction shall be so disposed as not to endanger the work and so that full access may at all times be had to partly completed work and structures and they shall be so distributed as to cause no injury to those having access to the work or any of the units.

ARTICLE 14 "OR APPROVED EQUAL" CLAUSE

(a) Whenever a material or article required is specified or shown on the drawings by using the name of the proprietary product or the name of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design, may be considered equal and satisfactory, providing the material or article so proposed is of equal substance and function in the Owner's opinion. It shall not be purchased or installed without his written approval. In all cases, new material shall be used in the project.

(b) If one or more brands, makes of material, devices, or equipment are shown or specified, each should be regarded as the equal of the other. Any other brand, make of material, device or equipment which, in the opinion of the Owner or his authorized agent, is the recognized equal of that specified, considering quality, workmanship, and economy of operation and is suitable for the purpose intended, may be accepted.

ARTICLE 15 PATENTS

(a) The Contractor shall hold and save the Owner and its officers, agents, servants and employees harmless from liability of any nature or kind, including cost and expenses for or on account of any patented or unpatented invention, process, article or appliance manufactured or used in the performance of the contract, including its use by the Owner.

(b) License and/or royalty fees for the use of a process which is authorized by the Owner of the project must be reasonable and paid to the holder of the patent or his authorized license, direct by the Contractor.

(c) If the Contractor uses any design, device or materials covered by letters, patent or copyright, he

shall provide for such use by suitable agreement with the owner of such patented or copyrighted design, device or material.

(d) It is mutually agreed and understood that, without exception, the contract prices shall include all royalties, license fees or costs arising from the use of such process, design, device or materials, in any way involved in the work. The Contractor and/or his Sureties shall indemnify and save harmless the Architects and/or the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Architects and/or the Owner for any cost, expense or damage which they may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

ARTICLE 16 OTHER CONTRACTS

(a) The owner reserves the right to do work by other contractors or by the Owner's forces and to permit public utility companies and others to do work during the progress and within the limits of or adjacent to the project, and the Contractor shall conduct his work and cooperate with such other parties so as to cause as little interference as possible with such other work. The Contractor agrees to make no claim against the Owner for additional payment due to delays or other conditions. created by other operations of such other parties. If there is a difference of opinion as to the respective rights of the Contractor and others doing work, within the limits of or adjacent to the project, the Owner will decide as to the respective rights of the various parties involved in order to secure completion of the Owner's work in a satisfactory manner, and his decision shall be final and binding on the Contractor.

(b) If any part of the work of the Contractor or any of his Subcontractors depends for proper execution, or results upon the work of any other Contractor, the Contractor will inspect and promptly give to the Architect notice of any such defects in the work of such Contractor, as to render it suitable for such proper execution and results or of any delay by such other Contractor in the performance of his work. The failure of the Contractor to inspect and give notice shall constitute an acceptance by him (but not by the Owner) of the work of the other Contractor as fit and proper for the reception of his own work, except as to defects developing in the work of such other Contractor after the execution of the Contractor's work and an acknowledgment of the timely performance by such other Contractor of his work.

ARTICLE 17 COMPLETENESS OF WORK

In addition to the specified or described portions, all other work and all other materials, equipment and labor of whatever description which are necessary or required to complete the work, or for carrying out the full intent of the drawings and specifications, as interpreted by the Owner, such work, labor, materials and equipment shall be provided by the Contractor, and payment therefore shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 18 CONTRACTOR TO CHECK DIMENSIONS AND SCHEDULES

The Contractor will be required to check all dimensions and quantities shown on the drawings or schedules given to him by the Owner, and shall notify the Owner of all errors therein which he may discover by examining and checking the same. The Contractor shall not take advantage of any error or omission in these specifications drawings or schedules. The owner will furnish all instructions should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

ARTICLE 19 REPRESENTATIONS OF CONTRACTOR: The contractor represents and warrants:

(a) That he is financially solvent and that he is experienced and competent to perform the type of work or furnish the materials, supplies or equipment to be performed or furnished by him; and

(b) That he is familiar with all City, Federal, State, municipal and department laws, ordinances, orders and regulations which may in any way affect the work of those employed therein, including but not

limited to any special acts relating to the work or to the project of which it is a part; and

(c) That such temporary and permanent work required by the contract documents to be done by him can be satisfactorily constructed and used for the purpose for which it is intended, and that such construction will not injure any person or damage any property; and

(d) That he has carefully examined the drawings, specifications and addendum (or addenda) if any, and the site of the work, and that from his own investigations, he has satisfied himself as to the nature and location of the work, the character, quality and quantity of surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the work, the general and local conditions, and all other materials which may in any way affect the work or its performance; and

(e) That he is aware of the hazards involved in the work and the danger to life and property both evident and inherent and that he will conduct the work in a careful and safe manner without injury to persons or property; and

(f) That he can provide the necessary equipment, labor and materials to complete the contract work within the specified contract duration.

ARTICLE 20 INTERFERENCE WITH EXISTING STRUCTURES:

a) Whenever it may be necessary to cross or interfere with existing culverts, drains, sewers, water pipes, guardrails, fences, gas pipes or other structures needing special care, due notice shall be given to the Owner, and the work shall be done according to his directions. Whenever required, all objects shall be strengthened to meet any additional stress that the work herein specified may impose upon it, and any damage caused shall be thoroughly repaired. If so directed by the Owner, the location of any existing work shall be changed to meet the requirements or appurtenances or the new work may be relocated, if necessary, to leave all in good working order. The entire work shall be the responsibility of the Contractor and the work shall be performed at no additional expense to the Owner.

(b) The Contractor shall be responsible for all broken utilities encountered during the progress of the work and shall repair and be responsible for correcting all damages to existing utilities and structures at no additional expense to the Owner. The Contractor shall contact the proper utility or authority to correct or make any changes due to utility or other obstructions during the work of construction of the new work but the entire responsibility and expense shall be with the Contractor.

(c) All damaged items of work or items required to be removed and replaced due to construction shall be replaced or repaired by the Contractor to the complete satisfaction of the property owner's and/or the Owner at no additional expense.

ARTICLE 21 EXISTING UTILITIES OR CONNECTIONS

(a) The location of existing underground pipes, utilities, conduits and structures as shown has been collected from the best available sources and the Owner together with its agents does not imply nor guarantee the data and information in connection with underground pipes, utilities, conduits, structures and such other parts as to their completeness nor their locations as indicated. The Contractor shall assume that there are existing water, gas and other utility connections to each and every building and route, whether they appear on the drawings or not. Any expense and/or delay occasioned by utilities and structures or damage thereto, including those not shown, shall be the responsibility of the Contractor, at no additional expense to the Owner.

(b) Before proceeding with construction operations, the Contractor shall notify the State of Rhode Island Utilities Underground Plant Damage Prevention System (DIG SAFE) at 1- 888-344-7233, and shall make such supplemental investigations, including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures, and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than shown on the drawings, or which are made known to the Contractor prior to construction operations. The Contractor shall be responsible and liable for all damages to the existing utilities and structures. Ground penetrating radar shall be used to verify path of new excavation and any

utilities in that path.

ARTICLE 22 PROTECTION OF PERSONS AND PROPERTY

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel, and shall protect from damage all lawns, terraces, trees, curbs, gutters, flagging, crosswalks, water pipes, hydrants, electric light and telephone poles, water stop cocks, manholes, gas pipes, conduits and other underground appurtenances on the line of the work and adjacent thereto, and at his own cost, unless particularly specified otherwise, repair or replace any of the aforementioned items which may become damaged or displaced at any time during the progress of the work. He shall, at his own expense, whenever necessary or required, maintain fences, install shoring, provide watchmen, maintain red lights, post danger signs warning against the hazards created by the construction work, as for example and without limiting the generality of the foregoing, open trenches, well holes and protruding nails, and he shall take such other precautions as may be necessary to protect life and property, and he shall be responsible for all damages occasioned in any way by his act or neglect, or that of his agents, employees or workmen.

ARTICLE 23 PROTECTION OF WORK AND PROPERTY - EMERGENCY

(a) The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work, and that of adjacent property, from damage. The Contractor shall replace or make good any such damage, loss or injury unless such be caused directly by errors contained in the contract or by the Owner, or his duly authorized representatives.

(b) In case of an emergency which threatens loss or injury of property and/or safety of life, the Contractor will be allowed to act, without previous instructions from the Owner, in a diligent manner. He shall notify the Owner immediately thereafter. Any claim for compensation by the Contractor due to such extra work shall be promptly submitted to the Owner for approval. All such claims shall be fully documented with information regarding the nature of the emergency, the action taken in response to the emergency, costs associated with the response actions taken, etc. Photographs, witness statements, recordings and other such documentation material shall be provided if possible.

(c) Where the Contractor has not taken action but has notified the Owner of an emergency threatening injury to persons or damage to the work or to any adjoining property, he shall act as instructed or authorized by the Owner.

(d) The amount of reimbursement claimed by the Contractor on account of any emergency action shall be determined in the manner provided elsewhere in the contract documents.

ARTICLE 24 WATER

The water system is owned by the City of Pawtucket, and the Contractor shall be required to abide by all rules and regulations of the Pawtucket Water Supply Board. He shall arrange with the Pawtucket Water Supply Board for the operation of any existing valves and the metering and use of water for construction purposes. Any hose for water for construction purposes that is to be connected to a hydrant shall have a PWSB issued meter and a testable RP backflow device such as a Watts 009. (Refer to Article 47, Operation of Valves, of the Special Conditions)

ARTICLE 25 SUPERINTENDENCE AND WORKMEN

(a) The employment of competent superintendents, foremen and experienced mechanics and laborers and others skilled in the particular duties entrusted to them will be required. Whenever the Architect shall inform the Contractor or his representative in charge that any man on the job is incompetent or disorderly or is working contrary to the specifications or the instructions of the Architect, or that the Architect knows that the man has been incompetent or disorderly on this or any previous work, that man shall thereupon be immediately dismissed from the job and shall not be given employment on any work connected with the contract.

(b) If requested, the Contractor shall deliver to the Architect each week a record of the numbers, pay scale and classifications of men employed upon the project each day of the previous week.

ARTICLE 26 INSPECTION

The authorized representatives and agents of the Owner shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records.

ARTICLE 27 REPORTS, RECORDS AND DATA

The Contractor and each of his Subcontractors shall submit to the Owner such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this Contract.

ARTICLE 28 WEATHER CONDITIONS

In the event of temporary suspension of work, or during inclement weather, or whenever the Owner shall direct, the Contractor shall, and shall cause his Subcontractors to protect carefully his and their work and materials against damage or injury from the weather. If, in the opinion of the Owner, any work or material was damaged or injured by reason of failure on the part of the Contractor or any of his Subcontractors to protect his work, or otherwise damaged by the negligence of the Contractor, Subcontractors or their agents or servants, or is otherwise defective, such materials shall be removed and replaced at the expense of the Contractor.

ARTICLE 29 SUBLETTING

(a) The Contractor is not to assign, transfer or sublet the contract in whole or in part to any other person or in any way to abridge the terms of the Contract Documents without written permission from the Architect and express resolution of the Owner, but must keep it in his name and control until completed and accepted by the Architect and the Owner. The Contractor shall likewise not assign any of the money payable under the contract. Approval by the Architect and Owner of the subletting of any part of the work shall not, under any circumstances, relieve the Contractor or his Surety of any liabilities or obligations under the terms of his Contract Documents.

(b) No subcontract will be approved by the Owner until evidence has been presented to the Owner that a Surety Bond will be supplied by the Subcontractor to cover the work performed and materials used in that particular subcontract.

(c) Said bond shall be drawn in favor of the General Contractor and the Owner as joint obligee and shall recite the fact that the original contract has been entered into as well as the subcontract which the bond immediately covers.

(d) Should any Subcontractor violate any of the terms of these specifications, the Owner may, at its option, require the Contractor to end and terminate such subcontract.

(e) The Contractor shall be as fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

(f) The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind Subcontractors to the Contractor by the terms of the Contract and General Conditions and other contract documents insofar as applicable to the work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provisions of the contract documents.

(g) Nothing contained in this contract shall create any contractual relation between any Subcontractor and the Owner.

ARTICLE 30 INSURANCES

General: The Contractor shall be responsible for maintaining insurance coverage in force for the life of this contract of the kinds in adequate amounts to secure all of his obligations under the contract and with insurance companies licensed to write such insurance in the State of Rhode Island. The kinds and amounts of such insurance carried shall not be less than the kinds and amounts designated herein, and the Contractor agrees that the stipulation herein of kinds and minimum amounts of insurance coverage or the acceptance by the Pawtucket Water Supply Board (PWSB) of certificates indicating the kinds and limits of coverage shall in no way limit the liability of the Contractor to any such kinds and amounts of insurance coverage. All policies issued shall include as additional insured's the City of Pawtucket and the PWSB, their officers, directors, agents and employees as Additional Insured within their Commercial General Liability, Business Auto Liability, and Umbrella Liability coverage sections. The additional insured status shall be on a primary basis (with no right of contribution by any other coverage available to the additional insured's stated above).

The Contractor shall purchase and maintain insurance of the following types of coverage and limits of liability:

Commercial General Liability (CGL) with limits of Insurance of not less than $1,000,000 each occurrence and $2,000,000 Annual Aggregate.

(1) If the CGL coverage contains a General Aggregate Limit, such General Aggregate shall apply separately to each project.

(2) CGL coverage shall be written on ISO Occurrence form CG 00 01(12 07) or a substitute form providing equivalent coverage and shall cover liability arising from premises, operations, independent contractors, products-completed operations, and personal and advertising injury.

(3) The City of Pawtucket Water Supply Board shall be included as additional insured on the CGL, using ISO Additional Insured Endorsement CG 20 10 (11 85) or CG 2010 (07 04) AND CG 20 37 (07 04) or CG2033 (07 04) AND CG2037 (07 04) or an endorsement providing equivalent coverage to the additional insured. This insurance for the additional insured shall be as broad as the coverage provided for the named insured Contractor. It shall apply as primary and non-contributing insurance before any other insurance or self-insurance, including any deductible, maintained by, or provided to, the additional insured's as stated above.

(4) The Contractor shall maintain CGL coverage for itself and all additional insured's for the duration of the project and maintain Completed Operations coverage for itself and the PWSB as an additional insured for at least 3 years after completion of the Work.

(b) Automobile Liability

(1) Business Auto Liability with a combined single limit of at least $1,000,000 each accident.

(2) Business Auto coverage must include coverage for liability arising out of all owned, leased, hired and non-owned automobiles.

(3) Additional insured status shall apply as stated above in the Article 30, Insurance, "General" section.

(c) Commercial Umbrella

(1) Umbrella limits must be at least $3,000,000.

(2) Additional insured status shall apply as stated above in the Article 30, Insurance, "General" section.

(d) Workers Compensation and Employers Liability

(1) Employers Liability Insurance limits of at least $500,000 each accident for bodily injury by accident and $500,000 each employee for injury by disease.

(e) Owner's and Contractor's Protective Liability. The Contractor shall provide the City of Pawtucket and the PWSB an insurance policy written in the name of the City of Pawtucket and the PWSB, its board of directors, employees, servants and agents, to protect against and from any liability which might be incurred against them as a result of any operations of the Contractor or his Subcontractors or their employees. This Liability shall have limits of Insurance of not less than $1,000,000 each occurrence and $2,000,000 Annual Aggregate.

Prior to signing the contract agreement, the Contractor must supply a certificate of insurance evidencing the above requirements. This certificate and the insurance policies required by this section shall contain a provision that coverage afforded under the policies will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the City of Pawtucket Water Supply Board. All insurance carriers must be an A.M. Best's "A" rated carrier or better with a financial size VII or better and licensed to do business in the State of Rhode Island. All the insurance specified in this contract shall be provided by the Contractor at no additional expense to the PWSB.

Waiver of Subrogation

The Contractor and its subcontractors and sub-subcontractors (and their insurance carriers) shall waive all rights of subrogation against the City of Pawtucket and the PWSB and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by commercial general liability, commercial umbrella liability, business auto liability, workers compensation and employers liability insurance maintained per requirements stated above.

ARTICLE 31 CONTRACT SECURITY

The contractor shall furnish four (4) copies of an executed Performance Bond in an amount equal to at least one hundred per cent (100%) of the contract price and an executed Payment Bond in an amount equal to at least one hundred percent (100%) of the contract price, as security for the payment of all persons performing labor on the project under this contract and furnishing materials, equipment and all other incidentals in connection with this contract. The Surety on such bonds shall be a duly authorized surety company satisfactory to the Owner and the cost of same shall be paid by the Contractor. Before final acceptance the bonds must be approved by the Owner.

ARTICLE 32 SUBSTITUTE BOND

If, at any time, the Contractor's Surety or Sureties, or the carriers of the other insurance herein specified to be written, become insolvent or, in a reasonable judgment of the Owner, become unsafe or unsound, then upon five days written notice from the Owner to the Contractor, the Contractor shall substitute such Performance, and Labor and Material Bonds, or insurance with such other Surety or carrier, and in such form as shall be satisfactory to the Owner. Any additional premium caused by such substitution shall be paid for by the Contractor. No further payments will be deemed due nor will be made until the new Surety or Sureties shall have furnished such an acceptable bond to the Owner.

ARTICLE 33 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

(a) It is hereby understood and mutually agreed by and between the Contractor and the Owner, that the date of beginning and the time for completion as specified in the contract of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the "Notice to Proceed."

(b) The Contractor agrees that said work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

(c) If the said Contractor shall neglect, fail or refuse to complete the work within the time herein specified, or within any proper extension thereof granted by the Owner, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay as liquidated damages to the Owner the amount specified in the contract, as herein before set forth, for each and every calendar day that the Contractor shall be in default after the time stipulated in the contract for completing the work.

(d) The said amount is fixed and agreed upon by and between the Contractor and the Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, and said amount is agreed to be the amount of damages which the Owner would sustain and said amount shall be retained by the Owner from current periodical payments.

(e) It is further agreed that time is of the essence for each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract an additional time is allowed for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the Contractor shall not be charged with the liquidated damages or any excess cost when the delay in completion of the work is due:

(1) To any preference, priority or allocation order duly issued by the Government, subsequent to date of contract.

(2) To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including but not restricted to acts of God or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather. There will be no time extension awarded for the winter shutdown period.

(3) To any delays of subcontractors or suppliers occasioned by any of the causes specified in subsections (1) and (2) of this article.

PROVIDED FURTHER, that the Contractor shall, within ten (10) days from the beginning of such delay, unless the Owner shall grant a further period of time prior to the date of final settlement of the contract, notify the Owner, in writing, of the causes of the delay, who shall ascertain the facts and extent of the delay and notify the Contractor within a reasonable time of its decision in the matter.

ARTICLE 34 MUTUAL RESPONSIBILITY OF CONTRACTORS

If, through acts of neglect on the part of the Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the work, the Contractor agrees to settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against the Owner on account of any damage alleged to have been sustained, the Owner shall notify the Contractor, who shall indemnify and save harmless the Owner against any such claim.

ARTICLE 35 CORRECTION OF WORK

All work, all materials, whether incorporated in the work or not, all processes of manufacture, and all methods of construction shall be at all times and places subject to the inspection of the Owner who shall be the final judge of the quality and suitability of the work, materials, processes of manufacture and methods of construction for the purposes for which they are used. Should they fail to meet his approval they shall be forthwith reconstructed, made good, replaced and/or corrected, as the case may be, by the Contractor, at his own expense. Rejected material shall immediately be removed from the site. If, in the opinion of the Owner, it is undesirable to replace any defective or damaged materials or to reconstruct or correct any portion of the work injured or not performed in accordance with the contract documents, the compensation to be paid to the Contractor hereunder shall be reduced by such amount as in the judgment of the Owner shall be equitable.

ARTICLE 36 CHANGES IN PLANS AND SPECIFICATIONS

(a) The Owner reserves the right to make changes in the plans or specifications or to increase or decrease the amount or quantity of the work at any time, before or after construction has commenced.

(b) Except as hereinafter provided, no such change shall be binding upon the Contractor nor require the payment of additional compensation to the Contractor, unless it has been ordered in writing by the Architect who has been especially authorized thereto in writing by the Owner pursuant to a resolution having been duly adopted by said Owner.

(c) Except as hereinafter provided, no oral agreement, conversation or understanding between the Contractor and the Architect or any inspector or any representative of the Owner, before or after the execution of the contract, shall affect or modify any of the terms or obligations of the Contract Documents or excuse the performance of any work in any manner contrary to the terms of the Contract Documents.

(d) The Contractor shall, however obey any oral instructions of the Architect which require no more than a change in the location, line or grade of pipes, manholes or other appurtenances, or an increase or decrease in the quantities of those items which are covered by unit prices in the proposal.

(e) For any work performed by the Contractor pursuant to such oral instructions, payment will be made under the unit prices applicable to the work actually done and in accordance with the actual amount of such work done. If such oral instructions decrease the quantities or amount of work, no payment will be made to the Contractor to compensate him for any loss of anticipated profit on the work omitted.

(f) If the Contractor does not concede that the unit prices in this proposal should be applicable to any work required to be performed under oral instructions of the Architect he must notify the Architect and clearly demonstrate that such unit prices will not apply and, in such case, the oral instructions of the Architect shall not be effective unless confirmed in writing as herein above provided. If such instructions are confirmed in writing, the compensation to the Contractor shall be computed as for Extra Work at the discretion of the Architect.

(g) If the Contractor proceeds with the performance of any work in accordance with the oral instructions of the Architect, it shall be conclusively presumed that the unit prices stated in the Contractor's proposal apply to such work and no additional or different compensation will be paid.

(h) If any change in the plans or specifications are authorized in writing by the Owner, and at the discretion of the Architect, the Contractor shall be paid therefore as provided in the section entitled Extra Work.

ARTICLE 37 EXTRA WORK

(A) The amount of compensation to be paid to the Contractor for any additional work required to be performed pursuant to any authorized written modification of the plans or specifications shall be determined on either of the following bases:

(1) If any unit prices stated in the proposal are applicable to such work the Contractor shall be paid such unit prices.

(2) The Engineer shall request the Contractor for a lump sum price for which he will do the work, and if the price is accepted by the Owner, then the Contractor will be paid such lump sum price. For work to be performed under a Lump Sum agreement the Contractor may apply a 10% allowance for overhead and profit against the net cost of work actually to be performed by him, except that in the event the change in work to be performed by him results in a net omission then no percentage for overhead and profit shall be allowed. The Contractor is permitted a 5% allowance to be applied against the net cost to a Subcontractor for work actually performed by the Subcontractor, but any change involving more than one Subcontractor, their net costs and/or net

omissions shall be combined as one before consideration is given to the application of the 5% for the Contractor's overhead profit, and in the event the Contractor shows a net omission for the change as it affects the work actually to be performed by him, he is permitted only the 5% applied to the amount (if any) by which the net cost to the Subcontractor exceeds the net omission by the Contractor. For work to be performed by a Subcontractor the cost to the Owner may include the net cost to the Subcontractor plus an allowance of an amount not to exceed 10% of the net cost for the Subcontractor's overhead and profit except that in the event that the change in work results in a net omission for the Subcontractor there shall be no application of the 15% overhead and profit. Net cost to the Contractor and/or any Subcontractor shall be that defined in sub-section (3) of this article, but in every case taxes imposed by law upon labor employed at the site shall be excluded; and all credits which in the case of the Contractor shall include net omissions by the Subcontractor shall be deducted before the percentage can be applied. For the purpose of applying the provisions of this article, the Owner will not recognize other than a direct subcontractor of the Contractor nor permit the aggregate allowance to exceed 15% as applied above, to the net cost of work performed by any Subcontractor.

(3) If the lump sum price proposed by the Contractor is not accepted by the Owner, the Contractor shall be paid in the following manner:

a) LABOR: For all labor and foreman in direct charge of the specific operations, the Contractor shall receive the rate of wage actually paid as shown by his certified payroll which shall be the prevailing rate of wage (or scale) for each and every hour that said labor and foremen are actually engaged in such work.

No part of the salary or expenses of anyone connected with the Contractor's forces above the grade of foreman, and having general supervision of the work, will be included in the labor item as specified above.

The Engineer reserves the right to determine the number and type of labor employed.

The Contractor shall receive the actual costs paid to, or in behalf of, health and welfare benefits, pension fund benefits or other benefits when such amounts are required by collective bargaining agreement or other employment contract generally applicable to the classes of labor employed on the work.

An amount equal to 15 percent of the sum of the above items will also be paid the Contractor.

BOND, INSURANCE AND TAX: For property damage, liability, and workmen's compensation insurance premiums, unemployment insurance contributions and social security taxes on the extra work, the Contractor shall receive the actual cost, to which cost 6 percent will be added. The Contractor shall furnish satisfactory evidence of the rate or rates paid for such bond, insurance and tax.

b) MATERIALS: For material accepted by the Architect and used, the Contractor shall receive the actual cost of such materials delivered on the work site to which cost 15 percent will be added.

The Contractor will not be reimbursed for any penalty or carrying charge incurred due to late or delayed payment for materials used.

c) EQUIPMENT: For any machinery or special equipment (other than small tools) including transportation cost, the use of which has been authorized by the Architect, the Contractor shall receive either the prevailing rental rates or the actual documented cost plus an amount equal to 15% of the actual documented cost. Under no circumstance shall the payment exceed the replacement cost of the equipment.

All rental rates shall include the estimated operating cost as indicated for that equipment in the RENTAL RATE BLUE BOOK or the RENTAL RATE BLUE BOOK FOR OLDER EQUIPMENT. Operator's wages are not included in the estimated operating cost and are paid separately, except for certain equipment which may have the operator included.

The hourly rate shall apply when the equipment is specifically assigned to the work for a period of four hours or less.

The daily rate per hour shall apply when the equipment is specifically assigned to the work by the Engineer for a period of more than four hours and less than four consecutive working days.

The weekly rate per hour shall apply when the equipment is specifically assigned to the work by the Engineer for four consecutive working days or more but less than fifteen consecutive working days. The monthly rate per hour shall apply when the equipment is specifically assigned to the work by the Engineer for fifteen consecutive working days or more.

The applicable hourly, daily, weekly, or monthly rate will be determined at the expiration of fifteen consecutive working days or upon release of the equipment, whichever occurs first. Interruption of the rental period, when equipment is used on other than assigned extra work, will not constitute a warrant for a rental rate applicable to shorter periods occasioned by such interruptions.

For rented equipment the cost shall be based on the actual documented cost plus an amount equal to 15% of the actual documented cost. The actual documented cost shall consist of the paid invoice for rented equipment plus other documented operating costs (i.e. fuel, maintenance, repairs, etc.).

The actual documented costs plus 15% of the actual documented costs shall not exceed the cost as calculated from the RENTAL RATE BLUE BOOK or the RENTAL RATE BLUE BOOK FOR OLDER CONSTRUCTION EQUIPMENT. The Contractor shall submit documentation for both the hourly rental rates and the actual documented cost to determine that the actual documented costs plus 15% does not exceed the calculated rental rate costs.

For equipment which is already on the project, the rental period shall start when ordered to work by the Engineer, and shall continue until ordered to discontinue by him.

For equipment which has to be brought to the project specifically for use on extra work, the PWSB will pay all loading and unloading costs, also all transportation costs to and from the project, including assembling and dismantling, provided, however, that the cost of return transportation shall not exceed that of moving the equipment to the project. Loading, unloading and transportation costs will not be paid if the equipment is used for work other than extra work while on the project. The rental period shall start at the time the equipment is ready for operations, and for that period of time the equipment is actually utilized in the extra work. The rental period shall end when the equipment is released by the Engineer.

All equipment, including trucks, shall, in the judgment of the Engineer, be in good working condition and fitting and suitable to the purpose intended, and the Engineer reserves the right to determine the number used. The manufacturer's model identification shall be the basis for identifying the type of equipment for payment purposes. Certification for the model year of the equipment will be required.

No percentage will be added to the "Blue Book rates" as prescribed herein by the PWSB for equipment. When the actual cost is used as the method of payment, an amount equal to 15% of the actual cost will be added provided the total cost does not exceed the applicable cost as calculated from the RENTAL RATE BLUE BOOK or the RENTAL RATE BLUE BOOK FOR OLDER CONSTRUCTION EQUIPMENT.

d) SUBCONTRACTOR COST: For work performed by a subcontractor, the Contractor shall accept as full payment therefore, an amount equal to the actual cost to the Contractor of such work performed by the subcontractor as determined by the Engineer, plus 10 percent of such cost. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

e) STATEMENTS: Statements shall be accompanied and supported by receipt Invoices for all

materials. However, if materials used on the Extra work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the Invoices, the Contractor shall furnish an affidavit certifying that such materials were taken from his stock, that the quantity claimed was actually used, and that the price claimed represents the actual cost to the Contractor.

(B) It shall not constitute a change in the plans or specifications or order entitling the Contractor to extra compensation if the Engineer shall order changes or increase in plant or personnel to maintain the scheduled rate of progress in the work to be done under the contract.

(C) If, in any part of the work done, the Contractor, without written order from the Architect, uses material in excess of the amounts required by the plans and specifications, no payment for such excess will be allowed nor shall it be claimed.

(D) Approval by the Engineer of materials or equipment substituted by the Contractor for those specified shall not be considered Extra Work.

(E) No claim for extra work or cost will be allowed unless the same was done in pursuance of a written order of the Owner, as aforesaid, and this claim presented with the first estimate after the changed or extra work is done. When work is performed under the terms specified herein, the Contractor shall furnish satisfactory bills, payrolls and vouchers covering all items of cost and, when requested by the Owner, give the Owner access to accounts relating thereto.

ARTICLE 38 CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

Immediately after execution and delivery of the contract, and before the first partial payment is made, the Contractor shall deliver to the Owner an estimated construction progress schedule in form satisfactory to the Owner and conforming to additional requirements specified herein under SPECIAL CONDITIONS, showing the proposed dates of commencement and completion of each of the various subdivisions of work required under the contract documents and the anticipated amount of each monthly payment that will become due the Contractor in accordance with the progress schedule. The Contractor shall also furnish on forms to be supplied by the Owner: (a) a detailed estimate giving a complete breakdown of the contract price, and (b) periodic itemized estimates of work done for the purpose of making partial payment thereon. The costs employed in making up any of these schedules will be used only for determining the basis of partial payments and will not be considered as fixing a basis for additions to or deductions from the contract price.

ARTICLE 39 PAYMENTS BY CONTRACTOR

The Contractor shall pay:

(a) for all transportation and utility services not later than the 20th day of the calendar month following that in which services are rendered.

(b) for all materials, tools and other expendable equipment to the extent of 95 percent of the cost thereof, not later than the 20th day of the calendar month following that in which such materials, tools and equipment are delivered at the site of the project, and the balance of the cost thereof not later than the 30th day following the completion of that part of the work in or on which such materials, tools and equipment are incorporated or used.

(c) to each of his Subcontractors not later than the 5th day following each payment to the Contractor, the respective amounts allowed the Contractor an account of the work performed by his Subcontractors to the extent of such Subcontractor's interest therein.

ARTICLE 40 CONFORMANCE WITH DRAWINGS

The Owner may make alterations in the lines, grade, plan, form dimensions or materials of the work, or any part thereof, either before or after the commencement of construction. If such alterations diminish the quantity included in any item of work to be done and paid for at a unit price, the Contractor shall have no claim for damages or for anticipated profits on the work that thus may be dispensed with. If they increase the quantity included in any such item, such increase shall be paid for at the stipulated

price.

ARTICLE 41 CHANGES IN THE WORK

(a) The Owner may at any time, as the need arises, order changes within the scope of the Work without invalidating the Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, an equitable adjustment shall be authorized by Change Order.

(b) The Owner also may at any time, by issuing a written Field Order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Owner unless the Contractor believes that such Written Field Order entitles him to a change in Contract Price or Time or both in which event he shall give the Owner Written Notice thereof within seven (7) days after the receipt of the ordered change. Thereafter the Contractor shall document the basis for the change in Contract Price or Time within thirty (30) days. The Contractor shall not execute such changes pending the receipt of an executed Change Order or further instruction from the Owner.

ARTICLE 42 CHANGES IN CONTRACT PRICE

The Contract Price may be changed only by a Change Order. The value of any Work covered by a Change Order or of any claim for increase or decrease in the Contract Price shall be determined by one or more of the following methods in the order of precedence listed below:

(1) Unit prices previously approved.
(2) An agreed lump sum.
(3) The actual cost of (a) Labor (b) direct overhead (c) materials, supplies, equipment, and other services necessary to complete the work.

To the cost of Subprograms 3 (above) there shall be an added fixed fee to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the work to cover the cost of supervision, overhead bond, profit and any other general expenses. In the case of extra work done by Subcontractors, whether under the specific contract items provided herein, or if so approved by the Owner the fifteen (15) percent added to the reasonable cost of the work will be allowed to the Subcontractor. For such work, an additional 5 percent of the reasonable cost (before addition of the 15 percent) will be paid to the General Contractor for his work in directing the work of the Subcontractor and for any and all overhead involved. Wherever applicable, wholly or in part, the Owner reserves the right to apply the approved contract unit prices to any changes in the work as per Subprograms 1 above.

ARTICLE 43 PAYMENTS TO CONTRACTOR

(a) Not later than the 15th day of each calendar month the Owner shall make a progress payment to the Contractor on the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this contract, but, to insure the proper performance of this contract, the Owner shall retain five percent (5%) of the amount of each estimate until final completion and acceptance of all work covered by this contract.

(b) After completion of fifty (50) percent of the value of the total contract, exclusive of materials and/or equipment stored on the site and not incorporated in the work, the Owner may, if the quality of the work and progress by the Contractor is satisfactory in the Owner's opinion, reduce the retained percentage to two point five percent (2.5%) of the contract, plus any additional percentage required by the Public Laws of the State of Rhode Island and these specifications.

(c) All material and work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the contract.

(d) The Owner shall have the right to enter the premises for the purpose of doing work not covered by the Contract Documents. This provision shall not be construed as relieving the Contractor of the

sole responsibility for the care and protection of the Work or the restoration of any damaged Work except such as may be caused by agents or employees of the Owner.

(e) Upon completion and acceptance of the Work, the Owner shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages but except such sums as may be lawfully retained by the Owner shall be paid to the Contractor.

(f) The Contractor will indemnify and save the Owner or the Owner's Representative harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools and all supplies incurred in the furtherance of the performance of the Work. The Contractor shall at the Owner's request furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived.

If the Contractor fails to do so the Owner may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed in accordance with the terms of the Contract Documents but in no event shall the provisions of this sentence be construed to impose any Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Owner shall be considered as a payment made under the Contract Documents by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

ARTICLE 44 ASSIGNMENTS

The Contractor shall not assign the whole or any part of this Contract or any monies due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any monies due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any monies due or to become due to the Contractor shall be subject to prior claims of all persons, firms or corporations for services rendered or materials supplied for the performance of the work called for in this Contract.

ARTICLE 45 ACCEPTANCE OF FINAL PAYMENT AS RELEASE

The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor other than claims in stated amounts as may be specifically excepted by the Contractor for all things done or furnished in connection with this work and for every act and neglect of the Owner and others relating to or arising out of this work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the contract Documents or the Performance and Payment.

ARTICLE 46 FINAL CERTIFICATE AND PAYMENT

Upon completion of the work in accordance with the contract and acceptance thereof by the Architect, and the Owner, and as soon thereafter as practicable, the Engineer shall prepare a Final Certificate which shall certify the value of the work performed and materials furnished and the exact aggregate amount of the compensation to which the Contractor will become entitled under the terms of the contract. The Final Certificate shall be submitted to the Owner and a copy shall be furnished to the Contractor. Upon approval of the Final Certificate by the Owner, the Owner shall pay the Contractor an amount equal to the total compensation to which the Contractor is entitled for the performance of the total contract less the amount of all previous payments. Any payment, however, final or otherwise shall not release the Contractor or his Sureties from any obligations under the Contract Documents or the Performance or Payment Bonds.

ARTICLE 47 ACCEPTANCE OF FINAL CERTIFICATE

The Contractor shall be conclusively deemed to have accepted the Final Certificate as a correct statement of the total liability of the Owner unless, within seven days after delivery of his copy of the Final Certificate

to him, the Contractor shall return such copy to the Owner together with a statement of his objections to such Certificate and of any claim for damages or compensation in excess of the amount shown on the certificate. The acceptance by the Contractor of the Final Certificate approved by the Owner shall constitute a release and shall discharge the Owner from any further claims by the Contractor arising out of or related to the contract except the Contractor's claim for the balance of the compensation shown to be due on the Final Certificate.

ARTICLE 48 RIGHT TO WITHHOLD PAYMENTS

(a) The Owner may withhold from the Contractor so much of any approved payments due him as may in the judgment of the Owner be necessary:

(1) To assure the payment of any lien, stop notice or claim filed with the Owner for work, labor or materials done, performed or delivered and used in the prosecution of the work herein provided for (whether in strictly legal form or otherwise).

2) To protect the Owner from loss due to defective work not remedied or through any improper or defective machinery, implements or appliances used by the Contractor or for failure of the Contractor to fully comply with any requirement of the contract, or

(3) To protect the Owner from loss due to injury to persons or damage to the work or property of other Contractors, Subcontractors or others caused by the act or neglect of the Contractor or any of his Subcontractors.

(b) The Owner shall have the right to apply any amounts so withheld in such manner as the Owner may deem proper to satisfy such claims or to secure such protection. Such application of such money shall be deemed payments to the account of the Contractor.

ARTICLE 49 NOTICE OF WARNING

If the Contractor shall fail to make prompt payment to persons supplying labor or materials for the work, or refuse or fail to supply enough properly skilled workmen or proper materials, or refuse or fail to prosecute the work or any part thereof in accordance with the Contract Documents or with such diligence as will insure its completion within the period herein specified (or any duly authorized extension thereof) or fail to complete the work within said period or fail or refuse to regard laws, ordinances, codes, instructions of the Owner, then the Owner shall forward by registered mail to the Contractor at the address given in the contract, a Notice of Warning and in the event the Contractor fails to comply with said Notice of Warning within five (5) days from receipt thereof, the Owner shall have the right to terminate the contract.

ARTICLE 50 TERMINATION OF CONTRACT: If,

(a) The Contractor shall be adjudged bankrupt or make an assignment for the benefit of creditors, or

(b) A receiver or liquidator shall be appointed for the Contractor or for any of his property and shall not be dismissed within twenty (20) days after such appointment, or the proceedings in connections therewith shall not be stayed on appeal within the said twenty (20) days, or

(c) The Contractor shall abandon the work, or

(d) The Contractor shall fail to make prompt payment to persons supplying labor or materials for the work after Notice of Warning from the Engineer, or

(e) The Contractor shall refuse or fail, after Notice of Warning from the Engineer to supply enough properly skilled workmen or proper materials or proper workmanship, or shall unnecessarily or unreasonably delay the work, or

(f) The Contractor shall refuse or fail after Notice of Warning from the Engineer to prosecute the work or any part thereof in accordance with the Contract Document, or

(g) The Contractor shall refuse or fail after Notice of Warning from the Engineer to prosecute the work or any part thereof with such diligence as will insure its completion within the period herein specified (or any duly authorized extension thereof) or shall fail to complete the work within said period, or

(h) The Contractor shall fail or refuse after Notice of Warning from the Engineer to regard laws, ordinances or the instructions of the Owner or Engineer or otherwise be guilty of a substantial violation of any provision of the contract, then and in such event, the Owner without prejudice to any other rights or remedy, may with seven (7) days' Notice to the Contractor terminate the employment of the Contractor and his right to proceed either as to the entire work, or at the option of the Owner as to any portion thereof as to which delay shall have occurred, and may take possession of the work and such materials and supplies as may be on the site of the work and may complete the work by contract or otherwise, as the Owner may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the compensation to be paid the Contractor hereunder shall exceed the expense of so completing the work (including compensation for additional managerial, administrative, engineering and inspection services and any damages for delay) such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor and his Sureties shall be liable to the Owner for such excess.

(i) The Owner is unable to complete the contract due to the inability to secure proper financing for the contract, or if other conditions warrant, the Owner may give written notice to the Contractor that the Contract is terminated. In such event, the contractor shall be paid for the work completed to date, and all reasonable and documented costs associated with the completion of the contract to that date, excluding lost profits.

ARTICLE 51 PERMITS

The Contractor's attention is directed to any phase of the work wherein the authority for permits is vested in private companies, corporations or in Federal, State, County or municipal agencies. He shall familiarize himself with the procedure in securing such permits and approvals as are necessary and accept full responsibility for obtaining the same and unless otherwise specified pay the cost and expense thereof. The Contractor will be required to pay for permits issued by the Owner, the State of Rhode Island, the City of Pawtucket, Rhode Island, and any other permits as required. The Owner will cooperate with the Contractor to the extent reasonably required to facilitate obtaining permits and approvals.

ARTICLE 52 LAWS AND ORDINANCES

(a) In the execution of the contract, the Contractor will be required to observe and obey all Federal, State, County and local laws, ordinances, codes and regulations relating to the performance of the Contract including but not limiting labor employed thereon, materials supplied, obstructing streets and highways, maintaining signals, storing, handling and use of explosives and all other general ordinances and State statutes affecting him or his employees or his work hereunder in his relations with the Municipality or any other persons, and also all laws, executing the work under the contract.

(b) As a condition of the contract, the Contractor shall and does hereby agree to comply with all requirements of the labor laws of the State of Rhode Island.

ARTICLE 53 RELEASE OF PAYMENT AND PERFORMANCE BONDS

(a) Within one year after the date of the issuance of the Final Certificate, the Owner shall make or shall cause to be made a reevaluation of the work. If the work shall be found satisfactory in accordance with the Contract Documents, the Owner shall approve the release of the Payment and Performance Bonds elsewhere provided for in these specifications.

(b) In the event the inspection discloses the existence of defects in the materials or workmanship or other non-compliances with the Contract Documents, the Contractor shall be required to immediately make good and rectify all defects as a prerequisite to the release of the Performance and Payment Bonds. If

the Contractor shall fail or neglect to satisfy the requirements of the Owner with respect to making the necessary corrections, then the Owner may proceed to have the work executed by others and charge the Contractor the cost thereby incurred.

(c) The Contractor and his Sureties shall be liable to the Owner for making any corrections to the work as may be necessary by reason of defects including repairs of any damage to other parts of the system resulting from such defects.

(d) The Performance Bond and Payment Bond shall remain in full force and effect through the guarantee period.

ARTICLE 54 RIGHT TO USE WORK

The Owner may enter upon and use the whole or any portion of the work which may be in condition to be used at any time previous to its final acceptance by the Owner. Such use shall not constitute or be evidence of acceptance by the Owner or the Architect of the whole or any part of the material furnished or work performed under the contract.

ARTICLE 55 WORKING HOURS

Work under the contract other than maintenance work, shall not be prosecuted on Saturdays, Sundays or on Rhode Island State holidays, except in time of emergency, and then only under written permit from the Architect, who shall be the judge as to the existence of the emergency. If the Contractor wishes to prosecute any portion of the work between the hours of 5 PM and 7 AM he shall first obtain permission from the Engineer and the Owner, notifying them each time in advance, giving them ample time in which to procure an Engineer or inspector for the work. In case of night work, the light, safety and other facilities which are deemed necessary by the Owner for performing such night work shall be provided by the Contractor. For night work, work on Saturdays, Sundays or legal holidays, if any be performed, the Contractor will receive no extra payment, but compensation shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid. Normal working hours shall be 7:00 AM to 5:00 PM, Monday through Friday.

ARTICLE 56 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

(a) Each and every provision of law and clause required by law to be inserted in this contract shall be deemed to be inserted herein and the contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, than upon the application of either party the contract shall forthwith be physically amended to make such insertion.

(b) If this contract contains any unlawful provisions not an essential part of the general structure of the contract and which shall not appear to have been a controlling or material inducement in the making thereof, the same shall be deemed of no effect and shall be deemed stricken from the Contract without affecting the binding force of the remainder.

ARTICLE 57 WAIVER

(a) Neither the inspection by the Owner or Engineer, or any of their employees, nor any order, measurement or certificate by the Engineer, nor any order by the Owner for the payment of any money, nor any payment for, or acceptance of the whole or any part of the work by the Architect for the Owner nor any extension of time nor any possession taken by the Owner or its employees, shall operate as a waiver of any provision of this contract, or of any power herein reserved to the Owner, or any right to damages herein provided; nor shall any waiver of any breach of the contract constitute a waiver of any other or subsequent breach. Any remedy provided in this contract shall be construed as cumulative, that is, in addition to each and every other remedy herein provided.

(b) No modification of this contract or waiver of any of its terms or provisions, except as herein provided, shall be made by or on behalf of the Owner, excepting by a resolution duly adopted by said Owner, and spread upon its minutes.

ARTICLE 58 ADDRESS

The address given in the proposal upon which this contract is founded is hereby designated as the place where notices, letters and other communications to the Contractor shall be mailed or delivered. The delivery at the above-named place, or the depositing in a postpaid wrapper directed to the above place, in any post office box, regularly maintained by the Post Office Department, of any notice, letter or other communication to the Contractor shall be deemed a sufficient delivery thereon to the Contractor. Such address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor, and delivered to the Owner. Nothing contained herein shall be deemed to preclude or render inoperative the delivery of any notice, letter or other communication to the Contractor personally.

ARTICLE 59 USE OF PREMISES AND REMOVAL OF DEBRIS:

The Contractor expressly undertakes at his own expense:

(a) To take every precaution against injuries to persons or damage to property.

(b) To store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the work as will not unduly interfere with the progress of his work or the work of any other Contractors.

(c) To place upon the work or any part thereof only such loads as are consistent with the safety of that portion of the work.

(d) To clean up daily, and as the work progresses, all refuse, rubbish, scrap materials, and debris caused by his operations, and to that end, render at all times the site of the work in a neat, unobstructed, unobtrusive, orderly, and workmanlike appearance. At no time will excess material or debris be permitted to remain in the road after work has been completed for the day.

(e) Before final payment, to remove all surplus material, false work, temporary structures, including foundations thereof, plant of any description and debris of every nature resulting from his operations, and to put the site in a neat, orderly condition. All cleanup materials shall be removed from the construction site, and deposited in a refuse disposal area by and at the expense of the Contractor.

(f) To effect all cutting, fitting or patching of his work required to make the same conform to the drawings and specifications, and except with the consent of the Owner, not to cut or otherwise alter the work of any other Contractor.

ARTICLE 60 ESTIMATED QUANTITIES

(a) The estimated quantities are given only for use in comparing bids and the Owner does not expressly or by implication represent that the final quantities will correspond therewith, but does call particular attention to the uncertainty in these quantities which cannot be determined in advance. The quantities required to complete the work contemplated under each contract may be substantially greater or substantially less than those given in the proposal. The actual quantities and cost of each contract can only be determined after the work is completed.

(b) By submitting a proposal, a bidder shall indicate knowledge of and agreement that the quantities stated in the proposals may be substantially altered, added to, decreased or certain quantities eliminated, and such changes shall not give the Contractor any right to change the unit prices bid or claim loss of anticipated profits.

ARTICLE 61 RIGHT-OF-WAY AND SUSPENSION OF WORK

Land and rights-of-way for the purposes of this contract will be furnished by the Owner to the extent shown on the drawings; the Owner will use due diligence in acquiring said land and rights-of-way as speedily as possible. But it is possible that all lands and rights-of-way may not be obtained as contemplated before construction begins, in which event the Contractor shall begin his work upon such land and rights-of-herein way as the Owner may have previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for the said work, the Contractor shall not be entitled to make or assert claim for damage by reason of said delay, or to withdraw from the contract except by consent of the Owner; but time for completion of the work will be extended to such time as the Owner determines will compensate for the time lost by such delay, such determination to be set forth in writing.

ARTICLE 62 MACHINERY AND EQUIPMENT

(a) All machinery, equipment, trucks and vehicles used in the prosecution of the work or in connection therewith shall at all times be in proper operating condition.

(b) Gasoline, electrical or diesel engines only shall be used for power in operating equipment.

(c) The Contractor shall be responsible for curtailing noise, smoke, fumes or any other nuisance resulting from his operations. He shall, upon written notification from the Architect, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

(d) All costs involved in complying with the stipulations outlined shall be included in the various prices bid in the proposal.

ARTICLE 63 GENERAL GUARANTY

(a) The work under this contract, except as expressly excluded, and all of its subcontracts, severally and collectively, whether herein stipulated in each case or not, shall be guaranteed against faulty workmanship and/or material as specified below from date of acceptance of the work. The provisions of the guarantee and/or guarantees shall be incumbent on all parties of the work, including the General Contractor, each Subcontractor, all material supply houses and all manufacturers whose products and/or equipment is incorporated into the facilities.

(b) Neither the final certificate of payment nor any provision in the contract documents, nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the contract documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty workmanship or materials. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one (1) year from the date of final acceptance of the work unless a longer period is specified.

(c) If, within one (1) year from the date of issuance of the Final Certificate, any portion of the work shall, in the opinion of the Owner, require repairing, replacing or rebuilding, the Contractor shall start such repairs within five (5) days after the receipt of notice from the Owner and if the Contractor shall fail or neglect to start such repairs within the said five (5) days, the Owner may employ such other person or persons as it may deem proper to make such and charge the Contractor the cost thereby incurred, provided nothing herein contained shall limit the liability of the Contractor or his Surety to the Owner for nonperformance of the Contractor's obligations at any time.

(d) The Performance and Payment Bonds shall remain in full force and effect through the guarantee period.

ARTICLE 64 PROCEDURE IN CONSTRUCTION

(a) The Contractor shall start work and carry it on at such point or points and in such order of precedence and at times and seasons as may be determined by the Owner, and shall complete the various parts of the work in accordance with the schedule approved by the Owner.

(b) A complete organization, equipment and ample materials shall be on hand before actual work commences. In carrying on and executing the construction work, the Contractor shall so arrange his organization, plant, equipment and materials so that construction operations will be carried on continuously. The Contractor will not be permitted to reduce the force of men nor remove any equipment from the work if such reduction or removal impairs the progress of the work.

(c) In the event the Owner awards more than one contract to the same Contractor, the Contractor will be required to prosecute the work on each contract simultaneously and will be required to maintain a separate and independent organization staff, labor forces and machinery on each contract in order to complete the work within the time set forth for the respective contracts.

ARTICLE 65 OTHER PROHIBITED INTERESTS

No official of the Owner who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept or approve, or to take part in negotiating, making, accepting, or approving any architectural, Architecting, inspection, construction or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly interested personally in this contract in any part hereof. No officer, employee, architect, attorney, Architect or inspector of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar function in connection with the construction of this project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

ARTICLE 66 OWNER'S AUTHORITY

The Owner shall give all orders and directions contemplated under this contract and specifications relative to the execution of the work. The Owner shall determine the amount, quality, acceptability and fitness of the several kinds of work and materials which are to be paid for under this contract and shall decide all questions which may arise in relation to said work and the construction thereof. The Owner's estimates and decisions shall be final and conclusive, except as herein otherwise expressly provided. In case any question shall arise between the parties hereto relative to said contract or specifications, the determination or decision of the Owner shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question. The Owner shall decide the meaning and intent of any portion of the specifications and of any plans or drawings where the same may be found obscure or be in dispute. Any differences or conflicts in regard to their work which may arise between the Contractor under this contract and other Contractors performing work for the Owner shall be adjusted and determined by the Owner.

ARTICLE 67 OWNER MAY STOP WORK

If the Work is defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, the Owner may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other party.

ARTICLE 68 LIENS

Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the Owner a complete release of all liens arising out of this contract, or receipts in full in lieu thereof, and if required in either case, an affidavit that so far as he had knowledge or information the releases and receipts include all the labor and material for which a lien could be billed; but the Contractor

may, if any Subcontractor refuses to furnish a release or receipt in full, furnish a bond satisfactory to the Owner to indemnify him against any liens. If any liens remain unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such lien, including all costs and a reasonable attorney's fees.

ARTICLE 69 WORK SUBJECT TO CONTROL OF OWNER

(a) In the performance of the work, the Contractor shall abide by all orders, directions and requirements of the Owner and shall perform all work to the satisfaction of the Owner; and at such times and places by such methods and in such manner and sequence as he may require. The Contractor shall employ no plant, equipment, materials, methods or men to which the Owner objects; and shall remove no plant, materials, equipment, or other facilities from the site of the work without the Owner's permission. Upon request, the Owner will confirm in writing any oral order, direction, requirement, or determination.

(b) Inspectors shall be authorized to inspect all work done and material furnished. Such inspection may extend to all or any part of the work, and to the preparation or manufacture of the materials to be used. The presence or absence of any inspector shall not relieve the Contractor from any requirements of the Contract. In case of any dispute arising between the Contractor and the inspector as to materials furnished or the manner of performing the work, the inspector shall have the authority to reject material or suspend the work until the question at issue can be referred to and decided by the Owner. The inspector shall not be authorized to revoke, alter, enlarge, relax or release any requirement of these Specifications, nor to approve or accept any portion of the work nor to issue instructions contrary to the Drawings and Specifications. The inspector shall in no case act as foreman or perform other duties for the Contractor, or interfere with the management of work by the latter. Any advice which the inspector may give the Contractor shall in no way be construed as binding the Owner, or the Owner's Representative or the Architect, in any way nor release the Contractor from the fulfillment of the terms of the Contract.

ARTICLE 70 OWNER'S CONTROL NOT LIMITED

In the articles of this contract, there are specific references in which the opinion, judgment, discretion or determination of the Owner shall control the work, and specific references to work that must be performed to the satisfaction of the Owner or is subject to the Owner's approval or inspection. This shall not imply or be construed that only the specific referenced items shall be so governed by the Owner, but that without exception, all the work in this contract shall be governed by the Owner.

ARTICLE 71 CONTRACTOR'S OBLIGATIONS

(a) The Contractor shall and will, in good workmanlike manner, do and perform all work and furnish all supplies and materials, machinery, equipment, facilities and means, except as herein otherwise expressly specified, necessary or proper to perform and complete all the work required by this contract, within the time herein specified, in accordance with the provisions of this contract and said specifications and in accordance with the plans and drawings covered by this contract and any and all supplemental plans and drawings, and in accordance with the directions of the Owner as given from time to time during the progress of the work. The Contractor shall furnish, erect, maintain and remove such construction plant and such temporary work as may be required. He alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation. The Contractor shall observe, comply with and be subject to all terms, conditions, requirements and limitations of the contract and specifications, and shall do, carry on, and complete the entire work to the satisfaction of the Owner.

(b) The Contractor shall be solely responsible for all the work and shall provide all precautionary measures necessary for preventing injury to persons or damage to property. All injury or damage of whatever nature resulting from the work or resulting to persons, property or the work during its progress, from whatever cause, shall be the responsibility of and shall be borne and sustained by the Contractor. The Contractor shall hold the Architects and the Owner or their agents harmless and defend and indemnify the Architects and the Owner or their agents against damages or claims for damages due to injuries to persons or to property arising out of the execution of the work and for damages to inventions, patents and patent rights used in doing the work, or damages arising

out of the use of any improper materials, equipment or labor used in the work, and for any act, omission or neglect of the Contractor, his agents, employees and his subcontractors therein. He shall bear all losses resulting to him including but not limited to losses sustained on account of the character, quality or quality of any part or all of the work, or because the nature of the land in or on which the work is done being different from what was estimated or indicated, or an account of the weather, elements or other causes.

ARTICLE 72 ABBREVIATIONS

Where any of the following abbreviations are used in the specifications, they shall have the meaning set forth opposite each.

AASTO (AASHTO)	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AIEE (IEEE)	American Institute of Electrical Engineers (Institute of Electrical and Electronics Engineers, Inc.)
AISC	American Institute of Steel Construction
API	American Petroleum Institute
ANSI (USASI)	American National Standards Institute (formerly United States of American Standards Institute)
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Architects.
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
IBR	Institute of Boiler and Radiator Manufacturers
MCB	Master Car Builders
NBS	National Bureau of Standards
NBFU	National Board of Fire Underwriters
NEC	National Electrical Code, latest edition
NEMA	National Electrical Manufacturers Association
NEWWA	New England Water Works Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation

SMACNA	Sheet Metal and Air Conditioning
FWQA (FWPCA)	Federal Water Quality Administration (formerly Federal Water Pollution Control Administration)

Federal specifications issued by the Federal Supply Service of the General Services Administration, Washington, D. C.

125-pound American Standard	United States of America Standard for cast-iron Pipe Flanges and Flange Fittings, Class 125, Designation B16.1-1967.
AWG	American or Brown and Sharpe Wire Gauge
CS	Commercial Standard
EDR	Equivalent direct radiation
OS&Y	Outside screw and yoke
Stl.Wg.	U. S. Steel Wire, Washburn and Moen, American Steel and Wire Companies, or Roebling Gauge
USS gauge	United States Standard Gauge
WOG	Water, oil, gas
WSP	Water steam pressure
NPT	National Pipe Thread

ARTICLE 73 SAFETY AND HEALTH REGULATIONS

These construction documents, and the joint and several phases of construction hereby contemplated are to be governed, at all times by applicable provisions of the Federal Law(s), including, but not limited to, the latest amendments of the following:

(1) Williams-Steiger Occupational Safety & Health Act of 1970, Public Law 91-596;

(2) Part 1910 - Occupational Safety and Health Standards; Chapter XVII of Title 29, Code of Federal Regulations;

(3) Part 1518 - Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

This project is subject to all of the Safety and Health Regulations (see 29 CFR 1518, as amended) as promulgated by the U. S. Department of Labor on April 17, 1971. Contractors are urged to make themselves familiar with the requirements of these regulations.

ARTICLE 74 TAXES

The Contractor's attention is called to the fact that certain taxes, including Federal, excise and/or Rhode Island Use Taxes are not applicable to City work. The City will execute exemption certificates, prepared by the Contractor, for the materials and equipment used in the work.

ARTICLE 75 WAGE RATES

(a) All Bidders must comply with the State of Rhode Island requirements as to conditions of employment to be observed and prevailing wage rates to be paid under the contract as on file in the Rhode Island Department of Labor, Office of the Director. All terms, conditions and provisions of Chapters 12 and 13 of Title 37, General Laws of Rhode Island, 1956, as amended, shall apply

to all bidders, and the provisions of said Chapters 12 and 13 of Title 37, General Laws of Rhode Island, 1956, as amended, are incorporated herein by reference thereto.

(b) If, after the award of the contract, it becomes necessary to employ any person in a trade or occupation not classified in the above list, such person shall be paid at not less than a rate to be determined by the same authority which established the other wage rates for this contract. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the Owner of his intention to employ persons in trades or occupations not classified in sufficient time for the Owner to obtain approved rates for such trades or occupations.

(c) The foregoing specified wage rates are minimum rates only, and the Owner will not consider any claims for additional compensation made by the Contractor because of payment by the Contractor of any wage rate in excess of the applicable rate contained in this contract. All disputes in regard to the payment of wages in excess of those specified in this contract shall be adjusted by the Contractor.

(d) Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by the Owner's governing body or other duly designated official.

ARTICLE 76 ACCESS TO THE WORK

(a) The Owner, agents and employees of the Owner may at all times enter upon the work and areas occupied by the Contractor and the Contractor shall provide safe and proper facilities for such entrance and for the inspection of the work.

(b) The Contractor shall provide at all times proper facilities for access and inspection by representatives of the United States of America and the State of Rhode Island to all work under this project wherever it is in preparation or progress.

ARTICLE 77 SUBSURFACE STRUCTURES AND UTILITIES

(a) Available information of the location of existing substructures and utilities has been collected from various sources but the results of the investigations shown on the drawings are not guaranteed to be accurate or complete.

(b) The Contractor shall make all supplemental investigations including exploratory excavations, by hand digging, as he deems necessary to uncover and determine the exact locations of utilities and structures and shall have no claims for damages due to encountering subsurface structures or utilities in locations other than shown on the drawings, or which are made known to the Contractor prior to construction operations.

ARTICLE 78 ARBITRATION

(a) All claims, disputes, and other matters in question arising out of or relating to this Contract or to the performance or interpretation thereof shall be submitted to arbitration. Arbitration shall be commenced by a demand in writing made by one (1) party to this Contract upon the other within a reasonable time after the dispute, claim, or other matter in question arose but in no event after payment in full of the contract price has been made and accepted. The written demand shall contain a statement of the question to be arbitrated and the name of the arbitrator appointed by the party. The other party to this Contract within ten (10) days of the receipt of the written demand shall appoint an arbitrator and give notice in writing thereof to the party who commenced arbitration. The two (2) arbitrators appointed by the parties shall within ten (10) days of the appointment of the second arbitrator select a third arbitrator who shall be designated as chairman and who immediately shall select a time, date and a place for hearing and give each party five (5) days in writing thereof. The date for the hearing shall not be more than fifteen (15) days after the appointment of the third arbitrator. The arbitrators shall render their award in writing not more than thirty (30) days after the date the hearing shall commence unless the parties shall otherwise agree in writing. In the event the party of whom arbitration is demanded shall fail to appoint his arbitrator within the time specified or the two (2) arbitrators appointed by the parties are unable to agree on an appointment of the third arbitrator within

the time specified, either party may petition the Presiding Justice of the Superior Court of the State of Rhode Island to appoint a single arbitrator who shall hear the parties and make an award as provided herein. The petitioner shall give five (5) days' notice in writing to the other party before filing his petition.

(b) The award rendered by the arbitrators shall be final, and the judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

(c) Unless otherwise instructed in writing by the Owner, the Contractor shall carry out his obligations to perform under this Contract during any arbitration proceedings, and the Owner will continue to make payments to the Contractor in accordance with this Contract.

(d) All claims which are related to or dependent upon each other shall be consolidated and heard by the same arbitrator or arbitrators even though the parties are not the same.

END OF SECTION

SECTION 00 73 00 – SUPPLEMENTAL GENERAL CONDITIONS

SPECIAL CONDITIONS

INDEX TO SPECIAL CONDITIONS

21. LENGTH OF TRENCH TO BE OPENED, MAINTAINING PREMISES FREE FROM OBSTRUCTIONS, CROSS-OVERS, DIRECTIONAL SIGNS AND LIGHTS
22. TURF, TOPSOIL AND OTHER REPLACED ITEMS
23. DEFECTIVE MATERIALS, INSPECTION AND TESTING OF MATERIALS FURNISHED, SAMPLES AND ORDERING LISTS 24OFFICE FOR OWNER
24. CONTRACTOR'S OFFICE AT THE PROJECT SITE
25. SANITARY REGULATIONS
26. SPIRITUOUS LIQUORS
27. FINISHING AND CLEANING UP
28. CLEAN-UP AT THE CONTRACTOR'S EXPENSE
29. RIGHTS OF ACCESS
30. WORK WITHIN THE LIMITS OF PRIVATE PROPERTY
31. LOADING
32. POLLUTION CONTROL
33. COMPLETENESS OF WORK
34. PLANK CROSSINGS
35. DUST CONTROL
36. CARE OF THE WORK
37. CONSTRUCTION SCHEDULE
38. WORK BY OTHERS
39. CHANGES AND MODIFICATIONS
40. FIRE PREVENTION AND PROTECTION
41. SUPERINTENDENCE
42. CERTIFICATES OF CONFORMANCE
43. MATERIALS AND WORKMANSHIP
44. WATER
45. FITTING AND COORDINATION OF THE WORK
46. OPERATION OF VALVES
47. CONTROL OF LEAKAGE
48. NOTIFICATION OF CUSTOMERS
49. CONTRACTOR IDENTIFICATION CARDS

SECTION 00 73 00

SPECIAL CONDITIONS

ARTICLE 1 SCOPE OF WORK:

The Contractor shall furnish all labor, materials, supplies, equipment and other facilities and services necessary or proper for, or incidental to, the work contemplated by this contract, as required by and in strict accordance with the Drawings, Specification and Addendum (or addenda), and/or with such changes as are ordered and approved pursuant to this contract. The Contractor shall perform all other obligations imposed on him by this contract, and shall be responsible for all materials delivered, and work performed, until completion and final acceptance. Upon completion of the contract, the project shall be presented, complete and undamaged.

ARTICLE 2 PROVISIONS FOR FLOW OF PRESENT DRAINAGE:

Provision for the flow of all sewers, drains and water courses that are met or altered during construction shall be provided by the Contractor and all the connections shall be restored without extra charge. All offensive matter shall be removed immediately with such precautions as may be required. If required, the Contractor shall install temporary bypass connections for surface or pipe drainage facilities to provide uninterrupted or continuous service during the time of construction. Whenever and wherever a temporary bypass is provided, an alternate means of bypass shall also be provided. The alternate bypass shall insure the continued flow of drainage in the event of failure of the initial bypass. Both methods of bypass shall be approved by the Owner and shall be provided by the Contractor at no additional expense to the Owner.

ARTICLE 3 CONTRACTOR TO CHECK DIMENSIONS AND SCHEDULES:

The Contractor will be required to check all dimensions and quantities shown on the drawings or schedules given to him by the Owner, and shall notify the Owner of all errors therein which he may discover by examining and checking the same. The Contractor shall not take advantage of any error or omission in these specifications, drawings and schedules. The Owner will furnish all instructions should such error or omission be discovered, and the Contractor shall carry out such instructions as if originally specified.

ARTICLE 4 PROTECTION OF CONSTRUCTION FEATURES:

The Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, adjoining property and such incidentals and to avoid damage thereto. The Contractor shall completely repair any damage caused by his operations at no additional expense to the Owner.

ARTICLE 5 PROTECTION OF LIVES AND HEALTH:

(a) In order to protect the lives and health of his employees under the Contract, the Contractor shall comply with all safety provisions of applicable laws, building and construction codes and all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General Contractors of America, Incorporated, and shall maintain an accurate record of all cases of death, occupational disease, and injury required medical attention or causing loss of time from work, arising out of and in the course of employment on work under this contract.

(b) The Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage which may result from their failure or their improper construction, maintenance or operation.

(c) The Contractor shall be solely responsible for the acts and omissions of his agents, employees and his subcontractor and their agents and employees and shall hold the Architects and the Owner harmless and defend the Architects and the Owner against damages or claims for damages arising out of injuries to other or property of others which result from said acts omissions.

ARTICLE 6 PROTECTION OF TREES:

The Contractor shall take special care to preserve and protect from injury all trees located along the lines of construction, and no such trees shall be cut down, trimmed or otherwise cut without permission from the Owner.

ARTICLE 7 HURRICANE PROTECTION:

Should hurricane warnings be issued, the Contractor shall take every practicable precaution to minimize danger to persons, to the work and to adjacent property. These precautions shall include closing all openings: removing all loose materials tools and/or equipment from exposed locations; and removing or securing scaffolding and other temporary work.

ARTICLE 8 FIRST AID TO INJURED:

The Contractor shall keep in his office ready for immediate use all articles necessary for giving first aid to injured employees. He shall also provide arrangements for the immediate removal and hospital treatment of any employee injured on the project who may require the same.

ARTICLE 9 CONFORMANCE WITH DIRECTIONS:

The Owner may make alterations in the lines, grade, plan, form, dimensions or materials to be used in project or any part thereof, either before or after the commencement of construction. If such alterations diminish the quantity included in any item of work, to be done and paid for at a unit price, the Contractor shall have no claim for damages or for anticipated profits on the work that thus may be dispensed with. If they increase the quantity included in any such item, such increase shall be paid for at the stipulated unit price.

ARTICLE 10 PROTECTION AGAINST HIGH WATER AND STORM:

(a) The Contractor shall take all precautions to prevent damage to the work or equipment by high water or by storms. The Owner may prohibit the carrying out of any work at any time when in his judgment, high water or storm conditions are unfavorable or not suitable, or at any time, regardless of the weather, when proper precautions are not being taken to safeguard previously constructed work or work in progress. No claim by the Contractor shall be made for lost time as a result of such shutdown by the Owner.

(b) In case of damage caused by the failure of the Contractor to take adequate precautions, the Contractor shall repair or replace equipment damaged and shall make such repairs or rebuild such parts of the damaged work, as the Owner may require, at no additional expense to the Owner.

ARTICLE 11 SEQUENCE OF WORK:

The Contractor shall be required to prosecute his work in accordance with the construction schedule prepared by him in advance in accordance with additional requirements specified herein and approved by the Owner. This schedule shall state the methods and shall forecast the times for doing each portion of the work. Before beginning any portion of the work, the Contractor shall give the Owner advance notice and ample time for making the necessary preparations. The Owner reserves the right of final approval of the construction sequence.

ARTICLE 12 COMPETENT HELP TO BE EMPLOYED:

The Contractor shall employ experienced foremen, craftsmen and other workmen competent in the work in which they are to be engaged. All work shall be accomplished by able, skilled and competent personnel. If any person employed on the work by the Contractor shall appear to be incompetent or unreliable in any way, he shall be discharged immediately upon the request of the Owner and shall not again be employed on the work.

ARTICLE 13 STREETS AND SIDEWALKS TO BE KEPT OPEN:

(a) The Contractor shall at all times keep the streets and sidewalks in which he may be at work open for pedestrian and vehicular traffic. If, in the opinion of the Owner, the interest of abutters and public requires it, the Contractor shall bridge or construct plank crossings over the trenches at street crossings, roads or private ways. The Contractor shall conduct his work for this objective in such manner as the Owner may direct from time to time. No sidewalk shall be obstructed where it is possible to avoid it. No additional payment shall be made to the Contractor for such work.

(b) The Contractor shall provide all necessary Fire Crossings at principal intersection or ways usually traveled by fire apparatus with provisions for the apparatus so it can travel along the line of pipeline installations.

(c) All work shall be conducted in such a manner as to provide minimum interference with existing business and commercial establishments. Such establishment shall be allowed to conduct business at all times during construction activities.

(d) If, with the approval of the Architect, a street requires closure to traffic, the Contractor is responsible for notifying the appropriate police and fire departments along with RIPTA if the street is on a bus route. All detours and road closures are to be approved by the Pawtucket Traffic Architect.

ARTICLE 14 LIGHTS, BARRIERS, FENCES, WATCHMEN AND INDEMNITY:

(a) The Contractor shall put up and maintain such barriers, fences, lighting and warning lights, danger-warning signals and signs as will absolutely prevent accidents during the construction work and protect the work and insure the safety of personnel and the public at all times and places; and the Contractor shall defend, indemnify and save harmless the Owner and the Architects and their agents in every respect from any injury or damage whatsoever caused by any act, omission or neglect of the Contractor or his Subcontractor, or their servants or agents, including any claims arising out of failure to erect and maintain sufficient railing or fence. The fact that the Owner may retain control of the premises, or that it or its agents may take action to erect or maintain railings or fences shall not relieve the Contractor's obligations hereunder.

(b) The Contractor at his own expense shall furnish, maintain and use, and cause all his Subcontractors to furnish, maintain and use all necessary safety devices and safe practices in prosecution of the work and to adopt, follow and maintain such additional safety measures as in the opinion of the Owner are conducive to safe operation by the Contractor and the Subcontractors. The Owner shall have the right to order any or all work suspended where, in the Owner's opinion, such work is not being carried on in a safe and proper manner, or where persons and property are not being properly protected or safeguarded and such work shall not be resumed until the Owner's requirements have been met and the Owner has directed that work be resumed. The work required by the preceding paragraph shall be totally at the Contractor's expense.

(c) In addition to the above, when and as necessary, or when required by the Owner, the Contractor shall post signs and employ watchmen, flagmen, or police officers for the direction of traffic at the site and for excluding at all times unauthorized persons from the project. The Contractor will not be paid additional compensation for this work, except that payment will be made under the Schedule of Bid Items for providing police for direction of traffic.

(d) The Contractor shall be responsible for excluding at all times from lands within easement areas, all persons not directly connected with the work or authorized by the Owner to be within the project areas.

ARTICLE 15 WORK OUTSIDE REGULAR HOURS:

Night work or work on Saturdays, Sundays or legal holidays requiring the presence of an Architect or inspector, will not be permissible except in case of emergency, and only upon the approval of the Owner. Should it be desired or required by the Owner to operate an organization for continuous night work or for emergency night work, the lighting, safety and other facilities which are deemed necessary by the Owner for performing such night work shall be provided by the Contractor. For night work, work on Saturdays, Sundays or legal holidays, if any be performed, the Contractor will receive no extra payment, but compensation shall be considered as having been included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 16 BUS LINE INTERFERENCE

Whenever it may be necessary to interfere with any bus lines, notice shall be given to the corporation owning the same, and reasonable time shall be given to said corporation to arrange the schedule for operation of same, as may be necessary.

ARTICLE 17 WORK IN COLD WEATHER:

(a) The Owner will determine when conditions are unfavorable for work and may order the work or any portions of it suspended whenever, in his opinion, the conditions are not such as will insure first class work. In general, work shall be prosecuted throughout the year and the Contractor will be expected to keep work going and employment of labor as continuous as possible.

(b) All methods and materials used in the performance and for the protection of the work in cold weather shall be subject to the approval of the Owner. The Contractor shall take necessary precautions to protect the work from damage and for removing ice and frost from materials, including heating and water, sand and coarse aggregate and for protecting the newly laid masonry. The Contractor will receive no extra payment for any labor, apparatus, tools or

materials necessary to comply with the above requirements, but compensation shall be construed to be included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 18 TUNNELING NOT PERMITTED:

Tunneling will not be permitted without the consent of the Owner.

ARTICLE 19 RESERVED MATERIALS:

Materials found on the work suitable for any special use shall be reserved for that purpose. Where permitted, the Contractor may use in the various parts of the work, without charge therefor, any materials taken from the excavations.

ARTICLE 20 DISPOSAL OF MATERIALS, ACCESS TO HYDRANTS AND GATES, AND MATERIALS TRIMMED-UP FOR CONVENIENCE OF PUBLIC TRAVEL OR ADJOINING TENANTS:

The materials from the trenches and excavations and those used in the construction of the work shall be deposited in such a manner so they will not endanger persons or the work, and so that free access may be had at any time to all hydrants and gates in the vicinity of the work. The materials shall be kept trimmed-up so as to be of as little inconvenience as possible to the public travel or the adjoining tenants. All excavated materials not approved for backfill and fill, all surplus material and all rock, boulders resulting from the excavations, and all existing piping removed from the trench during excavations shall be removed and satisfactorily disposed of off the site by the Contractor at no additional expense to the Owner. At no time is there to be debris of any kind left overnight on the jobsite.

ARTICLE 21 LENGTH OF TRENCH TO BE OPENED, MAINTAINING PREMISES FREE FROM OBSTRUCTIONS, CROSS-OVERS, DIRECTIONAL SIGNS AND LIGHTS:

(a) The length of trench opened at any time, from point where ground is being broken to completed backfill shall not exceed **75** feet and also the amount of space in streets or public and private lands occupied by equipment, trench and supplies, shall not exceed the length or space considered reasonably necessary and expedient by the Owner. In determining the length of open trench or spaces for equipment, materials, supplies and other necessities, the Owner will consider the nature of the lands or streets where work is being done, types and methods of construction and equipment being used, inconvenience to the public or to the private parties, possible dangers and other proper matters. All work must be constructed with a minimum of inconvenience and danger to the public and all other parties concerned.

(b) Whenever any trench obstructs pedestrian and vehicular traffic in or to any public street, private driveway or property entrance, or to private property, the Contractor shall take such means as may be necessary to maintain pedestrian and vehicular traffic and access. Until such time as the work may have attained sufficient strength to support backfill, or if for any other reason it is not expedient to backfill the trench immediately, the Contractor shall construct and maintain suitable plant crossings and bridges to carry essential traffic in or to the street, driveway or property in question as specified or directed.

(c) Suitable signs, lights and such required items to direct traffic shall be furnished and maintained by the Contractor.

(d) The Contractor must keep streets and premises free from unnecessary obstructions, debris and all other materials. The Owner may, at any time, order all equipment, materials, surplus from excavations, debris and all other materials lying outside that length of working space promptly removed, and should the Contractor fail to remove such material within 24 hours after notice to remove the same, the Owner may cause any part or all of such materials to be removed by such persons as he may employ, at the Contractor's expense, and may deduct the costs thereof from payments which may be or may become due to the Contractor under the contract. In special cases, where public safety urgently demands it, the Owner may cause such materials to be removed without prior notice.

ARTICLE 22 TURF, TOPSOIL AND OTHER REPLACED ITEMS:

Where work is performed through cultivated or sodded lands, the Contractor shall stockpile the turf and topsoil separately and replace the same after the trench is filled, leaving the land as near as possible to its original condition. Trees, fences, walls, walks and such other items must not be damaged.

ARTICLE 23 DEFECTIVE MATERIALS, INSPECTION AND TESTING OF MATERIALS FURNISHED, SAMPLES AND ORDERING LISTS:

(a) No materials shall be laid or used which are known, or may be found to be in any way defective. Notice shall be given to the Owner of any defective or imperfect material. Defective or unfit material found to have been laid shall be removed and replaced by the Contractor with sound and unobjectionable material without additional expense to the Owner.

(b) All materials furnished by the Contractor are subject to thorough inspections and tests by the Owner.

(c) The Contractor shall submit samples as required by the Owner of the various materials used on the contract for testing purposes.

(d) All ordering lists shall be submitted by the Contractor to the Owner for approval and shall be approved before the ordering of the materials.

ARTICLE 24 OFFICE FOR OWNER:

An office for the Owner is not required for this project.

ARTICLE 25 CONTRACTOR'S OFFICE AT THE PROJECT SITE:

The Contractor is required to maintain during the performance of this contract, an office at the site of the project. Additionally, the Superintendent or his authorized agent shall be present at all times while the work is in progress.

The location of a yard or storage site shall be required and as approved by the Owner. The Contractor shall be responsible for obtaining a suitable site for the location of the yard and it shall be the responsibility of the Contractor to maintain a neat and orderly area; however, the location and site shall be subject to the approval of the Owner; all costs in connection with the obtaining and use of a suitable yard site shall be the responsibility of the Contractor. The Contractor shall obtain approval of the yard location from the owner prior to entering into a contract or lease for use of the site.

ARTICLE 26 SANITARY REGULATIONS:

(a) Adequate sanitary conveniences for use of workmen on the premises, properly secluded from public observation, shall be provided and maintained by the Contractor in accordance with the requirements of local and State health authorities and in such manner and at such points as shall be approved and their use shall be strictly enforced. Sanitary waste shall be treated and disposed of in a manner satisfactory to and as directed by the Owner and the local and State health authorities; under no circumstances shall sanitary wastes be allowed to flow on the surface of the ground.

ARTICLE 27 SPIRITUOUS LIQUORS:

The Contractor shall neither permit nor suffer the introduction or use of spirituous liquors, dope or drugs of any kind or description unless ordered by a physician upon the work embraced in this contract.

ARTICLE 28 FINISHING AND CLEANING UP:

As the work progresses, in completing the backfilling of the trenches, the Contractor shall replace all surface material to the satisfaction of the Owner, and shall then immediately remove all surplus material, temporary water service piping and all tools and other property belonging to him, leaving the entire street and surrounding work areas free and clean and in an unobstructed and unobtrusive order, at no additional expense to the Owner. The backfilling, and removing of surplus materials, temporary piping, tools, etc., shall follow closely upon the completion of the work each day. The Contractor shall exercise special care in keeping rights-of-way and private and public lands, upon which work is to be performed, clean and free of debris at all times, and to remove tools and other property belonging to the Contractor when they are not being used. Before the work will be considered complete, the Contractor shall thoroughly clean the installed pipelines of all dirt and other debris, and shall leave the pipelines in a first class condition ready for use.

ARTICLE 29 CLEAN UP AT CONTRACTOR'S EXPENSE:

In case the Contractor shall fail or neglect, after backfilling, to promptly remove all surplus materials, temporary water service piping, tools and other incidentals; or to promptly clean any area of the work so directed by Owner to be cleaned, or to promptly do the required repaving when ordered, the Owner may, after 24 hours notice, cause the work to be done by others, and the cost thereof shall be deducted from any moneys then or thereafter due the Contractor.

ARTICLE 30 RIGHTS OF ACCESS:

Nothing herein contained or shown on the drawings shall be construed as giving the Contractor exclusive occupancy of the work areas involved. The Owner or any other Contractor employed by him, the various utility companies, Contractors or subcontractors employed by the Federal, State or local government agencies or other utility firms or agencies involved in the general project or upon public rights-of-way, may enter upon or cross the area of work or occupy portions of it as directed or permitted. When the territory of one contract is the convenient means of access to the other, each contractor shall arrange his work in such manner as to permit such access to the other and prevent unnecessary delay to the work as a whole.

ARTICLE 31 WORK WITHIN THE LIMITS OF PRIVATE PROPERTY:

(a) Particular attention is hereby directed to the fact that some of the work included under this contract may have to be done within the limits of properties that are State-owned and privately owned. The Owner has, or will, secure the necessary limited temporary or permanent easements for construction purposes. The Contractor will be permitted to use the areas of the Owner's easements, subject to all conditions and requirements as they may affect the Contractor's operations and the work of this contract and the Contractor shall conduct his operations and activities in the performance of the work under this contract in accordance with all such conditions and requirements and such additional requirements as may be imposed by the Owner.

(b) All means and rights of ingress and egress to the work areas and all areas required for work space shall be the entire responsibility of the Contractor and all costs in connection therewith shall be considered to be included in the prices stipulated for the appropriate items of work as listed in the bid; the Contractor shall not use nor occupy public or private lands outside the limits of the Owner's easements and rights-of-way unless permits in writing have first been obtained by the Contractor from the owners of the public and/or private land and copies of such permits filed with the Owner. The Contractor shall be responsible for cooperating with and for coordinating the prosecution of the work of his contract with State and private property owners. Any abuse to lands of State or private owners shall be immediately corrected by the Contractor at his expense to the complete satisfaction of the owners and such precautionary or preventive measures as required by the Owner shall be taken or made to prevent further additional nuisances, interference or inconvenience to the abutting owners.

(c) It shall be the Contractor's full responsibility to familiarize himself with the limitations imposed on the work of construction within the various properties of State or private ownership and rights-of-way by the existing occupancy or use. To this end, he will be required to make every effort to fully and satisfactorily protect trees, shrubs, lawns, gardens, fences, walks, driveways, structures and all and any other appurtenances of the property owners. In addition, he shall provide adequate access to all walks, driveways, yards or structures; protect all work by the erecting or placing safety guards or barriers,

lights and such other incidentals; and where required, the Contractor shall construct temporary plank crossings or timbers to permit full use of private facilities at all times, at no additional expense to the Owner. All other applicable provisions for control of work within the areas of public travel set forth elsewhere herein shall also apply to work within the limits of private ownership.

(d) The Contractor shall cooperate with State and private property owners and shall also contact the Owner for additional information regarding the requested (or required) length of time needed as a notice to be given to the State and private property owners before the Contractor enters the State or privately owned property in order to start the construction work. In some cases, a certain time to start the work and a certain limited length of time may be required by the State and private property owners for any shutdowns or construction operations so the work of the Contractor will not interfere with the operations of the State or private property owners.

(e) No separate payment will be made for the requirements specified under "WORK WITHIN THE LIMITS OF PRIVATE PROPERTY" and all costs in connection therewith shall be included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 32 LOADING:

No part of the structures involved in this contract shall be loaded during construction with a load greater than is calculated to carry with safety. Should any accidents or damage occur through any violation of this requirement, the Contractor will be held responsible under his contract and bond.

ARTICLE 33 POLLUTION CONTROL:

Special care shall be taken to prevent contamination or muddying up or unduly interfering with the stream flows, impounded waters of any ponds, or other bodies of water along the line of work. No waste matter of any kind will be allowed to discharge into the stream flows or impounded waters of any ponds or other bodies of water.

ARTICLE 34 COMPLETENESS OF WORK:

In addition to the specified or described portions, all other work and all other materials, equipment, and labor, of whatever description, which are necessary or required to complete the work or to carry out the full intent of the Drawings and Specifications, shall be provided by the Contractor, and payment therefor shall be considered as having been included in the prices stipulated for the appropriate items of work listed in the bid.

ARTICLE 35 PLANK CROSSINGS:

As required or directed by the Owner, the Contractor shall install at selected locations suitable plank or timber crossings substantially built and reinforced to sustain vehicular traffic across trench or other excavations. Crossings shall be constructed with passable approaches for use by the traveling public, private property owners or firefighting equipment. No separate payment will be made for this work but the cost shall be included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 36 DUST CONTROL:

The Contractor shall exercise every precaution and means to prevent and control dust arising out of all construction operations from becoming a nuisance to abutting property owners or surrounding neighborhoods. Pavements adjoining the pipe trenches shall be kept swept off daily and washed clean of excess trench material wherever and whenever directed. Earth piles along trenches, earth stockpiles and surfaces of refilled trenches shall be kept moist at all times, and treated with calcium chloride or other suitable dust-laying agent, as directed by the Architect. No extra payment will be made for providing the dust control measures and conforming to the requirements specified above, but compensation therefor shall be considered to be included in the prices stipulated for the appropriate items of work as listed in the bid.

ARTICLE 37 CARE OF THE WORK:

The Contractor shall be responsible for all damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all material delivered and work performed until completion and final acceptance, whether or not the same has been covered by partial payments made by the Owner. All valid claims for damage arising from the contractor's work is the sole responsibility of the contractor and all such claims shall be promptly submitted to the contractor and/or his insurance carrier.

ARTICLE 38 CONSTRUCTION SCHEDULE:

In addition to other requirements specified and within ten (10) days after notice to proceed, the Contractor shall confer with the Owner for the purpose of drafting a construction schedule satisfactory to the Owner which is to include all the work of this contract. The schedule shall be submitted on or before the Preconstruction Conference. The Contractor shall perform the work of this contract to conform to the construction schedule, as approved by the Owner, except the Owner reserves the right to amend and alter the construction schedule, as approved, at any time, in a manner which it deems to be in the best interests of the Owner so to do. The Contractor shall arrange his work under this contract to conform with the construction schedule as it may be revised from time to time by the Owner, at no additional expense to the Owner. The Contractor shall notify the Owner immediately of any circumstances which may affect the performance of the work in accordance with the current construction schedule.

ARTICLE 39 WORK BY OTHERS:

The Owner reserves the right to do any other work which may connect with, or become a part of, or be adjacent to the work embraced by this contract, at any time, by contract work or otherwise. The Contractor shall not interfere with or obstruct in any way the work of such other persons as the Owner may employ, and shall execute his own work in such manner as to aid to the executing of work by others as may be required. No backfilling of trenches or excavations will be permitted until such work by the Owner is completed.

ARTICLE 40 CHANGES AND MODIFICATIONS:

The Owner reserves the right to delete or cancel any item or items or parts thereof as listed in the bid, without recourse by the Contractor. The Owner also reserves the right to add to any item or part thereof and listed in the bid. The compensation to be paid the Contractor for such additional extension, appurtenances or item shall be made under the applicable items as listed in the bid. Where no applicable items are provided in the bid for such additional extension, appurtenance or item, the compensation to be paid the Contractor shall be as set forth under the article entitled "CHANGES IN THE WORK" of the GENERAL CONDITIONS.

ARTICLE 41 FIRE PREVENTION AND PROTECTION:

(a) All Federal laws (Occupational Safety and Health Act) and all State and municipal rules and regulations with respect to fire prevention, fire-resistant construction and fire protection shall be strictly adhered to and all work and facilities necessary therefor shall be provided and maintained by the Contractor in an approved manner.

(b) All fire protection equipment such as water tanks, hoses, pumps, extinguishers and other materials and apparatus shall be provided for the protection of the contract work, temporary work and adjacent property. Trained personnel experienced in the operation of all fire protection equipment and apparatus shall be available on the sites whenever work is in progress and at such other times as may be necessary for the safety of the public and the work.

(c) Open fires will not be permitted.

ARTICLE 42 SUPERINTENDENCE:

During the entire duration of the project, the Contractor shall employ a competent Superintendent, in personal charge of the work, who shall have full authority to act for the Contractor. The Superintendent is to be available at all times at the Project Site on a daily basis for the duration of the project. This person shall be continued in this capacity full time for this project unless (1) he ceases to be on the Contractor's payroll or (2) he proves himself to be unacceptable to the Owner. Instructions given to the Superintendent and/or his supervisory subordinates shall be considered as given to the Contractor. A chain-of-command listing shall be submitted and adhered to in the temporary absence of the superintendent. The Contractor shall provide the Superintendent, the night emergency person and/or other responsible supervisors who shall be on the job site and on call at all times with a cellular telephone (with a **local area code** that is without long distance charges to callers from Pawtucket) and a numeric pager (local area code) at no additional cost to the Owner. The Architect shall be provided with the respective numbers to have the ability to be in constant 24hr/7days contact with the contractor's personnel on the project site or in case of an emergency.

ARTICLE 43 CERTIFICATES OF CONFORMANCE:

In addition to other requirements specified herein, the Contractor shall furnish to the Owner, in the manner as directed, notarized certificates of conformance for all materials to be furnished under this contract. The notarized certificates of conformance shall state that the material to be furnished under this contract meets the specification requirements. When directed, each shipment of material shall be accompanied by the manufacturer's notarized certificates of conformance, certifying that the materials meet the requirements of the specifications. Unless otherwise specifically specified, all testing of materials shall be provided by the Contractor at no additional expense to the Owner.

ARTICLE 44 MATERIALS AND WORKMANSHIP:

All workmanship, equipment, material and articles incorporated in the work covered by this contract are to be of the best grade of their respective kinds for the purpose. The Contractor shall furnish to the Owner for his approval the name of the manufacturer of machinery, mechanical and other equipment which he contemplates installing, together with their respective performance capacities and other pertinent information. When required by the specifications, or when called for by the Owner, the Contractor shall furnish the required information for approval of all the material or articles which he contemplates incorporating in the work. Samples of material shall be submitted for approval when and as directed. Machinery, equipment, material and articles installed or used without such approval shall be at the risk of subsequent rejection.

ARTICLE 45 WATER:

The Contractor shall provide and maintain facilities for an adequate supply of water suitable for use for construction purposes and for domestic use as required for the work of this contract. All work, materials, equipment, appurtenances and accessories necessary for providing supplies of water at the site and including the cost of all water used, shall be borne by the Contractor. Upon completion of the work of this contract, and before final acceptance, the Contractor shall remove all temporary piping and appurtenant work used for temporary water supply. Temporary water supply work shall be provided in accordance with the requirements of the local water department and health authorities. All temporary piping and hoses shall be ANSI/NSF approved for contact with drinking water. The Contractor shall be responsible for providing all necessary water for construction purposes and for domestic use.

ARTICLE 46 FITTING AND COORDINATION OF THE WORK:

The Contractor shall be responsible for the proper fitting of all work and for the coordination of all operations of all trades, subcontractors or materialmen engaged upon the work. The Contractor shall be prepared to guarantee to each of his subcontractors the dimensions which they may require for the fitting of their work

to all surrounding work, and shall do, or cause his agents to do, all cutting, fitting, adjusting and patching necessary to make the several parts of the work come together satisfactorily and properly and to fit the work to receive or be received by the work of other contractors.

ARTICLE 47 OPERATION OF VALVES:

The Contractor will **not** be permitted to operate valves in the existing water supply system except to assist the PWSB in an approved emergency situation. The Contractor shall notify the Architect for the Pawtucket Water Supply Board of any desired valve operations required for the work of this Contract at least 48 hours in advance, and the Owner shall furnish all necessary personnel to operate any such valve(s) as needed, without cost to the Contractor.

ARTICLE 48 CONTROL OF LEAKAGE:

In the operation of gate valves, for the purpose of shutting down where connections are to be made to existing water mains, the Owner does **not** guarantee or imply that shutdowns will be completely effective in shutting off the flow of water into open ends. While the Owner will make every effort to control or reduce the leakage through the closed gates to a minimum, the Contractor will be required to provide the necessary pumps or other equipment or means required to handle or divert the leakage flows sufficiently to permit proper or good workmanship in making the connections, at no additional expense to the Owner. Work stoppages because of inadequate dewatering pumps is not grounds for separate compensation to the contractor.

ARTICLE 49 NOTIFICATION OF CUSTOMERS:

Before any mains are shutdown, the Architect shall ascertain the customers to be affected by the shutdown, and shall notify each at least **24** hours in advance and again just prior to the shutdown. The PWSB accepts responsibility of notifying all customers to be affected by a scheduled water main shutdown.
In conjunction with cleaning and lining projects, the Contractor shall notify customers in writing at least 24 hours in advance for any work that requires home or business entry. In particular the work involved with the connection of temporary by-pass service or the blow back to clean existing service connections.

ARTICLE 50 CONTRACTOR IDENTIFICATION CARDS:

Any of the Contractor's employees whose work will be on private property or will have direct contact with customers shall be required to display a company photo identification card along with a PWSB identification card. The ID cards shall be displayed on their person at all times and shall be clearly visible when having contact with PWSB customers. The PWSB identification card shall be supplied by the PWSB.

The State of Rhode Island Department of Labor, Division of Professional Regulation General Decision Modification document current as of the RFP issuance date for this Project, is an integral part of the Bid Documents for use in fulfilling prevailing wage rate requirements. A copy is available on the web site of the State of Rhode Island Department of Administration, Division of Purchases.

The Division of Purchases Web Site Address:

www.purchasing.ri.gov

Click on “Vendor Information”; “General Information”; then click on “Prevailing Wage Tables”.

END OF SECTION 00 73 46

SECTION 00 15 00 – MOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes work necessary for the movement of personnel and equipment to and from the Project site.

1.2 SUBMITTALS

A. Submit site-specific Health and Safety Plan (HASP) for informational purpose.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall prepare a site-specific Health and Safety Plan (HASP) in accordance with 29 CFR Part 1910.120: Hazardous Waste Operations and Emergency Response of the Occupational Safety and Health Administration (OSHA). A copy must be maintained on-site at all times and be available for examination by the Owner and Engineer, if requested.

B. The Contractor shall comply with all requirements of the most recent version of OSHA.

C. When any support system is used that requires design by an engineer, copies of the design stamped by a Professional Engineer registered in the State of Rhode Island shall be submitted to the Engineer.

D. The Contractor has full responsibility to comply with all provisions of the State of Rhode Island Public General Statutes concerning Occupational Safety and Health. Any fines levied against the Contractor for violations shall be the Contractor's responsibility.

3.2 PROTECTION

A. The Contractor shall assume full responsibility for the protection of all public or private buildings, structures and utilities in the rights-of-way, gas pipes, water pipes, hydrants, sewers, drains, electric and telephone cables, and any other improvements whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from damage of every description

and any such damage thereto shall be repaired or otherwise made good by the Contractor, at his expense, in a manner acceptable to the Engineer.

B. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at the Contractor's own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer.

END OF SECTION

SECTION 00 17 00 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. General installation of products.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.
7. Correction of the Work.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of electrical equipment and wiring and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of improvements and other structures.

B. Existing Utilities: The existence of other utilities and construction indicated as existing are not guaranteed. Field verify. Utilize Ground penetrating radar to verify areas in excavation area.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Engineer prior to proceeding with the Work.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturers' written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

A. Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

B. Maintain Project site free of waste materials and debris.

C. Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work and use of the existing properties.

D. Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

F. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

1. Thoroughly clean surfaces before applying paint or other finishing materials.

G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials into waterways will not be permitted.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

END OF SECTION

SECTION 00 17 70 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list and reasons why the Work is not complete.
2. Complete final cleaning requirements.

B. Inspection: When the Work is ready for its intended use, submit a written request for inspection for Substantial Completion. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.3 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will notify Contractor of construction that must be completed or corrected before final payment will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three (3) copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1.5 RECORD DOCUMENTS

A. General: Do not use Record Documents for construction purposes. Protect Record Documents from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

B. Prepare and submit Record Documents in accordance with Division 1 Section "Record Documents."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal, State, and local environmental and antipollution regulations.

B. Cleaning:

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

   a. Clean areas disturbed by construction activities of rubbish, surplus soil, waste material, litter, and other foreign substances.

   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

   d. Remove tools, construction equipment, machinery, and surplus material from Project site.

   e. Remove debris from limited access spaces, including trenches, equipment vaults, manholes, sand filter, bioretention basin, drainage structures, and similar spaces.

   f. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury stumps, debris or excess materials brought to the site on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

D. If the Contractor fails to clean up, the Owner may do so and the cost thereof will be charged to the Contractor.

END OF SECTION

SECTION 00 17 81 - RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Record Documents, including, but not limited to, the following:

1. As-Built Drawings.
2. Record Specifications.
3. Record Product Data.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:

1. As-Built Drawings: Submit three (3) copies and one CD-Rom containing CAD and PDF of As-Builts.

B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one (1) copy of each Project Data submittal.

1. Where Record Product Data is required as part of Operation and Maintenance Manual, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 AS-BUILT DRAWINGS

A. Immediately following inspection for Certificate of Substantial Completion, prepare and submit As-Built Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.

a. Engineer will furnish, as requested by Contractor, one set of the Contract Drawings in CAD format for use in preparation of As-Built Drawings.

B. Identify and date As-Built Drawings, including the designation "As-Built Drawings" in a prominent location.

1. As-Built Drawings: Organize CD information into separate files that corresponded to applicable sheets of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
2. Identification: As follows:
   a. Project Name.
   b. Date.
   c. Designation: "As-Built Drawings".

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Record the name of the manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
   4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
   5. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTAL

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal, one (1) during the construction period for Record Document processes. Post changes and modifications to Record Documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and samples: Store Record documents and Samples in the field office apart from the Contract documents used for construction. Do not use Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Record Documents for Engineer's reference during normal working hours.

END OF SECTION

SECTION 00 73 36 – PREVAILING WAGE RATES

The State of Rhode Island Department of Labor, Division of Professional Regulation General Decision Modification document is an integral part of the Bid Documents for use in fulfilling prevailing wage rate requirements. A copy is available linked to the web site for the State of Rhode Island Department of Administration, Division of Purchases. Contractors working on RI Prevailing Wage projects must adjust employee hourly rates every July 1 in accordance with updated Davis Bacon rates. These rates may be obtained at the following website:

www.wdol.gov/dba.aspx

The Division of Purchases Website Address is:

http://www.purchasing.ri.gov/RIVIP/INfo.asp

The link for the US Government prevailing wage tables is:

http://www.purchasing.ri.gov/bidinfo/geninfo/geninfo.aspx

Applicable Rhode Island labor laws may be found at:

http://www.dlt.ri.gov.pw/

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

FOR DUPLEX PRINTING PURPOSES

SECTION 01 20 49 – PAYMENT ITEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes measurement and payment paragraphs for

1. Base Bid payment items indicated on the Bid Form (lump sum and unit price).

B. Related Sections of the Specifications include the following:

1. Divisions 01 through 49 Sections for detailed procedural, material, and installation requirements associated with the Work of each payment item.

1.3 DEFINITIONS

A. Payment Items: The Owner's distribution of the Contract Price through listed work items.

1. Each item is specified to include a defined scope of services. However, not all materials, labor, equipment, or services of a payment item are guaranteed to be listed or specified.

2. Include costs associated with items of work required to complete the defined scope of services within the appropriately specified payment item.

3. Payment items include all necessary material, plus cost for delivery, installation, applicable taxes, overhead, and profit.

B. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Price by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

C. Payment for Work associated with individual Work Segments will not be released until such Work Segment is Substantially Complete, including site restoration and site improvements of that Work Segment and has been approved as such by the Site Manager.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 LIST OF PAYMENT ITEMS

A. Payment Items No. 1. – Well Field Electrical Power and Distribution System Upgrade - , Complete in Place

1. The Work of this item shall be measured by the Contract lump sum price for Civil and Electrical work associated with the Well Field Electrical Power and Distribution System Upgrade.

2. Work associated with this item will be paid for at the Contract Lump Sum price for each Work Segment.

B. Payment Items No. 2. – Provisional Item – Unsuitable Material

1. The Work of this item shall be measured per cubic yard of in-place material.

2. Work associated with this item will be paid for at the per Cubic Yard Contract price for excavating and disposing of unsuitable material, replacing unsuitable material with new material compacted, and all incidental materials, equipment, tools and labor required to complete the Work.

C. Payment Item No. 3 – Rock Excavation (exceeding 1 CY) and Disposal

1. The Work of this item shall be measured per cubic yard of in-place material.

2. Work associated with this item will be paid for at the per Cubic Yard Contract price for excavating and disposing of rock greater than one cubic yard in size, replacing excavated rock with compacted material, and all incidental materials, equipment, tools and labor required to complete the Work.

D. Payment Item No. 4 – Allowance item, as directed by Owner:

1. The Work of this item shall be measured per each field change directive encounter, as directed by Owner and Engineer.

END OF SECTION

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012950 "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
   a. Application for Payment forms with continuation sheets.
   b. Submittal schedule.
   c. Items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Engineer at earliest possible date, but no later than 7 days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
   a. Project name and location.
   b. Name of Engineer.
   c. Engineer's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.

10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATION FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Engineer.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.

2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

3. Provide summary documentation for stored materials indicating the following:
   a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
   b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
   c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Engineer by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.

2. Schedule of values.

3. Contractor's construction schedule.

4. Schedule of unit prices.

5. Submittal schedule (preliminary if not final).

6. List of Contractor's staff assignments.

7. Copies of building permits.

8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
9. Initial progress report.
10. Report of preconstruction conference.
11. Certificates of insurance and insurance policies.
12. Performance and payment bonds.
13. Data needed to acquire Owner's insurance.

H. Application for Payment at Substantial Completion: After Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 50 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including all Division 1 Specification Sections, shall apply to this Section of the Specifications.

1.2 WORK INCLUDED

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Owner of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Owner's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products, services and systems selected by Engineer from the designated supplier.

1.4 ACTION SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Engineer under allowance and shall include taxes,freight, and delivery to or transportation from the Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, removal, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

1. If requested by Owner retains and prepares unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.

2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.

3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.

4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 3 - PRODUCTS (Not Used)

PART 4 - EXECUTION

4.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

4.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION 01 29 50

THIS PAGE INTENTIONALLY LEFT BLANK

FOR DUPLEX PRINTING PURPOSES

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.

B. Related Requirements:

1. Section 013323 "Submittal Procedures" for submitting schedules and reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Engineer.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

3. Total Float Report: List of all activities sorted in ascending order of total float.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion and final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
    a. 15 kV Switch
    b. Transformers
3. Submittal Review Time: Include review and resubmittal times indicated in Section 0133023 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 14 days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.

6. Punch List and Final Completion: Include not more than 14 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.

2. Work Restrictions: Show the effect of the following items on the schedule:
   a. Uninterruptible services.
   b. Seasonal variations.
   c. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Submittals.
   b. Purcjhases.
   c. Installation.
   d. Tests and inspections.
   e. Startup and placement into final use and operation.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 012900 "Payment Procedures" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for commencement of the Work.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANNT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within [**one**] <**Insert number**> day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule 2 days before each scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Engineer and Owner.

.

END OF SECTION

SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
   1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
   2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   3. Section 011781 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
   a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action; informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Engineer's final release or approval.
   g. Scheduled date of fabrication.
   h. Scheduled dates for purchasing.
   i. Scheduled dates for installation.
   j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Engineer for Contractor's use in preparing submittals.

1. Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
   a. Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

   b. Digital Drawing Software Program: The Contract Drawings are available in ACAD. Contractor shall execute a data licensing agreement in the form to be provided by Engineer..

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
   a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 5 days for review of each resubmittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

2. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.

3. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Engineer**,** containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Engineer.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Indication of full or partial submittal.
   o. Transmittal number[, numbered consecutively].
   p. Submittal and transmittal distribution record.
   q. Other necessary identification.
   r. Remarks.

4. Metadata: Include the following information as keywords in the electronic submittal file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.

E. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

F. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Engineer's action stamp.

G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

1. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.
   A. Engineer, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets 30 by 42 inches.
3. Submit Shop Drawings it Shop Drawings in the following format:
    a. PDF electronic file.

D. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

E. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

G. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

H. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

I. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

PART 3 – EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

A. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

C. Submittals not required by the Contract Documents may be returned by the Engineer without action.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to:

1. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
2. Electric power service.

C. Support facilities include, but are not limited to:

1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Contractor field office.

D. Security and protection facilities include, but are not limited to:

1. Environmental protection.
2. Stormwater controls.
3. Erosion and sedimentation controls.
4. Tree and plant protection.
5. Barricades, construction fence, warning signs, and lights.

1.2 USE CHARGES

A. General: Cost or use charges for temporary facilities shall not be paid for by the Owner and shall be included in the Work. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner.
2. Engineer.
3. Testing agencies.
4. Personnel of authorities having jurisdiction.

B. Sewage Disposal Service: Pay sewage disposal service use charges for sewage disposal from Project site.

C. Potable Water Service: Pay potable water service use charges, whether metered or otherwise, for water used in construction activities at Project site.

D. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by or in construction activities at Project site.

E. Telephone Service: Pay telephone service use charges, for office telephones at Project site.

F. Internet Service: Pay internet service use charges, for office at Project site

1.3 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA241.

1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

2. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Engineer. Provide materials suitable for use intended.

B. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

C. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material for the exclusive use of the Engineer.

D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

1. Provide electric water coolers to maintain dispensed water temperature at 45 to 55 degrees F.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Temporary facilities and controls shall be installed on-site within seven calendar days of commencement of work on the site, unless special conditions on-site prevent such installation in which case installation shall be complete as quickly as practical.

C. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company requirements.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.

3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.

1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.

a. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnecting means, automatic ground-fault interrupters, and main distribution switchgear.

1. Install power distribution wiring overhead and rise vertically where least exposed to damage.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.

2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion.

B. Provide sedimentation control measures in accordance with Division 1 Section "Temporary Erosion and Sedimentation Control".

C. Dewatering Facilities and Drains: Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.

2. Remove snow and ice as required to minimize accumulations.

3. Dewatering measures shall comply will local, state, and federal regulations.

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

1. If required by authorities having jurisdiction, provide separate containers, clearly labeled, for each type of waste material to be deposited.

2. Develop a waste management plan for Work performed on Project. Indicate types of waste materials Project will produce and estimate quantities of each type. Provide detailed information for on-site waste storage and separation of recyclable materials. Provide information on destination of each type of waste material and means to be used to dispose of all waste materials.

E. Janitorial Services: Provide janitorial services on a weekly basis for field office, toilets, wash facilities, and similar areas.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise.

B. Stormwater Control: Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of stormwater from heavy rains.

C. Tree and Plant Protection: Install temporary fencing located as indicated on the Drawings or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage, flooding, and erosion.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erecting structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and public of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of the Contractor.

2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

END OF SECTION

SECTION 01 57 13 – TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. This Section includes furnishing, placing, and maintaining temporary sediment control measures as shown on the Drawings, as directed by the Engineer, and where necessary to reduce sediment content of runoff. Control measures are to remain in place until after completion of demolition. Measures include, but are not limited to, the following:

1. Wattles.
2. Dust control.
    a. Minimize the creation and dispersion of dust. If the Engineer determines that water is required for more effective dust control, provide such measures at no additional cost.
3. Tree Protection.
4. Temporary Seeding

B. Related Sections include the following:

1. Section 31 20 00 "Earth Moving".

1.3 SUBMITTALS

A. Product Data: For the following:

1. Wattles

B. Material Certificates:

1. None

C. Seed bag tags:

1. Temporary seed mix

1.4 QUALITY ASSURANCE

A. Standard Specifications: Rhode Island, Department of Transportation, "Standard Specifications for Road and Bridge Construction", amended March 2018, including all supplements and addenda.

B. Rhode Island "Soil Erosion and Sediment Control Handbook," prepared by Rhode Island Department of Environmental Management, dated 2016 including all supplements and addenda.

PART 2 - PRODUCTS

2.1 WATTLES

A. Material: Agricultural straw wrapped in tubular net.

B. Manufacturer: SediMax-SW12 by North American Green, or approved equal.

C. Stakes: Hardwood, 1-inch by 1-inch by 18" minimum.

2.2 DUST CONTROL

B. Water: Potable.

2.3 TREE PROTECTION FENCING

A. Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch maximum opening in pattern and weighing a minimum of 0.4 lb/ft.; remaining flexible from minus 60 to plus 200 deg F inert to most chemicals and acids; minimum tensile yield strength of 2000 psi and ultimate tensile strength of 2680 psi ; secured with plastic bands or galvanized-steel or stainless-steel wire ties

1. Height: 4 feet minimum
2. Color: High-visibility orange, nonfading.
3. Location: As noted on the Drawings.

B. Posts: Tubular or T-shape galvanized-steel posts spaced not more than 8 feet apart

2.4 TEMPORARY SEED MIX

C. Fresh, viable, re-cleaned pure quality seed of the latest crop, delivered in original unopened packages, bearing guaranteed analysis tags and name of the supplier.

D. Temporary seed mixture shall consist of 60% annual or perennial ryegrass and 40% of millet, or sudangrass or 100% of winter rye.

PART 3 - EXECUTION

3.1 GENERAL

A. Minimize environmental damage during construction. Prevent discharge of fuel, oil, lubricants, and other fluids. Mitigate effects of discharge.

B. Install erosion and sediment control measures prior to clearing, demolition or construction.

C. Construct erosion and sediment control measures in accordance with standards and specifications of the Rhode Island "Soil Erosion and Sediment Control Handbook", RIDEM Construction Stormwater Permit, state regulations, and as follows:

1. Attend a preconstruction meeting with the Engineer, to review contract conditions and construction methods.

2. Conduct inspections as indicated in the Contract Documents and prepare inspection reports with inspector name, date, areas of inspection, observations of site conditions, condition and effectiveness of controls, recommended corrective action, and corrective actions implemented, weather and precipitation data, and other relevant information. Submit inspection reports to the Owner weekly.

3. Provide additional sedimentation and erosion controls as required by Engineer to address field conditions.

4. Do not discharge turbid water from dewatering to drainage systems, including but not limited to pipes, swales, ditches, and inland wetlands and watercourses.

5. Weekly and prior to any anticipated rain event, inspect site. Ensure that erosion controls are properly maintained and functioning.

6. Construction yards outside of the work limits may require a separate wetland application, depending on the location.

7. Supply a 24-hour contact name and number as part of the erosion control plan.

D. Install additional control measures, if deemed necessary by the State, City, or Owner.

E. Implement and maintain the control measures shown on the Drawings. Inform parties engaged on the construction site of the requirements and objectives of the plan. Notify the proper municipal agency of transfer of this responsibility.

F. Protect catch basins with catch basin inlet protection throughout construction until disturbed area are stabilized.

1. Remove and dispose of sediment from control structures.

G. Control dust and wind erosion. Control dust to prevent a hazard to people, facilities, and traffic on the property. Dust control includes sprinkling of water on exposed soils and haul roads.

H. Do not discharge directly into drainage systems, wetlands or watercourses where dewatering is necessary. Utilize methods and devices as permitted by authorities having jurisdiction and appropriate regulations to minimize and retain suspended solids including pumping water into a temporary sedimentation bowl, providing surge protection at inlet and outlet of pumps, floating pump intake.

1. If pumping operation results in turbidity problems, stop pumping until means of controlling turbidity are determined and implemented.

I. Cut Areas

1. Establish an erosion control line at toe of slope in cut areas and slope stabilization with mulch or grass within 30 days of start of cut operations.

J. Fill Areas

1. Establish an erosion control line approximately 10 feet from toe of slope of proposed fill areas prior to beginning fill installation.
2. Initiate slope stabilization with mulch or grass within 30 days of start of fill installation.

K. Within 7 days of completing slope construction, stabilize slopes with vegetation or matting to minimize exposure.

L. Stockpiles

1. Side Slopes: 2:1 maximum.
2. Surround stockpiles by a hay bale sediment barrier.
3. Stabilize stockpiles left bare for more than 15 days with temporary vegetation or mulch.

M. Final Grading

N. If final grading is delayed for more than 30 days after land disturbances cease, stabilize soils with temporary vegetation or mulch. Planting Season for Temporary Vegetation

1. March 1 to June 15 and August 15 to October 1.

2. After September 15, stabilize areas with haybale check, filter fabric, or woodchip mulch.

O. Areas to Be Left Bare Prior to Finished Grading and Seeding

1. Within Planting Seasons

a. Temporarily seed with Perennial Ryegrass

b. Apply at a rate of 2 pounds per 1,000 sq. ft. at a depth of 1/2 inch.

c. Where grass predominates, fertilize according to a soil test at a minimum application rate of one pound per acre.

2. Outside of Planting Seasons

a. Apply air-dried wood chip mulch, free of coarse matter.

b. Apply at a rate of 185 to 275 pounds per 1,000 sq. ft.

3.2 CONTROL SYSTEMS

A. Wattles

1. Install around soil stockpile areas and downgradient of site disturbance, or as shown on Drawings. Ends of adjacent wattles shall be tightly butted or overlapped so that no opening exists for water to pass through.

2. Entrench bales 2- to 3- inches and compact excavated soil on upslope side.

3. Secure in place with stakes spaced 3- to 4-feet apart.

B. Dust Control

1. Apply water uniformly over the surface when dust becomes a nuisance or when directed by the Engineer. Provide shut-off valve in convenient location on water truck, to allow for regulating water flow.

C. Tree Protection

1. Install tree protection fencing before equipment is brought on-site. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

2. Regrading:
   a. Lowering Grade: Where finish grade is indicated below existing grade around trees to remain, slope grade away from trees as recommended by arborist unless otherwise indicated.

1) Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

b. Raising Grade: Where existing grade is 4 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

D. Temporary Seeding

1. Annual or perennial ryegrass shall be planted at a rate of 1.5 pounds per 1,000 square feet.
2. Winter rye shall be planted at a rate of 2.5 pounds per 1,000 square feet.
3. Millet or sudangrass shall be planted at a rate of 1.0 pounds per 1,000 square feet.

3.3 MAINTENANCE

A. Wattles

1. Inspect control system immediately after each rainfall and daily during prolonged rainfall. Make repairs immediately.
2. Remove and dispose of accumulated sediments when sediment reaches approximately one- third the height of the control system, or when directed by the Engineer.
3. Replace control system promptly if system becomes ineffective prior to the expected usable life.
4. Maintain or replace system until no longer necessary for the intended purpose.

3.4 REVIEW AND ACCEPTANCE

A. Upon completion of all turf areas, final review of all areas will be made by the Engineer upon written request of such review by the Contractor, when submitted at least ten (10) days before the anticipated date of review.

B. Issue the request, in no case earlier than four (4) weeks, after the installation of all turf areas

C. Upon completion of all repairs or replacements, which may appear at the time to be necessary in the judgment of the Engineer, the Engineer will notify the Owner, in writing, as to the acceptance of all turf areas.

D. Inspection and acceptance may be requested and granted in part, provided the areas for which acceptance is requested are substantial in size with clearly defined boundaries.

E. Establish a dense growth of permanent grasses, free of mounds and depressions; any part of

the seeded turf areas that fail to show a uniform stand of grass is to be re-seeded and re-mulched until a dense turf is established. Establish a healthy, well-rooted, even-colored, close stand of grass with coverage exceeding ninety-eight percent (98%) over any ten (10) square foot area in seeded areas with bare spots not to exceed two inches (2") by two inches (2").

F. Upon written final acceptance of all lawn areas, the Owner will be responsible for all turf areas, including maintenance and protection.

3.5 CLEANUP

A. Remove and dispose of control systems after area stabilizes with new growth, or when directed by the Engineer.

B. Apply seed and mulch to all areas where erosion control measures have been removed.

C. Remove the Construction Access and restore the access pad area in accordance with Contract Documents.

END OF SECTION

SECTION 26 03 45 - 15 kV PADMOUNT SWITCHES

Functional Specification for 15 kV Padmount Switches

1. Scope

1.1. This specification applies to three-phase, 60 Hz, fully dead front, sectionalizing underground distribution switchgear; with maximum main bus rating of 600 amperes continuous current and maximum tap rating of 600 amperes. Source switching shall be accomplished with vacuum switches. Tap overcurrent protection shall be accomplished utilizing a resettable vacuum fault interrupter (VFI) which shall be provided with: three-phase: three-pole ganged operation. The unit shall be manually operated.

1.2. The unit is to be insulated with Envirotemp™ FR3™ less-flammable fluid for operation to 0 degrees C (32 degrees F), dielectric, contained in a sealed tank design, so operation is unimpaired by flood conditions or contaminated environments (except control). The unit shall utilize vacuum interrupters for all current switching and fault current interruption such that the dielectric media is not consumed or contaminated by normal operations of the interrupters. The unit shall be designed for installation on a concrete or fiberglass pad at ground level.

1.3. The switchgear shall use resettable interrupter controls and shall not use fuses.

2. Applicable Standards

2.1. IEEE Std C37.74™-2003 standard – IEEE Standard Requirements for Subsurface, Vault, and Pad-Mounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems Up to 38 kV

2.2. IEEE Std C37.60™-2003 standard – IEEE Standard Requirements for Overhead, Pad-Mounted, Dry Vault, and Submersible Automatic Circuit Reclosers and Fault Interrupters for Alternating Current Systems Up to 38 kV

2.3. IEEE Std C57.12.28™-2005 standard – Standard for Pad-Mounted Equipment - Enclosure Integrity.

2.4. IEEE Std C57.12.29™-2005 standard – IEEE Standard for Pad-Mounted Equipment - Enclosure Integrity for Coastal Environments – applicable when stainless steel construction is specified.

2.5. IEEE Std 386™-2006 standard – Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.

2.6. IEEE Std C37.90™-2005 standard – IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus.

2.7. IEEE Std C37.90.2™-2004 standard – Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.

2.8. IEC 801-3 – Radiated Electromagnetic Field Requirements.

2.9. IEC 68-2-30 – Environmental Testing.

3. Ratings

The switchgear shall be rated* as follows:

Nominal Voltage		**15 kV**	**15 kV**	**25 kV**	**35 kV**
Maximum Design Voltage, kV		15.5	15.5	27.0	38.0
BIL, kV		95	95	125	150
1-Minute Withstand Voltage (60 Hz), kV		35	35	60	70
Momentary Current, 10 Cycles (sym.), kA		12.5	16.0	12.5	12.5
3-second Withstand Current (sym.), kA		12.5	16.0	12.5	12.5
Fault Interrupter	**Continuous Current, (max), A**	600	600	600	600
	Interrupting Current (sym./asym.)	12.5/20.0	16/25.8	12.5/20.0	12.5/20.0
	Making Current (sym.), kA	12.5	16.0	12.5	12.5
	Cable Charging Interrupting Current, A	10.0	10.0	25.0	40.0
Load-Break Switch	**Continuous Current, (max), A**	600	600	600	600
	Load Switching, A	600	600	600	600
	Fault Making, kA (sym./asym.)	12.5/20.0	16/25.8	12.5/20.0	12.5/20.0

Minimum Full Life Fault Interrupting Duty Cycle per IEEE Std C37.60™-2003 standard (2 duty cycles)		**Number of Operations**			
Percent of Interrupting Current Rating:	**15-20%**	88	88	88	88
	45-55%	112	112	112	112
	90-100%	32	32	32	32
Total		232	232	232	232

* Continuous and short-circuit currents may be limited by ratings of selected bushings.

3.1. The switchgear shall have an ambient operating temperature range of -30 ºC to +40 ºC.

3.2. Construction

3.2.1. The underground distribution switchgear shall consist of a 2-sided, sealed insulation tank, and separate front and rear cable compartments. Overall height, width, depth and layout shall conform to the manufacturer's standard construction practices for the configuration, ratings, and voltage class specified. Standard construction shall be of mild steel with stainless steel hardware.

3.2.2. The liquid filled unit shall have a tamperproof bolted tank cover design, utilizing Buna-N rubber gaskets. The sealed tank (with deadfront terminators installed) shall be capable of withstanding flood immersion while energized, and shall be impervious to contaminants and animals, so as not to compromise the main insulation structure. The cable compartments shall be located at the front and back of the tank respectively. The main cable compartments may house a combination of source way(s) and load or tap way(s). All switch and VFI operating handles shall be located on the same front plate as the ways that they operate, in order to reduce the likelihood of

operating an incorrect switch. Recessed lifting provisions for suitable balanced lift shall be provided on the tank ends.

3.2.3. Cable compartments shall both have a minimum depth of 30 inches, to provide ease of cable installation and allow for the addition of termination accessories.

3.2.4. Side-hinged cabinet style doors shall be provided. The side-hinged doors shall provide three-point latching and shall not require a center support post. Side-hinged doors shall have a door stay to manually latch the door in the open position at approximately 120º from the closed position. The right hand door on each side shall be the first opening door and shall be secured with a recessed stainless steel pentahead bolt, with provisions for padlocking. The cabinets shall be equipped with a hinged cabinet top to facilitate entry to the cable compartments; it shall open approximately 60 degrees and have door stays to hold it in the open position. The cabinet top when in the closed position shall interlock with the cabinet doors without additional means required to secure it. Cabinet construction shall meet all NEMA and ANSI security requirements as defined in the IEEE Std C57.12.28™-2005 standard and the construction requirements of the IEEE Std C37.74™-2003 standard.

3.2.5. Units shall be shipped complete with Envirotemp™ FR3™ less-flammable fluid for operation to 0 degrees C (32 degrees F) for operation to minus 30 degrees C]

3.2.6. Select below based on insulation requirements.

- The unit shall be equipped with a 1-inch oil-fill plug and a 1-inch drain plug with 3/8" sampler. A single automatic pressure relief valve shall be supplied that is hotstick-operable and located on the source-side front plate above the oil level indicator within the switchgear. The unit shall have sight gages to monitor the dielectric level located on each unit side equipped with an operating handle.

3.2.7. The manufacturer shall provide a factory assembled 1/2-inch diameter copper ground rod in each compartment, for use with user's grounded clamps that shall provide a 3 inch clearance from the ground rod to the front plate of the tank to accommodate grounding of the insulated connectors.

3.2.8. A non-corrosive operating diagram (one-line schematic of the unit) shall be affixed to the inside of the right hand, first opening door, on both sides of the unit, if two (2) sided. When visible break switches are specified, the one-line schematic will also show the electrical connection and mechanical interlock of these switches. A single nameplate shall be provided that is mounted on the source side tank front plate in the upper right hand corner. The switching current and voltage ratings on this nameplate shall also apply to the visible break switch. The nameplate shall contain the following information:

- Catalog Number/Model Number
- Serial Number
- Nominal voltage class, kV
- Rated maximum voltage, kV
- BIL, kV
- Manufacturing Date: MM/YYYY
- Rated continuous current, A

- Rated load interrupting rating, A
- Momentary current rating, kA asym.
- Close & latch rating, kA asym.
- Total weight, lbs.
- Liquid dielectric volume (gallons) – Liquid-Filled Units Only
- SF_6 Weight, Pressure – SF_6 Units only

3.2.9. Three (3) Faulted Circuit Indicator mounting provisions shall be provided in the sills beneath the cabinet doors at the position of each way. The provisions shall include a 1-1/16 diameter hole sized for Eaton's Cooper Power series type S.T.A.R. fault indicator small remote display, cover plate, and tamperproof mounting bolts. There shall be provisions for mounting at least one fault indicator for each equipment bushing.

3.2.10. Bushings

Bushings shall be deadfront type for use with separable connectors conforming to IEEE Std 386™-2006 standard and ANSI Standard C119.2. The source ways shall have a continuous current rating of 200 ampere with wells for bushing inserts. Tap ways shall have a continuous current rating of 200 ampere with wells for bushing inserts.

The two-hundred (200) ampere wells] shall be horizontally configured at 24 inches above the pad and accept molded, separable dead front connectors. Bushings shall be mounted with minimum spacing of 8.0-inches between centerlines, except between the C-phase bushings which may be a minimum of 7.0-inches. A standoff bracket or parking stand shall be supplied for each bushing and shall be mounted horizontally adjacent to each bushing on a 4.0-inch centerline from the bushing centerline. The standard phasing of the bushings from left to right shall follow the sequence ABC-CBA. Each bushing shall have identification affixed to the front plate identifying its source or tap designation, as shown on the one-line operating diagram, and its phase identification.

3.2.11. Source Switches

Source Switches shall utilize vacuum interruption only, such that the dielectric media is never contaminated by switching arc products. Switches shall be three-phase gang-operated vacuum switches that meet or exceed the performance requirements of IEEE C37.74™-2003 standard. The mechanism and the vacuum interrupters employed shall be capable of interrupting the rated continuous current 200 amperes and fault currents up to 12,500 RMS amperes symmetrical]. The switch shall have a single operating handle, designed for operation with a lineman's hot stick, which has a push to close / pull to open operation. Operation of the handle shall requiring no more than 75 lbs. of force and 60 degrees of movement for complete operation. The mechanism shall close the switch independently of the operator's speed of moving the handle. The switch, as a safety feature, shall close into a fault and remain closed at any current up to its full rating. Switch operating handles shall be front plate mounted and shall be pad lockable in both the open and closed positions.

3.2.12. Vacuum Fault Interrupters

The switchgear shall incorporate vacuum fault interrupters for tap overcurrent protection only, such that the major dielectric media is never contaminated by circuit

interruption arc products. The device shall interrupt all fault currents up to its maximum rated current of 12,500 RMS amperes symmetrical]. The interrupter shall be manually resettable, with no consumable parts (i.e. fuses). The maximum interrupting time from issuance of a trip signal from the electronic control shall be 2 cycles.

To maximize safety to the operator, the interrupter shall incorporate a trip-free mechanism to prevent the possibility of holding the interrupter mechanism closed under a faulted circuit condition.

The vacuum fault interrupters shall act as a three single-phase independent circuit breakers. The trip mechanisms for each phase shall be mechanically linked and the electronic control shall be set so that an overcurrent condition on any one phase shall simultaneously trip all three phases. A single operating handle shall be provided for manual opening, reset and closing. The operating handle(s) shall be mounted on the front plate of the tank in close relation to the VFI being controlled and shall have three distinct operating positions corresponding to the vacuum fault interrupter positions of closed, open, or tripped. A pointer attached to the handle shall be provided for ready identification of the handle's position. The handle shall be designed for operation with a lineman's hot stick and have a push to close / pull to open / pull to reset operation requiring no more than 75 lbs. of force and 60 degrees of movement for complete operation. Except when equipped with the optional motor operator, when the vacuum fault interrupter is tripped by automatic action of the VFI control, the operating handle shall drop to an intermediate position between its closed and open positions, to provide indication that it is tripped. The operating handle assembly shall include provisions to padlock the handle in the open position.

4. Visible Break Switch (600 A or less liquid filled units only)

4.1. A separate, interlocked, visible break switch shall be provided in each circuit. The visible break switch 3 position (Open/Closed/Cable Ground). The visible break option will consist of an isolating switch, in series with the vacuum switch, which meets all of the continuous current and voltage ratings of the switchgear. The contacts of the visible break switch will be clearly visible through a 4" x 11" view window manufactured of a clear material with an impact strength rating of "Excellent". Both the vacuum switches or interrupters and their corresponding visible break switches shall be mechanically interlocked such that the visible break switch will never operate under load. All current interruption shall be by the vacuum interrupters. For 4-way units, the visible break switches shall be operated from the side of the switchgear via a rotary style hot stick operable handle. The operating handles for optional visible break switches shall be located at the sides of the switchgear tank inside pad lockable "side-pockets". These "side pockets" shall be bolted shut using pentahead bolts and shall house T-Handles for operation of the rotary style visible break switch handles.

5. Electronic Trip Control

5.1. Overcurrent sensing shall be accomplished with an electronic trip control that shall be Eaton's Cooper Power series type Tri-Phase Control.

5.2. The control shall use internally mounted 1000:1 bushing current transformers (CTs) to sense line current and shall also provide the control operating power, eliminating the effects of system voltage conditions. The control shall be self-contained and includes the following:

5.2.1. Meet the specified time-current curve immediately upon energization.
5.2.2. No "warm-up", initialization, or arming time delays adjustments shall be necessary.
5.2.3. No minimum load requirement or battery back-up device shall be necessary to meet the specified time-current characteristics.
5.2.4. The control shall have a minimum operating temperature range of -30 ºC to +65 ºC with no more than a ±5% variation in time-current response characteristics from its response at +25 ºC.

5.3. The standard control shall provide minimum phase overcurrent trip settings that are field selectable (in 10 amp increments) from 20 amps to 1290 amps. Trip settings may be changed while the switchgear is energized (so service is not interrupted). An instantaneous trip feature shall be provided as a standard feature of the control. Instantaneous trip shall be a field selectable multiple of 1X, 3X, 5X,...15X times the phase overcurrent trip settings or it may be selected to be disabled. The instantaneous trip feature shall provide a fixed 0.025-second response time characteristic.

5.4. A single time-current curve shall be provided that is common to all three phases. Time-current trip curves shall be changeable via plug-in TCC modules. The time-current curve provided shall be Eaton's Cooper Power series type for Tri-Phase Control – EF (standard), KF, TF, H or F, and shall emulate the time-current characteristics of its associated fuse type.

5.5. The control shall provide ganged tripping of the vacuum fault interrupters on each phase of the protected tap. This shall be a standard feature and shall be selectable via a switch located on the control circuit board.

5.6. The control and its enclosure shall be mounted on the inside of the cabinet door of the VFI tap compartment. The control enclosures shall be mild steel and vented in design to prevent trapping of moisture within the control. The control enclosures shall have internal thermostatically controlled 120 Vac heaters to prevent condensation in the enclosure, powered from internal control transformer.

6. Finish Performance Requirements:

6.1. The switchgear shall be constructed of mild steel with stainless steel details and painted green conforming to Munsell 7GY 3.29/1.5. The coating system employed shall meet or exceed IEEE Std C57.12.28™-2005 standard coating system requirements for underground distribution equipment, including the following performance tests:

- 1500-hour 5% salt spray corrosion test per ASTM B117 / D1654
- 1000-hour humidity test per ASTM D2247 / D1654
- 500-hour ultraviolet accelerated weathering test per ASTM G53 / D523
- Direct impact test with 160 in. lb. falling dart per ASTM D2794
- Tabor abrasion test 3,000 cycles per ASTM D4060
- Crosshatch adhesion per ASTM D3359

7. Optional Features

7.1. Control Provisions

7.1.1. When specified, an internal 1.5-kVA rated single-phase potential transformer (liquid-insulated designs only) shall be provided that shall be connected to the "B phase" of the common bus and protected against potential transformer failure by an under-oil primary current-limiting fuse. The transformer primary shall be rated at line-to-ground connection and voltage and provide a 120 Vac secondary voltage output. Primary connection shall be phase-to-phase and secondary grounded wye. The potential transformer shall be wired to the MIL C-5015 style connector that is provided for the auxiliary switch connections. The potential transformer shall provide power for the control heater circuits. For units with a bus tie switch a PT shall be supplied on each side of the tie switch such that power shall be available should one-half the bus be energized – the control circuits shall contain a power transfer relay so that the inactive bus half will not be reverse energized by the control circuits.

7.2. Special Certifications

7.2.1. A UL® listed and labeled product shall be provided. The following features meet requirements for UL® listing and labeling:

- Voltage rating classes of 15 kV and 25 kV
- Fluid Dielectrics (mineral oil, E200, and Envirotemp™ FR3™ fluids)
- Visible-breaks (two- and three-position)
- Standard ground pads
- 600 A bushings or 200 A bushing wells and inserts

8. Production Testing - The unit shall be subjected to the following production tests:

8.1. Continuity test to assure correct internal connections.
8.2. Hi-pot test to determine dielectric strength of the unit.
8.3. Pressure test to assure tank is completely sealed.
8.4. Electrical TCC trip test.

9. Submittals

9.1. The manufacturer shall furnish a detailed list of ratings and accessories and set of drawings defined as follows :

- Detailed front elevation.
- Single Line
- Base Plan
- Schematics

9.2. The manufacturer shall furnish instruction manuals covering the installation of the switchgear and the operation of its various components.

10. Quality Assurance

10.1. The manufacturer shall be a company specializing in medium voltage underground distribution switchgear with at least fifteen years of documented experience.

10.2. Equipment shall be built in accordance with the industry standards for medium voltage equipment.

10.3. The manufacturer shall be registered and certified as ISO 9001 compliant by a recognized international and independent body.

11. Warranty

The underground distribution switchgear shall be provided with a one-year warranty in-service/18 months maximum from date of shipment.

APPENDIX A: MODELS AND WAYS

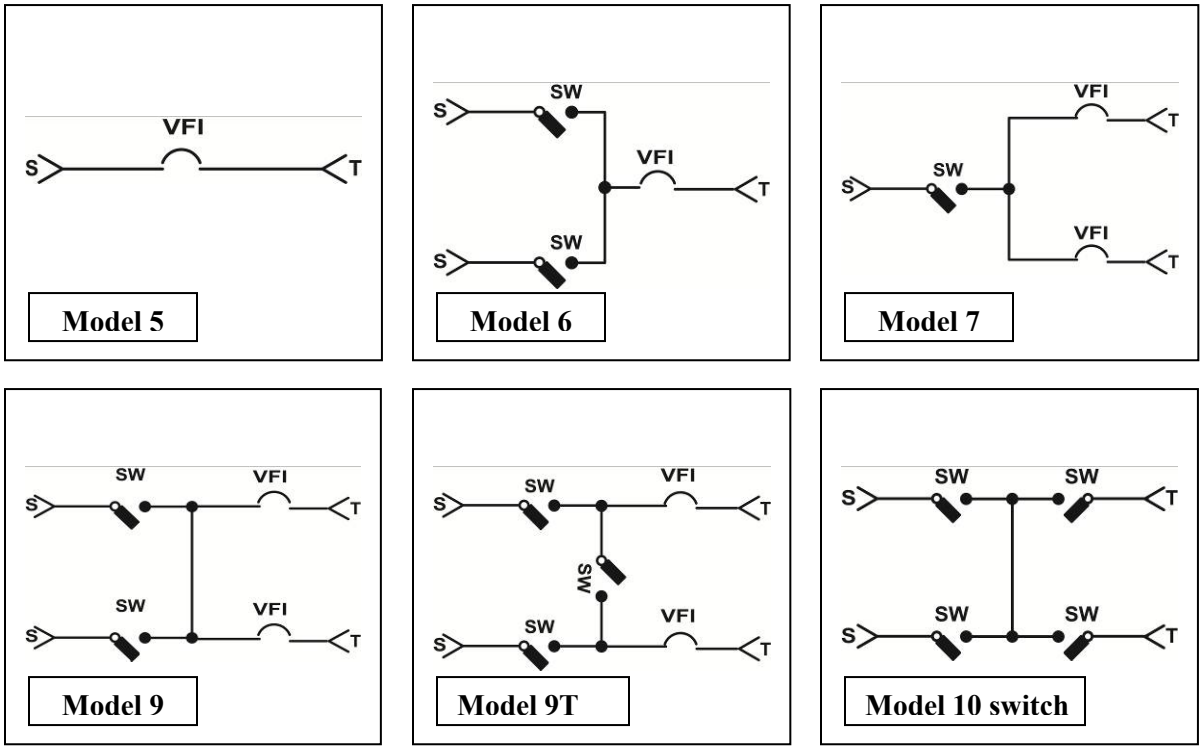
These notes are for the user of this specification guide and are not intended to be a part of the specification.

Definitions:

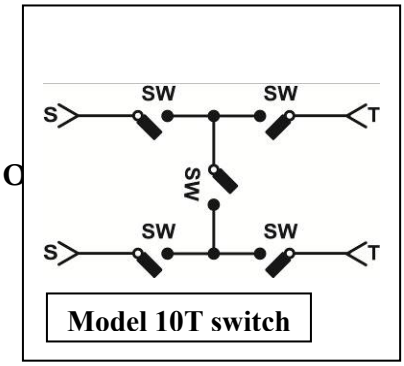
WAY - A "way" is defined as a connection from the exterior (either a source or a tap) to the interior switchgear bus that may be a direct electrical connection or a connection via switch or a vacuum fault interrupter. The total number of "ways" is the sum of all sources and taps. An internal bus tie switch is not a way.

MODEL or MODEL NUMBER – A shorthand method to describe a bus arrangement that includes sources, taps and tie switches that further defines the presence of switches, VFIs, and direct connections to the bus. This allows one to describe bus common arrangements without creating or transmitting drawings. Typical model number arrangements follow; these may be modified to accommodate any possible arrangement of the circuit elements.

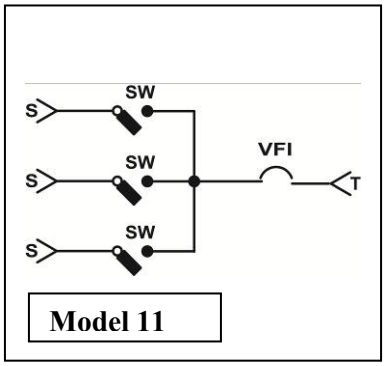
INSERT A MODEL DIAGRAM INTO THE SPECIFICATION FROM THIS LIST OR CREATE A SKETCH
(maximum of 6 ways, total):



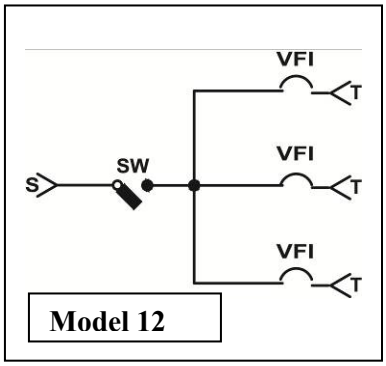
END O



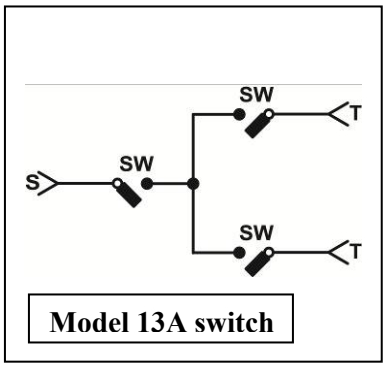
Model 10T switch



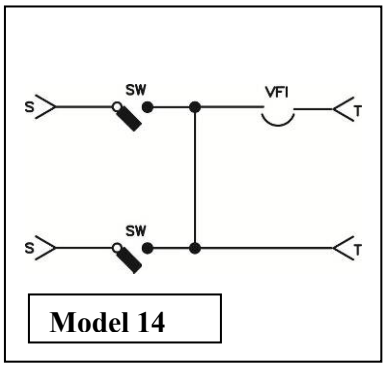
Model 11



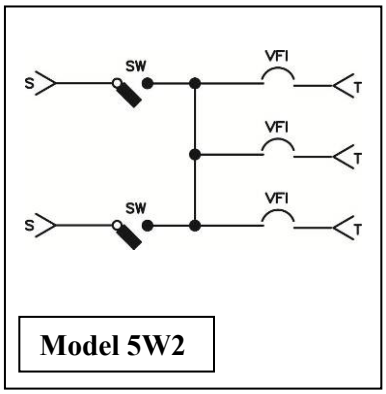
Model 12



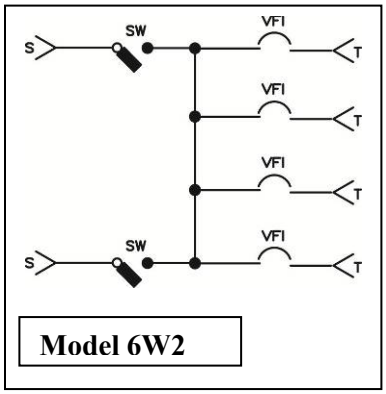
Model 13A switch



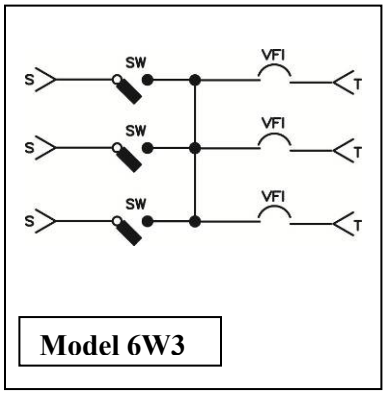
Model 14



Model 5W2



Model 6W2



Model 6W3

SECTION 26 05 11 - REQUIREMENTS FOR ELECTRICAL INSTALLATIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section applies to all sections of Division 26.

B. Furnish and install electrical systems, materials, equipment, and accessories in accordance with the specifications and drawings. Capacities and ratings of motors, transformers, conductors and cable, switchboards, switchgear, panelboards, and other items and arrangements for the specified items are shown on the drawings.

C. Electrical service entrance equipment and arrangements for connections to the electric utility company's system shall conform to the electric utility company's requirements.

D. Conductor ampacities specified or shown on the drawings are based on copper conductors, with the conduit and raceways sized per NEC. Aluminum conductors are prohibited.

1.3 MINIMUM REQUIREMENTS

A. The latest International Building Code (IBC), Underwriters Laboratories, Inc. (UL), Institute of Electrical and Electronics Engineers (IEEE), and National Fire Protection Association (NFPA) codes and standards are the minimum requirements for materials and installation.

B. The drawings and specifications shall govern in those instances where requirements are greater than those stated in the above codes and standards.

1.4 TEST STANDARDS

A. All materials and equipment shall be listed, labeled, or certified by a Nationally Recognized Testing Laboratory (NRTL) to meet Underwriters Laboratories, Inc. (UL), standards where test standards have been established. Materials and equipment which are not covered by UL standards will be accepted, providing that materials and equipment are listed, labeled, certified or otherwise determined to meet the safety requirements of a NRTL.

B. Definitions:

1. Listed: Materials and equipment included in a list published by an organization that is acceptable to the Authority Having Jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production or listed materials and equipment or periodic evaluation of services, and whose listing states that the materials and equipment either meets appropriate designated standards or has been tested and found suitable for a specified purpose.

2. Labeled: Materials and equipment to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the Authority Having Jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled materials and equipment, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3. Certified: Materials and equipment which:
   a. Have been tested and found by a NRTL to meet nationally recognized standards or to be safe for use in a specified manner.
   b. Are periodically inspected by a NRTL.
   c. Bear a label, tag, or other record of certification.

4. Nationally Recognized Testing Laboratory: Testing laboratory which is recognized and approved by the Secretary of Labor in accordance with OSHA regulations.

1.5 QUALIFICATIONS (PRODUCTS AND SERVICES)

A. Manufacturer's Qualifications: The manufacturer shall regularly and currently produce, as one of the manufacturer's principal products, the materials and equipment specified for this project, and shall have manufactured the materials and equipment for at least three years.

B. Product Qualification:

1. Manufacturer's materials and equipment shall have been in satisfactory operation, on three installations of similar size and type as this project, for at least three years.

2. The Owner reserves the right to require the Contractor to submit a list of installations where the materials and equipment have been in operation before approval.

C. Service Qualifications: There shall be a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within four hours of receipt of notification that service is needed. Submit name and address of service organizations.

1.6 APPLICABLE PUBLICATIONS

A. Applicable publications listed in all Sections of Division 26 shall be the latest issue, unless otherwise noted.

B. Products specified in all sections of Division 26 shall comply with the applicable publications listed in each section.

1.7 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, and for which replacement parts shall be available. Materials and equipment furnished shall be new, and shall have superior quality and freshness.

B. When more than one unit of the same class or type of materials and equipment is required, such units shall be the product of a single manufacturer.

C. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.
2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
3. Components shall be compatible with each other and with the total assembly for the intended service.
4. Constituent parts which are similar shall be the product of a single manufacturer.

D. Factory wiring and terminals shall be identified on the equipment being furnished and on all wiring diagrams.

1.8 MATERIALS AND EQUIPMENT PROTECTION

A. Materials and equipment shall be protected during shipment and storage against physical damage, vermin, dirt, corrosive substances, fumes, moisture, cold and rain.

1. Store materials and equipment indoors in clean dry space with uniform temperature to prevent condensation.
2. During installation, equipment shall be protected against entry of foreign matter, and be vacuum-cleaned both inside and outside before testing and operating. Compressed air shall not be used to clean equipment. Remove loose packing and flammable materials from inside equipment.
3. Damaged equipment shall be repaired or replaced, as determined by the Engineer.
4. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
5. Damaged paint on equipment shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

1.9 WORK PERFORMANCE

A. All electrical work shall comply with requirements of the latest NFPA 70 (NEC), NFPA 70B, NFPA 70E, NFPA 99, NFPA 110, OSHA Part 1910 subpart J – General Environmental Controls, OSHA Part 1910 subpart K – Medical and First Aid, and OSHA Part 1910 subpart S – Electrical, in addition to other references required by contract.

B. Job site safety and worker safety is the responsibility of the Contractor.

C. Electrical work shall be accomplished with all affected circuits or equipment de-energized.

D. For work that affects existing electrical systems, arrange, phase and perform work to assure minimal interference with normal functioning of the facility.

E. New work shall be installed and connected to existing work neatly, safely and professionally. Disturbed or damaged work shall be replaced or repaired to its prior conditions.

1.10 EQUIPMENT INSTALLATION AND REQUIREMENTS

A. Equipment location shall be as close as practical to locations shown on the drawings.

B. Working clearances shall not be less than specified in the NEC.

C. Inaccessible Equipment:

1. Where the Engineer determines that the Contractor has installed equipment not readily accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the Owner.

2. "Readily accessible" is defined as being capable of being reached quickly for operation, maintenance, or inspections without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

E. Electrical service entrance equipment and arrangements for temporary and permanent connections to the electric utility company's system shall conform to the electric utility company's requirements.

1.11 EQUIPMENT IDENTIFICATION

A. In addition to the requirements of the NEC, install an identification sign which clearly indicates information required for use and maintenance of items such as switchboards and switchgear, panelboards, cabinets, motor controllers, fused and non-fused safety switches, separately enclosed circuit breakers, individual breakers and other significant equipment.

B. Identification signs for Normal Power System equipment shall be laminated black phenolic resin with a white core with engraved lettering. Lettering shall be a minimum of 12 mm (1/2 inch) high. Identification signs shall indicate equipment designation, rated bus amperage, voltage, number of phases, number of wires. Secure nameplates with screws.

C. Install adhesive arc flash warning labels on all equipment as required by the latest NFPA 70E. Label shall show specific and correct information for specific equipment based on its arc flash calculations. Label shall show the followings:
   1. Nominal system voltage.
   2. Equipment/bus name, date prepared, and manufacturer name and address.
   3. Arc flash boundary.
   4. Available arc flash incident energy and the corresponding working distance.
   5. Minimum arc rating of clothing.
   6. Site-specific level of PPE.

1.12 SUBMITTALS

A. Submit to the Engineer in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. The Engineer's approval shall be obtained for all materials and equipment before delivery to the job site. Delivery, storage or installation of materials and equipment which has not had prior approval will not be permitted.

C. All submittals shall include six copies of adequate descriptive literature, catalog cuts, shop drawings, test reports, certifications, samples, and other data necessary for the Government to ascertain that the proposed materials and equipment comply with drawing and specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify specific materials and equipment being submitted.

D. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole. Partial submittals will not be considered for approval.
   1. Mark the submittals, "SUBMITTED UNDER SECTION_____".
   2. Submittals shall be marked to show specification reference including the section and paragraph numbers.
   3. Submit each section separately.

E. The submittals shall include the following:

1. Information that confirms compliance with contract requirements. Include the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, manuals, pictures, nameplate data, and test reports as required.
2. Elementary and interconnection wiring diagrams for communication and signal systems, control systems, and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
3. Parts list which shall include information for replacement parts and ordering instructions, as recommended by the equipment manufacturer.

F. Maintenance and Operation Manuals:

1. Submit as required for systems and equipment specified in the technical sections. Furnish in hardcover binders or an approved equivalent.
2. Inscribe the following identification on the cover: the words "MAINTENANCE AND OPERATION MANUAL," the name and location of the system, material, equipment, building, name of Contractor, and contract name and number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the material or equipment.
3. Provide a table of contents and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. The manuals shall include:
    a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
    b. A control sequence describing start-up, operation, and shutdown.
    c. Description of the function of each principal item of equipment.
    d. Installation instructions.
    e. Safety precautions for operation and maintenance.
    f. Diagrams and illustrations.
    g. Periodic maintenance and testing procedures and frequencies, including replacement parts numbers.
    h. Performance data.
    i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare and replacement parts, and name of servicing organization.
    j. List of factory approved or qualified permanent servicing organizations for equipment repair and periodic testing and maintenance, including addresses and factory certification qualifications.

G. Approvals will be based on complete submission of shop drawings, manuals, test reports, certifications, and samples as applicable.

1.13 SINGULAR NUMBER

A. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.

1.14 ACCEPTANCE CHECKS AND TESTS

A. The Contractor shall furnish the instruments, materials, and labor for tests.

B. Where systems are comprised of components specified in more than one section of Division 26, the Contractor shall coordinate the installation, testing, and adjustment of all components between various manufacturer's representatives and technicians so that a complete, functional, and operational system is delivered to the Government.

C. When test results indicate any defects, the Contractor shall repair or replace the defective materials or equipment, and repeat the tests for the equipment. Repair, replacement, and re-testing shall be accomplished at no additional cost to the Government.

1.15 WARRANTY

A. All work performed and all equipment and material furnished under this Division shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer for the Government.

1.16 INSTRUCTION

A. Instruction to designated Government personnel shall be provided for the particular equipment or system as required in each associated technical specification section.

B. Furnish the services of competent and factory-trained instructors to give full instruction in the adjustment, operation, and maintenance of the specified equipment and system, including pertinent safety requirements. Instructors shall be thoroughly familiar with all aspects of the installation, and shall be factory-trained in operating theory as well as practical operation and maintenance procedures.

C. A training schedule shall be developed and submitted by the Contractor and approved by the Owner at least 30 days prior to the planned training.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED**)**

END OF SECTION

SECTION 26 05 13 - MEDIUM-VOLTAGE CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of medium-voltage cables, indicated as cable or cables in this section, and medium-voltage cable splices and terminations.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for medium-voltage cables.

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Manholes and ducts for medium-voltage cables.

E. Section 26 12 19, PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS/Switches: Medium-voltage cable terminations for use in pad-mounted, liquid-filled, medium-voltage transformers.

1.4 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 FACTORY TESTS

A. Factory Tests shall be required.

B. Factory Tests shall be in accordance with Paragraph, MANUFACTURED PRODUCTS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.6 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient informationto demonstrate compliance with drawings and specifications.
   b. Submit the following data for approval:
      1) Complete electrical ratings.
      2) Installation instructions.
2. Certifications:
   a. Factory Test Reports: Submit certified factory production test reports for approval.
   b. Compatibility: Submit a certificate from the cable manufacturer that the splices and terminations are approved for use with the cable.
   c. Two weeks prior to final inspection, submit the following.
      1) Certification by the manufacturer that the cables, splices, and terminations conform to the requirements of the drawings and specifications.
      2) Certification by the Contractor that the cables, splices, and terminations have been properly installed and tested.
      3) Certification by the Contractor that each splice and each termination were completely installed in a single continuous work period by a single qualifiedworker without any overnight interruption.
3. Qualified Worker Approval:
   a. Qualified workers who install cables, splices, and terminations shall have a minimum of five years of experience splicing and terminating cables, including experience with the materials in the approved splices and terminations. Qualified workers who perform cable testing shall have a minimum of five year of experience performing electrical testing of medium-voltage cables, including the ability to understand, interpret test results and develop test report.
   b. Furnish satisfactory proof of such experience for each qualified worker who splices or terminates the cables.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):
B3-13 ..... Standard Specification for Soft or Annealed Copper Wire

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
48-09 ..... Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV
386-06 ..... Separable Insulated Connector Systems for Power Distribution Systems above 600 V
400-12 ..... Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems
400.2-13 ..... Guide for Field Testing of Shielded Power Cable Systems Using Very Low Frequency (VLF)
404-12 ..... Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500,000 V

D. National Electrical Manufacturers Association (NEMA):
WC 71-14 ..... Non-Shielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electric Energy
WC 74-12 ..... 5-46 KV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

E. National Fire Protection Association (NFPA):
70-17 ..... National Electrical Code (NEC)

F. Underwriters Laboratories (UL):
1072-06 ..... Medium-Voltage Power Cables

1.8 SHIPMENT AND STORAGE

A. Cable shall be shipped on reels such that it is protected against physical, mechanical and environmental damage. Each end of each length of cable shall be hermetically sealed with manufacturer's end caps and securely attached to the reel.
B. Cable stored and/or cut on site shall have the ends turned down, and sealed with cable manufacturer's standard cable end seals, or field-installed heat-shrink cable end seals.

PART 2- PRODUCTS

2.1 CABLE

A. Cable shall be in accordance with ASTM, IEEE, NEC, NEMA and UL, and as shown on the drawings.

B. Cable shall be Okonite or Kerite.

C. Single conductor stranded copper conforming to ASTM B3.

D. Voltage Rating:

1. 15,000 Volt cable shall be used on all distribution systems with voltages ranging from 5,000 V to 15,000 V.

E. Insulation:

1. Insulation level shall be 133%.
2. Types of insulation:
   a. Cable type abbreviation, EPR: Ethylene propylene rubber insulation shall be thermosetting, light and heat stabilized.

F. Insulation shield shall be semi-conducting. Conductor shield shall be semi-conducting.

G. Insulation shall be wrapped with copper shielding tape, helically-applied over semi-conducting insulation shield.

H. Heavy duty, overall protective polyvinyl chloride jacket shall enclose every cable. The manufacturer's name, cable type and size, and other pertinent information shall be marked or molded clearly on the overall protective jacket.

I. Cable temperature ratings for continuous operation, emergency overload operation, and short circuit operation shall be not less than the NEC, NEMA WC 71, or NEMA WC 74 standard for the respective cable.

2.2 SPLICES AND TERMINATIONS

A. Materials shall be compatible with the cables being spliced and terminated, and shall be suitable for the prevailing environmental conditions.

B. In locations where moisture might be present, the splices shall be watertight. In manholes and pullboxes, the splices shall be submersible.

C. Splices:

1. Shall comply with IEEE 404. Include all components required for complete splice, with detailed instructions.

D. Terminations:

1. Shall comply with IEEE 48. Include shield ground strap for shielded cable terminations.
2. Load-break terminations for indoor and outdoor use: 200 A loadbreak premolded rubber elbow connectors with bushing inserts, suitable for submersible applications. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Allow sufficient slack in medium-voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.
3. Dead-break terminations for indoor and outdoor use: 600 A deadbreakpremolded rubber elbow connectors with bushing inserts, suitable for submersible applications. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Allow sufficient slack in medium-voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.
4. Ground metallic cable shields with a device designed for that purpose, consisting of a solderless connector enclosed in watertight rubber housing covering the entire assembly.
5. Provide insulated cable supports to relieve any strain imposed by cable weight or movement. Ground cable supports to the grounding system.

2.3 FIREPROOFING TAPE

A. Fireproofing tape shall be flexible, non-corrosive, self-extinguishing, arcproof, and fireproof intumescent elastomer. Securing tape shall be glass cloth electrical tape not less than 0.18 mm (7 mils) thick, and 19 mm (0.75 inch) wide.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

B. Cable shall be installed in conduit above grade and duct bank below grade.

C. All cables of a feeder shall be pulled simultaneously.

D. Conductors of different systems (e.g., 5kV and 15kV) shall not be installed in the same raceway.

E. Splice the cables only in manholes and pullboxes.

F. Ground shields in accordance with Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

G. Cable maximum pull length, maximum pulling tension, and minimum bend radius shall conform with the recommendations of the manufacturer.

H. Use suitable lubricating compounds on the cables to prevent pulling damage. Provide compounds that are not injurious to the cable jacket and do not harden or become adhesive.

I. Seal the cable ends prior to pulling, to prevent the entry of moisture or lubricant.

3.2 PROTECTION DURING SPLICING OPERATIONS

A. Blowers shall be provided to force fresh air into manholes where free movement or circulation of air is obstructed. Waterproof protective coverings shall be available on the work site to provide protection against moisture while a splice is being made. Pumps shall be used to keep manholes dry during splicing operations. Under no conditions shall a splice or termination be made that exposes the interior of a cable to moisture. A manhole ring at least 150 mm (6 inches) above ground shall be used around the manhole entrance to keep surface water from entering the manhole. Unused ducts shall be plugged and water seepage through ducts in use shall be stopped before splicing.

3.3 PULLING CABLES IN DUCTS AND MANHOLES

A. Cables shall be pulled into ducts with equipment designed for this purpose, including power-driven winches, cable-feeding flexible tube guides, cable grips, pulling eyes, and lubricants. A sufficient number of qualified workers and equipment shall be employed to ensure the careful and proper installation of the cable.

B. Cable reels shall be set up at the side of the manhole opening and above the duct or hatch level, allowing cables to enter through the opening without reverse bending. Flexible tube guides shall be installed through the opening in a manner that will prevent cables from rubbing on the edges of any structural member.

C. Cable shall be unreeled from the top of the reel. Pay-out shall be carefully controlled. Cables to be pulled shall be attached through a swivel to the main pulling wire by means of a suitable cable grip and pulling eye.

D. Woven-wire cable grips shall be used to grip the cable end when pulling small cables and short straight lengths of heavier cables.

E. Pulling eyes shall be attached to the cable conductors to prevent damage to the cable structure.

F. Cables shall be liberally coated with a suitable lubricant as they enter the tube guide or duct. Rollers, sheaves, or tube guides around which the cable is pulled shall conform to the minimum bending radius of the cable.

G. Cables shall be pulled into ducts at a reasonable speed. Cable pulling using a vehicle shall not be permitted. Pulling operations shall be stopped immediately at any indication of binding or obstruction, and shall not be resumed until the potential for damage to the cable is corrected. Sufficient slack shall be provided for free movement of cable due to expansion or contraction.

H. Splices in manholes shall be firmly supported on cable racks. Cable ends shall overlap at the ends of a section to provide sufficient undamaged cable for splicing.

I. Cables cut in the field shall have the cut ends immediately sealed to prevent entrance of moisture.

3.4 SPLICES AND TERMINATIONS

A. Install the materials as recommended by the manufacturer, including precautions pertaining to air temperature and humidity during installation.

B. Installation shall be executed by qualified person trained to perform medium-voltage equipment installations. Tools shall be as recommended or provided by the manufacturer. Installation shall comply with manufacturer's instructions.

C. Splices in manholes shall be located midway between cable racks on walls of manholes, and supported with cable arms at approximately the same elevation as the enclosing duct.

D. Where the Government determines that unsatisfactory splices and terminations have been installed, the Contractor shall replace the unsatisfactory splices and terminations with approved material at no additional cost to the Government.

3.5 FIREPROOFING

A. Cover all cable segments exposed in manholes and pullboxes with fireproofing tape.

B. Apply the tape in a single layer, wrapped in a half-lap manner, or as recommended by the manufacturer. Extend the tape not less than 25 mm (1 inch) into each duct.

C. At each end of a taped cable section, secure the fireproof tape in place with glass cloth tape.

3.6 CIRCUIT IDENTIFICATION OF FEEDERS

A. In each manhole and pullbox, install permanent identification tags on each circuit's cables to clearly designate the circuit identification and voltage. The tags shall be the embossed brass type, 40 mm (1.5 inches) in diameter and 40 mils thick. Attach tags with plastic ties. Position the tags so they will be easy to read after the fireproofing tape is installed.

3.7 ACCEPTANCE CHECKS AND TESTS

A. General:
   1. Perform tests in accordance with the latest IEEE 400 and 400.2, manufacturer's recommendations, and as specified in this specification.
   2. Contractor shall make arrangements to have tests witnessed by the Engineer. Contractor shall proceed with tests only after obtaining approval from the Engineer.

B. Visual Inspection:Perform visual inspection prior to electrical tests.
   1. Inspect exposed sections of cables for physical damage.
   2. Inspect shield grounding, cable supports, splices, and terminations.
   3. Verify that visible cable bends meet manufacturer's minimum bending radius requirement.
   4. Verify installation of fireproofing tape and identification tags.

C. Electrical Tests - New Cables: Perform preparation and tests in order shown below:
   1. Preparation Prior to Testing: Splices and terminations applied to new cables shall be completed prior to testing. For renovation installation, ends of new cables intended to be spliced to existing service-aged cables shall be prepared (cut back) to allow testing without flashover or tracking. Cables shall not be connected to other equipment while under test.
   2. Perform Insulation-Resistance Test.Test all cables with respect to ground and adjacent cables. All adjacent cables shall be grounded during testing.

a. Apply test voltage for a period sufficient to stabilize output voltage and insulation resistance measurement.
b. Test data shall include megohm, applied test voltage, and leakage current readings.
c. Further testing shall not continue unless the insulation resistance test results meet or exceed the values listed below. Test voltages and minimum acceptable resistance values shall be:

Voltage Class	Test Voltage	Min. Insulation Resistance
5kV	2,500 VDC	1,000 megohms
15kV	2,500 VDC	5,000 megohms
25kV	5,000 VDC	20,000 megohms
35kV	15,000 VDC	100,000 megohms

D. Field Test Report:Submit a field test report to the Engineer that includes the following information:

1. Project Name, Location, Test Date.
2. Name of Technician and Company performing the test.
3. Ambient temperature and humidity at time of test.
4. Name, Model Number and Description of Test Equipment used.
5. Circuit identification, cable length, cable type and size, insulation type, cable manufacturer, service age (if any), voltage rating, description of splices or terminations.
6. Visual field inspection notes, findings, and photographs.
7. Insulation Resistance Test results:
   a. Test voltage.
   b. Measurement in Megohms.
   c. Leakage current.
8. Tan Delta results:
   a. Test voltage.
   b. Waveform (sinusoidal or cosine-rectangular).
   c. Mean Tan Delta at V_0.
   d. Stability measured by Standard Deviation at V_0.
   e. Differential Tan Delta.
   f. IEEE Condition Assessment Rating.
9. VLF Withstand results:
   1) Test voltage.
   2) Waveform (sinusoidal or cosine-rectangular).
   3) Pass/Fail Rating.

10. Conclusions. If any deficiency is discovered based on test results, provide recommendations for corrective action.

E. Final Acceptance: Final acceptance shall depend upon the satisfactory performance of the cables under test. No cable shall be put into service until all tests are successfully passed, and field test reports have been approved by the Engineer.

END OF SECTION

SECTION 26 05 14 – C-L-X CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. This specification covers three conductor power cable insulated with an ozone and discharge-resistant, flexible, rubber-like, thermosetting dialectric used in a discharge-free insulation system. The insulated conductors are cabled together with fillers, grounding conductor(s), enclosed in a continuously welded, impervious corrugated aluminum C-L-X sheath and covered with an Okoseal (PVC) jacket.

The cable shall be UL listed and identified as Type MV-105 and Type MC-HL, cable for use in accordance with Articles 326 and 334 of the National Electric Code. The cable can be CSA listed in accordance with CSA Standard C68.3.

The cable shall be suited for use on services and feeders, indoors and outdoors, in wet or dry locations, as open runs of cable, in cable tray, direct buried, or as aerial cable on a messenger. The cable shall be UL Listed as sunlight-resistant and for cable tray use.

The cable shall be rated 105 degrees C for normal operation, 140 degrees C for emergency overload operation, and 250 degrees C for short circuit conditions. Emergency overload operation shall not exceed 1500 hours cumulative during the life of the cable.

B. The medium voltage power cable shall have a performance record demonstrating a minimum of forty (40) years successful operating experience in utility and industrial power cable applications.

C. 3/C Class B compact stranded copper or aluminum conductor, triple tandem extruded semi-conducting ethylene-propylene rubber strand screen, Okoguard EPR insulation, extruded semi-conducting ethylene-propylene rubber insulated screen, copper shield tape, cabled with fillers and grounding conductor(s), enclosed in a continuously welded, impervious corrugated aluminum C-L-X sheath and covered with an Okoseal (propvinyl-chloride) jacket.

D. Cable shall meet or exceed the last editions of the following industry specification:

ICEA S-93-639	ASTM B-495,B-400, B-8, B-231
UL-1072, 1569	CSA C68.3

PART 2 - PRODUCTS

2.1 CONDUCTOR

A. The conductor shall be uncoated copper or aluminum stranded concentric compact round copper per ASTM B-496 or aluminum per ASTM B-400 for sizes up to and including 1000 Kemil. Larger sizes shall be Class B compressed concentric round per ASTM B-8 for copper and ASTM B-231 for aluminum.

B. Conductors shall meet the electrical resistance requirements for ICEA S-93-639.

C. The center strand sahall be stamped.

2.2 CONDUCTOR SCREEN

A. An extruded layer of semiconducting EPR thermosetting compound will be applied directly over the conductor and have a volume resistivity not to in excess of 100 ohm meters at 150 degrees C. The compound shall have a minimum elongation after an air oven test at 136 degrees C for 168 hours of 100% and a brittleness temperature not warmer than -40 degrees C.

B. The screen shall be clean stripping from the conductor and inseparably bonded to the overlying insulation.

C. The thickness of the conductor screen shall be as shown in Table 1. The thickness of the screen is measured and controlled by means of a laser micrometer. For # 8 hours 4/0 screen shall be 12 mils.

2.3 INSULATION

A. The insulation shall be Okoguard, a red colored flexible thermosetting dielectric based on an ethylene propylene elastomer. It shall meet the electrical and physical characteristics shown in Appendix A. The ethylene content of the elastomer used in the insulation compound shall not exceed 72% by weight nor shall the insulation compound contain any polyethylene, both features to limit the degree of susceptibility to treeing experienced by highly crystalline materials. The insulation shall be compounded by the cable manufacturer

in its own facility using a closed system to insure maximum cleanliness. All ingredients will be mixed, screened through a 325 mesh screen pack and then threated with the cross linking agent to insure complete blending and uniformity of the final compound.

B. The minimum insulation thickness shall not be less than 210 mils at 133%; nominal insulation thickness 220 mils.

C. The Okoguard insulation shall be EPR Class III per ICEA S-93-639 and be triple-tandem extruded with the conductor an insulation screen to prevent interfacial contamination. The extrusion operation shall be performed by three separate in-line extruder heads thereby permitting the measurement and accurate individual control of the wall thickness of each layer of compound as the cable is being manufactured.

2.4 INSULATION SCREEN

A. The insulation screen shall be an extruded cured thermostat semiconducting EPR compound with a volume resistivity not in excess of 100 ohm meters at 110 degrees C when tested per ICEA S-93-639.

B. The extruded screen shall be clean stripping and shall have a peel strength from the insulation between 4 and 24 pounds / 0.5 inch width when tested per ICEA S-93-639. The compound will have a minimum elongation of 100% after an air-oven test at 136 degrees C for 168 hours and a brittleness temperature not warmer than -40 degrees C.

2.5 METALLIC SHIELD

A. The extruded screen shall be covered with a bare copper tape. It shall be applied helically with a 12.5% nominal overlap.

B. A colored mylar strip, black/red/blue shall be placed longitudinally under the copper shield tape for phase identification.

2.6 GROUNDING CONDUCTOR

A. Equipment grounding conductor(s) of uninsulated copper, compact stranded per ASTM B-496 shall be inserted in the interstice between the black and red conductor and in contact with the metal shielding tape. The size of the equipment grounding conductor shall be #6 minimum.

2.7 CABLE ASSEMBLY

A. The three shielded conductors shall be enabled together with fillers and the bar copper grounding conductor(s). The cabled assembly shall have a left hand lay and shall provide a ground substantially filled core covered in a binder tape overall.

2.8 C-L-X SHEATH

A. A tight-fitting, continuously welded, impervious, corrugated aluminum (or copper) sheath is applied over the cable core in accordance with the construction specifications listed in UL 1072.

2.9 JACKET

A. An Okoseal (polyvinyl-chloride) jacket shall be extruded over the C-L-X sheath. The jacket color shall be RED.

2.10 IDENTIFICATION

A. The following identifying legend shall be printed on the jacket with contrasting ink repeated at two (2) foot intervals with unmarked surfaces not exceeding six inches.

(A) Plant Number
(B) Conductor Size
(C) KCMIL or AWG
(D) CU or AL
(E) Voltage
(F) 100 or 133
(G) Nominal insulation thickness
(H) Grounding Conductor Size, e.g. 3 x 5 AWG

PART 3 - EXECUTION

3.1 PRELIMINARY TESTS

Each reel of shielded single conductor cable shall be tested as follows:

A. A high voltage AC test shall be performed in accordance with Part 9.8 of ICEA S-93-639 at the AC test voltages given in Table II.

B. Partial Discharge (Corona) Test – Each reel of shielded power cable shall comply with the maximum partial discharge of 5 picocoulombs at 200 volts per mil (7.9kV/mm). The partial discharge test shall be performed in accordance with the procedures of ICEA T-24-380.

3.2 FINAL TESTS

Each reel of completed cable shall be tested as follows:

A. Conductors shall meet the electrical resistance requirements of ICEA S-93-639, Section 2.4.

B. Insulation resistance test shall comply with the requirements of ICEA S-93-639. Each cable shall have an insulation resistance not less than the corresponding to the insulation resistance constant of at least 50,000 megohms – 1000 ft. at 15.6 degrees C.

C. A high voltage AC test is performed in accordance with Part 6.27 of ICEA S-93-639 at the AC test voltages given in Table II.

D. Shield and grounding conductors – size

3.3 QUALITY ASSURANCE

The medium voltage cable shall be manufactured and tested under the control of a Quality Assurance Program which conforms to the requirements of ISO-9000.

The Quality Assurance Program shall demonstrate compliance with the above-referenced criteria by having passed yearly quality audits conducted by outside independent organizations.

3.4 QUALIFICATION FLAME TESTS

Three conductor shielded Okoguard C-L-X Type MV-105 or MC-HL or CSA power cable, either jacketed or non-jacketed shall meet the requirements of the UL 1072/1569 vertical tray flame test. It is UL labeled "Type MV-105 or MC-HL or CSA for CT-USE". These constructions shall also pass the vertical tray flame test modified for 210,000 BTU/hr heat source per ICEA T-29-520 as well as the IEEE 1202 flame test. Qualification tests shall be provided upon request.

END OF SECTION

SECTION 26 05 19 - LOW-VOLTAGE POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of the electrical conductors and cables for use in electrical systems rated 600 V and below, indicated as cable(s), conductor(s), wire, or wiring in this section.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits for conductors and cables.

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Installation of conductors and cables in manholes and ducts.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:

1. Shop Drawings:
   a. Submit sufficient informationto demonstrate compliance with drawings and specifications.
   b. Submit the following data for approval:
      1) Electrical ratings and insulation type for each conductor and cable.
      2) Splicing materials and pulling lubricant.
2. Certifications: Two weeks prior to final inspection, submit the following.
   a. Certification by the manufacturer that the conductors and cables conform to the requirements of the drawings and specifications.
   b. Certification by the Contractor that the conductors and cables have been properly installed, adjusted, and tested.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. Publications are reference in the text by designation only.

B. American Society of Testing Material (ASTM):

D2301-10	Standard Specification for Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape
D2304-10	Test Method for Thermal Endurance of Rigid Electrical Insulating Materials
D3005-10	Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape

C. National Electrical Manufacturers Association (NEMA):

WC 70-09	Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy

D. National Fire Protection Association (NFPA):

70-17	National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):

44-14	Thermoset-Insulated Wires and Cables
83-14	Thermoplastic-Insulated Wires and Cables
467-13	Grounding and Bonding Equipment
486A-486B-13	Wire Connectors
486C-13	Splicing Wire Connectors
486D-15	Sealed Wire Connector Systems
486E-15	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors
493-07	Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables
514B-12	Conduit, Tubing, and Cable Fittings

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Conductors and cables shall be in accordance with ASTM, NEMA, NFPA, UL, as specified herein, and as shown on the drawings.

B. All conductors shall be copper.

C. Single Conductor and Cable:

1. No. 12 AWG: Minimum size, except where smaller sizes are specified herein or shown on the drawings.
2. No. 8 AWG and larger: Stranded.
3. No. 10 AWG and smaller: Solid; except shall be stranded for final connection to motors, transformers, and vibrating equipment.
4. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

D. Color Code:

1. No. 10 AWG and smaller: Solid color insulation or solid color coating.
2. No. 8 AWG and larger: Color-coded using one of the following methods:
   a. Solid color insulation or solid color coating.
   b. Stripes, bands, or hash marks of color specified.
   c. Color using 19 mm (0.75 inches) wide tape.
4. For modifications and additions to existing wiring systems, color coding shall conform to the existing wiring system.
5. Conductors shall be color-coded as follows:

208/120 V	Phase	480/277 V
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray *
* or white with colored (other than green) tracer.		

2.2 SPLICES

A. Splices shall be in accordance with NEC and UL.

B. Above Ground Splices for No. 10 AWG and Smaller:

1. Solderless, screw-on, reusable pressure cable type, with integral insulation, approved for copper and aluminum conductors.
2. The integral insulator shall have a skirt to completely cover the stripped conductors.
3. The number, size, and combination of conductors used with the connector, as listed on the manufacturer's packaging, shall be strictly followed.

C. Above Ground Splices for No. 8 AWG to No. 4/0 AWG:

1. Compression, hex screw, or bolt clamp-type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.
2. Insulate with materials approved for the particular use, location, voltage, and temperature. Insulation level shall be not less than the insulation level of the conductors being joined.
3. Splice and insulation shall be product of the same manufacturer.
4. All bolts, nuts, and washers used with splices shall be zinc-plated steel.

2.3 CONNECTORS AND TERMINATIONS

A. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

B. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

C. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points shall be zinc-plated steel.

2.4 WIRE LUBRICATING COMPOUND

A. Lubricating compound shall be suitable for the wire insulation and conduit, and shall not harden or become adhesive.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

B. Install all conductors in raceway systems.

C. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.

D. Conductors of different systems (e.g., 120 V and 277 V) shall not be installed in the same raceway.

E. Install cable supports for all vertical feeders in accordance with the NEC. Provide split wedge type which firmly clamps each individual cable and tightens due to cable weight.

F. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic ties.

G. For connections to motors, transformers, and vibrating equipment, stranded conductors shall be used only from the last fixed point of connection to the motors, transformers, or vibrating equipment.

H. Use expanding foam or non-hardening duct-seal to seal conduits entering a building, after installation of conductors.

I. Conductor and Cable Pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling. Use lubricants approved for the cable.
2. Use nonmetallic pull ropes.
3. Attach pull ropes by means of either woven basket grips or pulling eyes attached directly to the conductors.
4. All conductors in a single conduit shall be pulled simultaneously.
5. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

J. No more than three branch circuits shall be installed in any one conduit.

K. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.2 SPLICE AND TERMINATION INSTALLATION

A. Splices and terminations shall be mechanically and electrically secure, and tightened to manufacturer's published torque values using a torque screwdriver or wrench.

B. Where the Engineer determines that unsatisfactory splices or terminations have been installed, replace the splices or terminations at no additional cost to the Government.

3.3 CONDUCTOR IDENTIFICATION

A. When using colored tape to identify phase, neutral, and ground conductors larger than No. 8 AWG, apply tape in half-overlapping turns for a minimum of 75 mm (3 inches) from terminal points, and in junction boxes, pullboxes, and manholes. Apply the last two laps of tape with no tension to prevent possible unwinding. Where cable markings are covered by tape, apply tags to cable, stating size and insulation type.

3.4 FEEDER CONDUCTOR IDENTIFICATION

A. In each interior pullbox and each underground manhole and handhole, install brass tags on all feeder conductors to clearly designate their circuit identification and voltage. The tags shall be the embossed type, 40 mm (1-1/2 inches) in diameter and 40 mils thick. Attach tags with plastic ties.

3.5 EXISTING CONDUCTORS

A. Unless specifically indicated on the plans, existing conductors shall not be reused.

3.6 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:

1. Visual Inspection and Tests: Inspect physical condition.
2. Electrical tests:
   a. After installation but before connection to utilization devices, such as fixtures, motors, or appliances, testconductors phase-to-phase and phase-to-ground resistance with aninsulation resistance tester. Existing conductors to be reused shall also be tested.
   b. Applied voltage shall be 500 V DC for 300 V rated cable, and 1000 VDC for 600 V rated cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. Minimum insulation resistance values shall not be less than 25 megohms for 300 V rated cable and 100 megohms for 600 V rated cable.
   c. Perform phase rotation test on all three-phase circuits.

END OF SECTION

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTSs

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of grounding and bonding equipment, indicated as grounding equipment in this section.

B. "Grounding electrode system" refers to grounding electrode conductors and all electrodes required or allowed by NEC, as well as made, supplementary, and lightning protection system grounding electrodes.

C. The terms "connect" and "bond" are used interchangeably in this section and have the same meaning.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduit and boxes.

D. Section 26 12 19, PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS: pad-mounted, liquid-filled, medium-voltage transformers.

E. Section 26 24 16, PANELBOARDS: Low-voltage panelboards.

1.4 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:
      a. Submit sufficient informationto demonstrate compliance with drawings and specifications.
      b. Submit plans showing the location of system grounding electrodes and connections, and the routing of aboveground and underground grounding electrode conductors.
   2. Test Reports:
      a. Two weeks prior to the final inspection, submit ground resistance field test reports to the Engineer.
   3. Certifications:
      a. Certification by the Contractor that the grounding equipment has been properly installed and tested.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):
   B1-13 ..... Standard Specification for Hard-Drawn Copper Wire
   B3-13 ..... Standard Specification for Soft or Annealed Copper Wire
   B8-11 ..... Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

C. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   81-12 ..... IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System Part 1: Normal Measurements

D. National Fire Protection Association (NFPA):
   70-17 ..... National Electrical Code (NEC)
   70E-15 ..... National Electrical Safety Code
   99-15 ..... Health Care Facilities

E. Underwriters Laboratories, Inc. (UL):
   44-14 ..... Thermoset-Insulated Wires and Cables
   83-14 ..... Thermoplastic-Insulated Wires and Cables
   467-13 ..... Grounding and Bonding Equipment

PART 2 - PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

A. Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be identified per NEC.

B. Bonding conductors shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper. Bonding conductors shall be stranded for final connection to motors, transformers, and vibrating equipment.

C. Conductor sizes shall not be less than shown on the drawings, or not less than required by the NEC, whichever is greater.

D. Insulation: THHN-THWN and XHHW-2. XHHW-2 shall be used for isolated power systems.

2.2 GROUND RODS

A. Copper clad steel, 19 mm (0.75 inch) diameter by 3 M (10 feet) long.

B. Quantity of rods shall be as shown on the drawings, and as required to obtain the specified ground resistance.

2.3 GROUND CONNECTIONS

A. Below Grade and Inaccessible Locations: Exothermic-welded type connectors.

B. Above Grade:

1. Bonding Jumpers: Listed for use with aluminum and copper conductors. For wire sizes No. 8 AWG and larger, use compression-type connectors. For wire sizes smaller than No. 8 AWG, use mechanical type lugs. Connectors or lugs shall use //zinc-plated//cadmium-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2. Connection to Grounding Bus Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated- steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

4. Connection to Equipment Rack and Cabinet Ground Bars: Listed for use with aluminum and copper conductors. Use mechanical type lugs, with zinc-plated steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.5 EQUIPMENT RACK AND CABINET GROUND BARS

A. Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks. Ground bars shall have minimum dimensions of 6.3 mm (0.25 inch) thick x 19 mm (0.75 inch) wide, with length as required or as shown on the drawings. Provide insulators and mounting brackets.

2.6 GROUND TERMINAL BLOCKS

A. At any equipment mounting location (e.g., backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide mechanical type lugs, with //zinc-plated//cadmium-plated// steel bolts, nuts, and washers. Bolts shall be torqued to the values recommended by the manufacturer.

2.7 GROUNDING BUS BAR

A. Pre-drilled rectangular copper bar with stand-off insulators,minimum 6.3 mm (0.25 inch) thick x100 mm (4 inches) high in cross-section, length as shown on the drawings, with hole size, quantity, and spacing per detail shown on the drawings. Provide insulators and mounting brackets.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

B. System Grounding:
   1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformer.

C. Equipment Grounding: Metallic piping, building structural steel, electrical enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

A. Make grounding connections, which are normally buried or otherwise inaccessible, by exothermic weld.

3.3 MEDIUM-VOLTAGE EQUIPMENT AND CIRCUITS

A. Switchgear: Provide a bare grounding electrode conductor from the switchgear ground bus to the grounding electrode system.

B. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing medium-voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the switchgear ground bus, to all manhole grounding provisions and hardware, to the cable shield grounding provisions of medium-voltage cable splices and terminations, and to equipment enclosures.

C. Pad-Mounted Transformers:

1. Provide a driven ground rod and bond with a grounding electrode conductor to the transformer grounding pad.
2. Ground the secondary neutral.

D. Lightning Arresters: Connect lightning arresters to the equipment ground bus or ground rods as applicable.

3.4 SECONDARY VOLTAGE EQUIPMENT AND CIRCUITS

A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.

B. Metallic Piping, Building Structural Steel, and Supplemental Electrode(s):

1. Provide a grounding electrode conductor sized per NEC between the service equipment ground bus and all metallic water pipe systems, building structural steel, and supplemental or made electrodes. Provide jumpers across insulating joints in the metallic piping.
2. Provide a supplemental ground electrode as shown on the drawings and bond to the grounding electrode system.

C. Switchgear, Panelboards, and other electrical equipment:

1. Connect the equipment grounding conductors to the ground bus.
2. Connect metallic conduits by grounding bushings and equipment grounding conductor to the equipment ground bus.

D. Transformers:

1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.

3.5 RACEWAY

A. Conduit Systems:

1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.
2. Non-metallic conduit systems, except non-metallic feeder conduits that carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment, shall contain an equipment grounding conductor.
3. Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.
4. Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with a equipment grounding conductor to the equipment ground bus.

B. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, and power and lighting branch circuits.

C. Boxes, Cabinets, Enclosures, and Panelboards:

1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes (except for special grounding systems for intensive care units and other critical units shown).
2. Provide lugs in each box and enclosure for equipment grounding conductor termination.

3.6 CORROSION INHIBITORS

A. When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.7 CONDUCTIVE PIPING

A. Bond all conductive piping systems, interior and exterior, to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

B. In operating rooms and at intensive care and coronary care type beds, bond the medical gas piping and medical vacuum piping at the outlets directly to the patient ground bus.

3.8 GROUND RESISTANCE

A. Grounding system resistance to ground shall not exceed 5 ohms. Make any modifications or additions to the grounding electrode system necessary for compliance without additional cost to the Government. Final tests shall ensure that this requirement is met.
B. Grounding system resistance shall comply with the electric utility company ground resistance requirements.

3.9 GROUND ROD INSTALLATION

A. For outdoor installations, drive each rod vertically in the earth, until top of rod is 610 mm (24 inches) below final grade.

B. For indoor installations, leave 100 mm (4 inches) of each rod exposed.

C. Where buried or permanently concealed ground connections are required, make the connections by the exothermic process, to form solid metal joints. Make accessible ground connections with mechanical pressure-type ground connectors.

D. Where rock or impenetrable soil prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches to achieve the specified ground resistance.

3.10 ACCEPTANCE CHECKS AND TESTS

A. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE 81. Ground resistance measurements shall be made before the electrical distribution system is energized or connected to the electric utility company ground system, and shall be made in normally dry conditions not fewer than 48 hours after the last rainfall.

END OF SECTION

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of conduit, fittings, and boxes, to form complete, coordinated, grounded raceway systems. Raceways are required for all wiring unless shown or specified otherwise.

B. Definitions: The term conduit, as used in this specification, shall mean any or all of the raceway types specified.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.

B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

C. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Underground conduits.

1.4 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:
      a. Submit the following data for approval:

1) Raceway types and sizes.
2) Conduit bodies, connectors and fittings.
3) Junction and pull boxes, types and sizes.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Iron and Steel Institute (AISI):
S100-12 ..... North American Specification for the Design of Cold-Formed Steel Structural Members

C. National Electrical Manufacturers Association (NEMA):
C80.1-15..... Electrical Rigid Steel Conduit
C80.3-15..... Steel Electrical Metal Tubing
FB1-14 ..... Fittings, Cast Metal Boxes and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
FB2.10-13 ..... Selection and Installation Guidelines for Fittings for use with Non-Flexible Conduit or Tubing (Rigid Metal Conduit, Intermediate Metallic Conduit, and Electrical Metallic Tubing)
FB2.20-14 ..... Selection and Installation Guidelines for Fittings for use with Flexible Electrical Conduit and Cable
TC-2-13..... Electrical Polyvinyl Chloride (PVC) Tubing and Conduit
TC-3-13..... PVC Fittings for Use with Rigid PVC Conduit and Tubing

D. National Fire Protection Association (NFPA):
70-17..... National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):
1-05..... Flexible Metal Conduit
6-07..... Electrical Rigid Metal Conduit - Steel
50-15..... Enclosures for Electrical Equipment
360-13..... Liquid-Tight Flexible Steel Conduit
467-13..... Grounding and Bonding Equipment
514A-13 ..... Metallic Outlet Boxes
514B-12..... Conduit, Tubing, and Cable Fittings
651-11..... Schedule 40 and 80 Rigid PVC Conduit and Fittings
651A-11 ..... Type EB and A Rigid PVC Conduit and HDPE Conduit
797-07..... Electrical Metallic Tubing

PART 2 – PRODUCTS

2.1 MATERIAL

A. Conduit Size:In accordance with the NEC, but not less than 13 mm (0.5-inch) unless otherwise shown. Where permitted by the NEC, 13 mm (0.5-inch) flexible conduit may be used for tap connections to recessed lighting fixtures.

B. Conduit:

1. Size: In accordance with the NEC, but not less than 13 mm (0.5-inch).
2. Rigid Steel Conduit (RMC):Shall conform to UL 6 and NEMA C80.1.
3. Electrical Metallic Tubing (EMT):Shall conform to UL 797 and NEMA C80.3. Maximum size not to exceed 105 mm(4 inches) and shall be permitted only with cable rated 600 V or less.
4. Liquid-tight Flexible Metal Conduit: Shall conform to UL 360.
8. Direct Burial Plastic Conduit: Shall conform to UL 651 and UL 651A, heavy wall PVC or high density polyethylene (PE).

C. Conduit Fittings:

1. Rigid Steel Fittings:
   a. Fittings shall meet the requirements of UL 514B and NEMA FB1.
   b. Standard threaded couplings, locknuts, bushings, conduit bodies, and elbows: Only steel or malleable iron materials are acceptable. Integral retractable type IMC couplings are also acceptable.
   c. Locknuts: Bonding type with sharp edges for digging into the metal wall of an enclosure.
   d. Bushings: Metallic insulating type, consisting of an insulating insert, molded or locked into the metallic body of the fitting. Bushings made entirely of metal or nonmetallic material are not permitted.
2. Electrical Metallic Tubing Fittings:
   a. Fittings and conduit bodies shall meet the requirements of UL 514B, NEMA C80.3, and NEMA FB1.
   b. Only steel or malleable iron materials are acceptable.
   c. Compression Couplings and Connectors: Concrete-tight and rain-tight, with connectors having insulated throats.
   d. Indent-type connectors or couplings are prohibited.
   e. Die-cast or pressure-cast zinc-alloy fittings or fittings made of "pot metal" are prohibited.
3. Liquid-tight Flexible Metal Conduit Fittings:

a. Fittings shall meet the requirements of UL 514B and NEMA FB1.

b. Only steel or malleable iron materials are acceptable.

c. Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening. Connectors shall have insulated throats.

4. Direct Burial Plastic Conduit Fittings: Fittings shall meet the requirements of UL 514C and NEMA TC3.

D. Conduit Supports:

1. Parts and Hardware: Zinc-coat or provide equivalent corrosion protection.

2. Individual Conduit Hangers: Designed for the purpose, having a pre-assembled closure bolt and nut, and provisions for receiving a hanger rod.

E. Outlet, Junction, and PullBoxes:

1. Comply with UL-50 and UL-514A.

2. Rustproof cast metal where required by the NEC or shown on drawings.

3. Sheet Metal Boxes: Galvanized steel, except where shown on drawings.

PART 3 - EXECUTION

3.1 PENETRATIONS

A. Cutting or Holes:

1. Cut holes in advance where they should be placed in the structural elements, such as ribs or beams. Obtain the approval of the Engineer prior to drilling through structural elements.

2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammers, impact electric, hand, or manual hammer-type drills are not allowed, except when permitted by the Engineer where working space is limited.

B. Firestop: Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases.

C. Waterproofing: At floor, exterior wall, and roof conduit penetrations, completely seal the gaparound conduit to render it watertight.

3.2 INSTALLATION, GENERAL

A. In accordance with NEC, NEMA, UL, as shown on drawings, and as specified herein.

B. Install conduit as follows:

1. In complete mechanically and electrically continuous runs before pulling in cables or wires.
2. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new conduits.
4. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Cut conduits square, ream, remove burrs, and draw up tight.
6. Independently support conduit at 2.4 M (8 feet) on centers with specified materials and as shown on drawings.
7. Support within 300 mm (12 inches) of changes of direction, and within 300 mm (12 inches) of each enclosure to which connected.
9. Close ends of empty conduits with plugs or caps at the rough-in stage until wires are pulled in,to prevent entry of debris.

C. Conduit Bends:

1. Make bends with standard conduit bending machines.
2. Conduit hickey may be used for slight offsets and for straightening stubbed out conduits.
3. Bending of conduits with a pipe tee or vise is prohibited.

D. Layout and Homeruns:

1. Install conduit with wiring, including homeruns, as shown on drawings.
2. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the Engineer.

3.3 CONCEALED WORK INSTALLATION

A. In Concrete:

1. Conduit: Rigid steel.
2. Align and run conduit in direct lines.
3. Install conduit through concrete beams only:
   a. Where shown on the structural drawings.

b. As approved by the Engineer prior to construction, and after submittal of drawing showing location, size, and position of each penetration.

4. Installation of conduit in concrete that is less than 75 mm (3 inches) thick is prohibited.
   a. Conduit outside diameter larger than one-third of the slab thickness is prohibited.
   b. Space between conduits in slabs: Approximately six conduit diameters apart, andone conduit diameter at conduit crossings.
   c. Install conduits approximately in the center of the slab so that there will be a minimum of 19 mm (0.75-inch) of concrete around the conduits.
5. Make couplings and connections watertight. Use thread compounds that are UL approved conductive type to ensure low resistance ground continuity through the conduits. Tightening setscrews with pliers is prohibited.

3.4 EXPOSED WORK INSTALLATION

A Conduit for Conductors 600 V and Below: Rigid steel.

B. Align and run conduit parallel or perpendicular to the building lines.

C. Align and run conduit parallel or perpendicular to the building lines.

D. Install horizontal runs close to the ceiling or beams and secure with conduit straps.

E. Support horizontal or vertical runs at not over 2.4 M (8 feet) intervals.

3.5 DIRECT BURIAL INSTALLATION

Refer to Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION.

3.6 WET OR DAMP LOCATIONS

A. Use rigid steel conduits unless as shown on drawings.

B. Provide sealing fittings to prevent passage of water vapor where conduits pass from warm to cold locations, i.e., refrigerated spaces, constant-temperature rooms, air-conditioned spaces, building exterior walls, roofs, or similar spaces.

3.7 MOTORS AND VIBRATING EQUIPMENT

A. Use flexible metal conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters, or noise transmission.

B. Use liquid-tight flexible metal conduit for installation in exterior locations, moisture or humidity laden atmosphere, corrosive atmosphere, water or spray wash-down operations, inside airstream of HVAC units, and locations subject to seepage or dripping of oil, grease, or water.

C. Provide a green equipment grounding conductor with flexible and liquid-tight flexible metal conduit.

38 CONDUIT SUPPORTS

A. Safe working load shall not exceed one-quarter of proof test load of fastening devices.

B. Use pipe straps or individual conduit hangers for supporting individual conduits.

C. Support conduit independently of junction boxes, pull-boxes, fixtures, suspended ceiling T-bars, angle supports, and similar items.

D. Fasteners and Supports in Solid Masonry and Concrete:

1. New Construction: Use steel or malleable iron concrete inserts set in place prior to placing the concrete.
2. Existing Construction:
    a. Steel expansion anchors not less than 6 mm (0.25-inch) bolt size and not less than 28 mm (1.125 inch) in embedment.
    b. Power set fasteners not less than 6 mm (0.25-inch)diameter with depth of penetration not less than 75 mm (3 inch).
    c. Use vibration and shock-resistant anchors and fasteners for attaching to concrete ceilings.

E. Hollow Masonry: Toggle bolts.

F. Bolts supported only by plaster or gypsum wallboard are not acceptable.

G. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

H. Attachment by wood plugs, raw plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.

I. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

J. Spring steel type supports or fasteners are prohibited for all uses except horizontal and vertical supports/fasteners within walls.

K. Vertical Supports: Vertical conduit runs shall have riser clamps and supports in accordance with the NEC and as shown. Provide supports for cable and wire with fittings that include internal wedges and retaining collars.

END OF SECTION

SECTION 26 05 41 - UNDERGROUND ELECTRICAL CONSTRUCTION

PART 1 – GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of underground ducts, cables and raceways.

B. The terms "duct" and "conduit" are used interchangeably in this section.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. Coordinate layout and installation of ducts, cable and pullboxes with final arrangement of other utilities, site grading, and surface features.

1.4 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:
      a. Submit sufficient information to demonstrate compliance with drawings and specifications.
      b. Submit information on ducts, and hardware.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. National Electrical Manufacturers Association (NEMA):

TC 2-13 ..... Electrical Polyvinyl Chloride (PVC) Conduit
TC 3-15 ..... Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit And Tubing
TC 6 & 8-13 ..... Polyvinyl Chloride (PVC) Plastic Utilities Duct For Underground Installations
TC 9-04 ..... Fittings For Polyvinyl Chloride (PVC) Plastic Utilities Duct For Underground Installation

C. National Fire Protection Association (NFPA):
70-17 ..... National Electrical Code (NEC)
70E-15 ..... National Electrical Safety Code

D. Underwriters Laboratories, Inc. (UL):
6-07 ..... Electrical Rigid Metal Conduit-Steel
467-13 ..... Grounding and Bonding Equipment
651A-11 ..... Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit

PART 2 - PRODUCTS

2.1 DUCTS

A. Number and sizes shall be as shown on the drawings.

B. Ducts (concrete-encased):
1. Plastic Duct:
a. Schedule 40 PVC conduit.
b. Duct shall be suitable for use with 90° C (194° F) rated conductors.
2. Conduit Spacers: Prefabricated plastic.

2.2 WARNING TAPE

A. 4-mil polyethylene 75 mm (3 inches) wide detectable tape, red with black letters, imprinted with "CAUTION - BURIED ELECTRIC CABLE BELOW" or similar.

PART 3 - EXECUTION

3.1 TRENCHING

A. Refer to Section 31 20 00, EARTH MOVING for trenching, backfilling, and compaction.

B. Before performing trenching work at existing facilities, a Ground Penetrating Radar Survey shall be carefully performed by a certified technician to reveal all existing underground ducts, conduits, cables, and other utility systems.

C. Work with extreme care near existing ducts, conduits, and other utilities to avoid damaging them.

D. Cut the trenches neatly and uniformly.

E. For Concrete-Encased Ducts:
   1. After excavation of the trench, stakes shall be driven in the bottom of the trench at 1.2 M (4 feet) intervals to establish the grade and route of the duct bank.
   2. Pitch the trenches uniformly toward manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts toward buildings wherever possible.
   3. The walls of the trench may be used to form the side walls of the duct bank, provided that the soil is self-supporting and that the concrete envelope can be poured without soil inclusions. Forms are required where the soil is not self-supporting.
   4. After the concrete-encased duct has sufficiently cured, the trench shall be backfilled to grade with earth, and appropriate warning tape installed.

F. Individual conduits to be installed under existing paved areas and roads that cannot be disturbed shall be jacked into place using rigid metal conduit, or bored using plastic utilities duct or PVC conduit, as approved by the Engineer.

3.3 DUCT INSTALLATION

A. General Requirements:
   1. Ducts shall be in accordance with the NEC, as shown on the drawings, and as specified.
   2. Join and terminate ducts with fittings recommended by the manufacturer.
   3. Slope ducts to drain towards manholes and pullboxes, and away from building and equipment entrances. Pitch not less than 100 mm (4 inches) in 30 M (100 feet).
   4. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) outside the building foundation. Tops of conduits below building slab shall be minimum 610 mm (24 inches) below bottom of slab.
   5. Stub-ups and sweeps to equipment mounted on outdoor concrete slabs shall be galvanized rigid metal conduit half-lap wrapped with PVC tape, and shall extend a minimum of 1.5 M (5 feet) away from the edge of slab.
   6. Install insulated grounding bushings on the conduit terminations.
   7. Radius for sweeps shall be sufficient to accomplish pulls without damage. Minimum radius shall be six times conduit diameter.
   8. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly a minimum of 75 mm (3 inches) above the bottom of the trench during the concrete pour. Spacer spacing shall not exceed 1.5 M (5 feet). Secure spacers to ducts and earth to prevent floating during concrete pour.

Provide nonferrous tie wires to prevent displacement of the ducts during concrete pour. Tie wires shall not act as substitute for spacers.

9. Duct lines shall be installed no less than 300 mm (12 inches) from other utility systems, such as water, sewer, chilled water.
10. Clearances between individual ducts:
    a. For similar services, not less than 75 mm (3 inches).
    b. For power and signal services, not less than 150 mm (6 inches).
11. Duct lines shall terminate at window openings in manhole walls as shown on the drawings. All ducts shall be fitted with end bells.
12. Couple the ducts with proper couplings. Stagger couplings in rows and layers to ensure maximum strength and rigidity of the duct bank.
13. Keep ducts clean of earth, sand, or gravel, and seal with tapered plugs upon completion of each portion of the work.
14. Spare Ducts: Where spare ducts are shown, they shall have a nylon pull rope installed. They shall be capped at each end and labeled as to location of the other end.
15. Duct Identification: Place continuous strip of warning tape approximately 300 mm (12 inches) above ducts before backfilling trenches. Warning tape shall be preprinted with proper identification.
16. Duct Sealing: Seal ducts, including spare ducts, at building entrances and at outdoor terminations for equipment, with a suitable non-hardening compound to prevent the entrance of foreign objects and material, moisture, and gases.
17. Use plastic ties to secure cables to insulators on cable arms. Use minimum two ties per cable per insulator.

B. Concrete-Encased Ducts:
    1. Install concrete-encased ducts for medium-voltage systems, low-voltage systems, and signal systems, unless otherwise shown on the drawings.
    2. Duct banks shall be single or multiple duct assemblies encased in concrete. Ducts shall be uniform in size and material throughout the installation.
    3. Tops of concrete-encased ducts shall be:
        a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.
        b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
        c. Additional burial depth shall be required in order to accomplish NEC-required minimum bend radius of ducts.
        d. Conduits crossing under grade slab construction joints shall be installed a minimum of 1.2 M (4 feet) below slab.
    4. Extend the concrete envelope encasing the ducts not less than 75 mm (3 inches) beyond the outside walls of the outer ducts.
    5. Within 3 M (10 feet} of building and manhole wall penetrations, install reinforcing steel bars at the top and bottom of each concrete envelope to provide protection against vertical shearing.
    6. Install reinforcing steel bars at the top and bottom of each concrete envelope of all ducts underneath roadways and parking areas.

7. Where new ducts and concrete envelopes are to be joined to existing manholes, pullboxes, ducts, and concrete envelopes, make the joints with the proper fittings and fabricate the concrete envelopes to ensure smooth durable transitions.
8. Duct joints in concrete may be placed side by side horizontally, but shall be staggered at least 150 mm (6 inches) vertically.
9. Pour each run of concrete envelope between manholes or other terminations in one continuous pour. If more than one pour is necessary, terminate each pour in a vertical plane and install 19 mm (0.75 inch) reinforcing rod dowels extending 450 mm (18 inches) into concrete on both sides of joint near corners of envelope.
10. Pour concrete so that open spaces are uniformly filled. Do not agitate with power equipment unless approved by //Resident Engineer// //COR//.

C. Direct-Burial Ducts:
1. Install direct-burial ducts only where shown on the drawings. Provide direct-burial ducts only for low-voltage power and lighting branch circuits.
2. Tops of ducts shall be:
   a. Not less than 600 mm (24 inches) and not less than shown on the drawings, below finished grade.
   b. Not less than 750 mm (30 inches) and not less than shown on the drawings, below roads and other paved surfaces.
   c. Additional burial depth shall be required in order to accomplish NEC-required minimum bend radius of ducts.
3. Do not kink the ducts. Compaction shall not deform the ducts.

3.4 ACCEPTANCE CHECKS AND TESTS

A. Duct Testing and Cleaning:
1. Upon completion of the duct installation, a standard flexible mandrel shall be pulled through each duct to loosen particles of earth, sand, or foreign material left in the duct, and to test for out-of-round conditions.
2. The mandrel shall be not less than 300 mm (12 inches) long, and shall have a diameter not less than 13 mm (0.5 inch) less than the inside diameter of the duct. A brush with stiff bristles shall then be pulled through each duct to remove the loosened particles. The diameter of the brush shall be the same as, or slightly larger than, the diameter of the duct.
3. If testing reveals obstructions or out-of-round conditions, the Contractor shall replace affected section(s) of duct and retest to the satisfaction of the Engineer.
4. Mandrel pulls shall be witnessed by the Engineer.

END OF SECTION

SECTION 26 12 19 - PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing, installation, connection, and testing of the pad-mounted, liquid-filled, medium-voltage transformers, indicated as transformers in this section.

1.2 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 13, MEDIUM-VOLTAGE CABLES: Medium-voltage cables.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path to ground for possible ground currents.

D. Section 26 05 41, UNDERGROUND ELECTRICAL CONSTRUCTION: Manholes, pull-boxes, and ducts for underground raceway systems.

1.3 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.4 FACTORY TESTS

A. Factory Tests shall be required.

B. Factory Tests shall be in accordance with Paragraph, MANUFACTURED PRODUCTS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirement:
   1. Transformers shall be thoroughly tested at the factory to ensure that there are no electrical or mechanical defects. Tests shall be conducted as per IEEE Standards. Factory tests shall be certified. The following tests shall be performed:
      a. Perform insulation-resistance tests, winding-to-winding and each winding-to-ground.
      b. Perform turns-ratio tests at all tap positions.

1.5 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:
      a. Submit sufficient information to demonstrate compliance with drawings and specifications.
      b. Include electrical ratings, nameplate data, impedance, outline drawing with dimensions and front, top, and side views, weight, mounting details, decibel rating, termination information, temperature rise, no-load and full-load losses, regulation, overcurrent protection, connection diagrams, and accessories.
      c. Complete nameplate data, including manufacturer's name and catalog number.

      d. Certification from the manufacturer that representative transformers have been seismically tested to International Building Code requirements. Certification shall be based upon simulated seismic forces on a shake table or by analytical methods, but not by experience data or other methods.//
   2. Manuals:
      a. When submitting the shop drawings, submit companion copies of complete maintenance and operating manuals, including technical data sheets, wiring diagrams, and information for ordering replacement parts.
         1) Identify terminals on wiring diagrams to facilitate installation, maintenance, and operation.
         2) Indicate on wiring diagrams the internal wiring for each piece of equipment and interconnections between the pieces of equipment.
         3) Approvals will be based on complete submissions of manuals, together with shop drawings.
      b. If changes have been made to the maintenance and operating manuals originally submitted, submit updated maintenance and operating manuals two weeks prior to the final inspection.
         1) Update the manual to include any information necessitated by shop drawing approval.
         2) Show all terminal identification.
         3) Include information for testing, repair, troubleshooting, assembly, disassembly, and recommended maintenance intervals.
         4) Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.

B. Certifications:
   1. Two weeks prior to the final inspection, submit the following certifications.
      a. Certification by the manufacturer that the transformers conform to the requirements of the drawings and specifications.

b. Certification by the Contractor that the transformers have been properly installed, connected, and tested.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. American Society for Testing and Materials (ASTM):
D3487-16 ..... Standard Specification for Mineral Insulating Oil Used in Electrical Apparatus

C. Institute of Electrical and Electronic Engineers (IEEE):
48-09 ..... Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5kV Through 765kV or Extruded Insulation Rated 2.5kV Through 500kV
386-16 ..... Separable Insulated Connector Systems for Power Distribution Systems Above 600 V
592-07 ..... Exposed Semiconducting Shields on High-Voltage Cable Joints and Separable Connectors
C2-17 ..... National Electrical Safety Code
C37.47-11 ..... Specification for High Voltage (>1000V) Distribution Class Current-Limiting Fuses and Fuse Disconnecting Switches
C57.12.00-15 ..... Liquid-Immersed Distribution, Power and Regulating Transformers
C57.12.10-13 ..... Liquid-Immersed Power Transformers
C57.12.28-14 ..... Pad-Mounted Equipment - Enclosure Integrity
C57.12.29-14 ..... Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments
C57.12.34-15 ..... Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 5 MVA and Smaller; High Voltage, 34.5 kV Nominal System Voltage and Below; Low Voltage, 15kV Nominal System Voltage and Below
C57.12.90-15 ..... Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
C62.11-12 ..... Metal-Oxide Surge Arresters for AC Power Circuits

D. International Code Council (ICC):
IBC-15 ..... International Building Code

E. National Electrical Manufacturers Association (NEMA):
TR 1-13 ..... Transformers, Regulators, and Reactors

F. National Fire Protection Association (NFPA):
70-17.....National Electrical Code (NEC)

G. Underwriters Laboratories Inc. (UL):
467-13.....Grounding and Bonding Equipment

H. United States Department of Energy (DOE):
10 CFR Part 431.....Energy Efficiency Program for Certain Commercial and Industrial Equipment

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Transformers shall be in accordance with ASTM, IEEE, NFPA, UL, as shown on the drawings, and as specified herein. Each transformer shall be assembled as an integral unit by a single manufacturer.

B. Transformers shall be complete, outdoor type, continuous duty, integral assembly, grounded, tamper-resistant, and with liquid-immersed windings.

C. Ratings shall not be less than shown on the drawings.

D. Completely fabricate transformers at the factory so that only the external cable connections are required at the project site.

E. Thoroughly clean, phosphatize, and finish all the metal surfaces at the factory with a rust-resistant primer and dark green enamel finish coat, except where a different color is specified in Section 09 06 00, SCHEDULE FOR FINISHES. All surfaces of the transformer that will be in contact with the concrete pad shall be treated with corrosion-resistant compounds and epoxy resin or a rubberized sealing compound.

2.2 COMPARTMENTS

A. Construction:
1. Enclosures shall be weatherproof and in accordance with IEEE C57.12.28.
2. The medium- and low-voltage compartments shall be separated with a steel barrier that extends the full height and depth of the compartments.
3. The compartments shall be constructed of sheet steel (gauge to meet ANSI requirements) with bracing and with reinforcing gussets using jig welds to assure rectangular rigidity.
4. All bolts, nuts, and washers shall be cadmium-plated steel.

5. Sufficient space shall be provided for equipment, cabling, and terminations within the compartments.
6. Affix transformer nameplate permanently within the low-voltage compartment. Voltage and kVA rating, connection configuration, impedance, date of manufacture, and serial number shall be shown on the nameplate.

B. Doors:
1. Provide a separate door for each compartment with provisions for a single padlock to secure all doors. Provide each compartment door with open-position doorstops and corrosion-resistant tamperproof hinges welded in place. The medium-voltage compartment door shall be mechanically prevented from opening unless the low-voltage compartment door is open.
2. The secondary compartment door shall have a one-piece steel handle and incorporate three-point locking mechanisms.

3. Provide a 50 mm (2 inches) size padlock for each assembly, as approved by the Owner. Padlocks shall be keyed to the Owner's established key set. Firmly attach the padlock to the door assembly by a chain.

2.3 BIL RATING

A. 15 kV class equipment shall have a minimum 95 kV BIL rating.//

2.4 TRANSFORMER FUSE ASSEMBLY

A. The primary fuse assembly shall be a combination of externally replaceable Bay-O-Net liquid-immersed fuses in series with liquid-immersed current-limiting fuses.

B. The primary fuse assembly shall be load-break combination fuse and dry-well fuse holder rated for system voltage, rated for 10 load makes and 10 load breaks, with rated 200 amp load current at 75% power factor, 10,000 symmetrical A close-in on fault duty, and 95 kV BIL. The entire fuse assembly shall be removable through the use of hot stick.
1. The fuses shall be concealed, hot stick removable, 50,000 A symmetrical interrupting, non-expulsion, current-limiting primary distribution type, of the size and voltage class as shown on the drawings. The fuses shall operate within the fuse holder as a unit disconnecting means. Fuses shall be in accordance with ANSI C37.47.
2. Transformers shall not have internal "weak link" fuses that require transformer tank cover removal for replacement.
3. For units above 500 kVA using fusing above the 50 A 15 kV and 100 A 5 kV application, a clip-mounted arrangement of the current limiting fuses (i.e., live-front configuration) is required.

2.5 PRIMARY CONNECTIONS

A. Primary connections shall be 200 A dead-front loadbreak 600 A deadbreak wells and inserts for cable sizes shown on the drawings.

B. Surge Arresters: Distribution class, one for each primary phase, complying with IEEE C62.11, supported from tank wall.

2.6 MEDIUM-VOLTAGE SWITCH

A. The transformer primary disconnect switch shall be an oil-immersed, internal, gang-operated, load-interrupter type, rated at ampacity and system voltage as shown on the drawings, with a minimum momentary withstand rating of not less than the calculated available fault current shown on the drawings.
B. For loop feeds, switch shall be a four-position, T-blade manual switch located in the medium-voltage compartment and hot-stick-operated.

2.7 MEDIUM-VOLTAGE TERMINATIONS

A. Terminate the medium-voltage cables in the primary compartment with 200 A loadbreak premolded rubber elbow connectors, suitable for submersible applications. Elbow connectors shall have a semi-conductive shield material covering the housing. The separable connector system shall include the loadbreak elbow, the bushing insert, and the bushing well. Separable connectors shall comply with the requirements of IEEE 386, and shall be interchangeable between suppliers. Allow sufficient slack in medium-voltage cable, ground, and drain wires to permit elbow connectors to be moved to their respective parking stands.

B. Ground metallic cable shield with a cable shield grounding adapter, consisting of a solderless connector enclosed in watertight rubber housing covering the entire assembly, bleeder wire, and ground braid.

2.8 LOW-VOLTAGE EQUIPMENT

A. The low-voltage leads shall be brought out of the tank by epoxy pressure tight bushings, and shall be standard arrangement.

B. Tin-plate the low-voltage neutral terminal and isolate from the transformer tank. Provide a removable ground strap sized in accordance with the NEC and connect between the secondary neutral and ground pad.

2.9 TRANSFORMERS

A. Transformer ratings shall be as shown on drawings. kVA ratings shown on the drawings are for continuous duty without the use of cooling fans.

B. Temperature rises shall not exceed the NEMA TR 1 of 65° C (149° F) by resistance.

C. Transformer insulating material shall be less flammable, edible-seed-oil based, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300° C (600° F) when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.

D. Transformer impedance shall be not less than 4-1/2% for sizes 150 kVA and larger. Impedance shall be as shown on the drawings.

E. Sound levels shall conform to NEMA TR 1 standards.

F. Primary and Secondary Windings for Three-Phase Transformers:
   1. Primary windings shall be delta-connected.
   2. Secondary windings shall be wye-connected, except where otherwise indicated on the drawings. Provide isolated neutral bushings for secondary wye-connected transformers.
   3. Secondary leads shall be brought out through pressure-tight epoxy bushings.

G. Primary windings shall have four 2-1/2% full-capacity voltage taps; two taps above and two taps below rated voltage.

H. Core and Coil Assemblies:
   1. Cores shall be grain-oriented, non-aging, silicon steel to minimize losses.
   2. Core and coil assemblies shall be rigidly braced to withstand the stresses caused by rough handling during shipment, and stresses caused by any possible short-circuit currents.
   3. Coils shall be continuous-winding type without splices except for taps. Material shall be copper.
   4. Coil and core losses shall be optimum for efficient operation.
   5. Primary, secondary, and tap connections shall be brazed or pressure type.
   6. Provide end fillers or tie-downs for coil windings.

I. The transformer tank, cover, and radiator gauge thickness shall not be less than that required by ANSI.

J. Accessories:
   1. Provide standard NEMA features, accessories, and the following:
      a. No-load tap changer. Provide warning sign.
      b. Lifting, pulling, and jacking facilities.
      c. Globe-type valve for oil filtering and draining, including sampling device.

d. Pressure relief valve.
e. Liquid level gauge and filling plug.
f. A grounding pad in the medium- and low-voltage compartments.
g. A diagrammatic nameplate.
h. Dial-type liquid thermometer with a maximum reading pointer and an external reset.
i. Hot stick. Securely fasten hot stick within low-voltage compartment.

2. The accessories shall be made accessible within the compartments without disassembling trims and covers.

K. Transformers shall meet the energy conservation standards for transformers per the United States Department of Energy 10 CFR Part 431.

2.10 CABLE FAULT INDICATORS**:**

A. Provide each incoming and outgoing cable within the medium-voltage compartment with a single-phase cable fault indicator with in-rush restraint. Mount the indicator on the cable support member.
1. The sensor assembly shall have a split-core for easy installation over the incoming and outgoing cable. The core shall be laminated, grain-oriented silicon steel, and encapsulated. Provide a clamp to secure the two coil halves around the cable.
2. Select the coil to the pick-up at the current setting shown on the drawings.
a. The coil setting shall be accurate to within 10% of the pick-up.
b. The coil current-time curve shall coordinate with the primary current-limiting fuse.

B. Upon restoration of the system to normal operating conditions, the cable fault indicator shall automatically reset to normal and be ready to operate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install transformers outdoors, as shown on the drawings, in accordance with the NEC, and as recommended by the manufacturer.

B. Anchor transformers with rustproof bolts, nuts, and washers not less than 12 mm (1/2 inch) diameter, in accordance with manufacturer's instructions, and as shown on drawings.

C. Mount transformers on concrete slab.

D. Grounding:
1. Ground each transformer in accordance with the requirements of the NEC. Install ground rods per the requirements of Section 26 05 26, GROUNDING AND

BONDING FOR ELECTRICAL SYSTEMS, to maintain a maximum resistance of 5 ohms to ground.

2. Connect the ground rod to the ground pads in the medium- and low-voltage compartments.
3. Install and connect the cable shield grounding adapter per the manufacturer's instructions. Connect the bleeder wire of the cable shield grounding adapter to the loadbreak or deadbreak elbow grounding point with minimum No. 14 AWG wire, and connect the ground braid to the grounding system with minimum No. 6 AWG bare copper wire. Use soldered or mechanical grounding connectors listed for this purpose.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform manufacturer's required field tests in accordance with the manufacturer's recommendations. In addition, include the following:
   1. Visual Inspection and Tests:
      a. Compare equipment nameplate data with specifications and approved shop drawings.
      b. Inspect physical and mechanical condition. Check for damaged or cracked bushings and liquid leaks.
      c. Verify that control and alarm settings on temperature indicators are as specified.
      d. Inspect all field-installed bolted electrical connections, using the calibrated torque-wrench method to verify tightness of accessible bolted electrical connections, and perform thermographic survey after energization under load.
      e. Vacuum-clean transformer interior. Clean transformer enclosure exterior.
      f. Verify correct liquid level in transformer tank.
      g. Verify correct equipment grounding per the requirements of Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
      h. Verify the presence and connection of transformer surge arresters, if provided.
      i. Verify that the tap-changer is set at rated system voltage.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the transformers are in good operating condition and properly performing the intended function.

3.4 SPARE PARTS

A. Deliver the following spare parts for the project to the //Resident Engineer// //COR// two weeks prior to final inspection:
   1. Six insulated protective caps.
   2. One spare set of medium-voltage fuses for each size and type of fuse used in the project.
   3. One spare set of three cable fault indicators.

3.5 INSTRUCTION

A. The Contractor shall instruct maintenance personnel, for not less than one 2-hour period, on the maintenance and operation of the equipment on the date requested by the Owner.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 Related Documents

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of panelboards.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground fault currents.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

1.4 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:
      a. Submit sufficient information to demonstrate compliance with drawings and specifications.
      b. Include electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, circuit breakers, wiring and connection diagrams, accessories, and nameplate data.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):
IBC-15.....International Building Code

C. National Electrical Manufacturers Association (NEMA):
PB 1-11 .....Panelboards
250-14.....Enclosures for Electrical Equipment (1,000V Maximum)

D. National Fire Protection Association (NFPA):
70-17.....National Electrical Code (NEC)
70E-18.....Standard for Electrical Safety in the Workplace

E. Underwriters Laboratories, Inc. (UL):
50-15.....Enclosures for Electrical Equipment
67-09.....Panelboards
489-16.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Panelboards shall be in accordance with NEC, NEMA, UL, as specified, and as shown on the drawings.

B. Panelboards shall have main breaker or main lugs, bus size, voltage, phases, number of circuit breaker mounting spaces, top or bottom feed, flush or surface mounting, branch circuit breakers, and accessories as shown on the drawings.

C. Panelboards shall be completely factory-assembled with molded case circuit breakers and integral accessories as shown on the drawings or specified herein.

D. Non-reduced size copper bus bars, rigidly supported on molded insulators, and fabricated for bolt-on type circuit breakers.

E. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.

F. Mechanical lugs furnished with panelboards shall be cast, stamped, or machined metal alloys listed for use with the conductors to which they will be connected.

G. Neutral bus shall be 100% rated, mounted on insulated supports.

H. Grounding bus bar shall be equipped with screws or lugs for the connection of equipment grounding conductors.

I. Bus bars shall be braced for the available short-circuit current as shown on the drawings, but not be less than 10,000 A symmetrical for 120/208 V and 120/240 V panelboards, and 14,000 A symmetrical for 277/480 V panelboards.

J. Series-rated panelboards are not permitted.

2.2 ENCLOSURES AND TRIMS

A. Enclosures:
   1. Provide galvanized steel enclosures, with NEMA rating as shown on the drawings or as required for the environmental conditions in which installed.
   2. Enclosures shall not have ventilating openings.
   3. Enclosures may be of one-piece formed steel or of formed sheet steel with end and side panels welded, riveted, or bolted as required.
   4. Provide manufacturer's standard option for prepunched knockouts on top and bottom endwalls.
   5. Include removable inner dead front cover, independent of the panelboard cover.

B. Trims:

   1. Hinged "door-in-door" type.
   2. Interior hinged door with hand-operated latch or latches, as required to provide access only to circuit breaker operating handles, not to energized parts.
   3. Outer hinged door shall be securely mounted to the panelboard enclosure with factory bolts, screws, clips, or other fasteners, requiring a key or tool for entry. Hand-operated latches are not acceptable.
   4. Inner and outer doors shall open left to right.
   5. Trims shall be flush or surface type as shown on the drawings.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Circuit breakers shall be per UL, NEC, as shown on the drawings, and as specified.

B. Circuit breakers shall be bolt-on type.

C. Circuit breakers shall have minimum interrupting rating as required to withstand the available fault current, but not less than:
   1. 120/208 V Panelboard: 10,000 A symmetrical.

2. 120/240 V Panelboard: 10,000 A symmetrical.
3. 277/480 V Panelboard: 14,000 A symmetrical.

D. Circuit breakers shall have automatic, trip free, non-adjustable, inverse time, and instantaneous magnetic trips for less than 400 A frame.

E. Circuit breaker features shall be as follows:
1. A rugged, integral housing of molded insulating material.
2. Silver alloy contacts.
3. Arc quenchers and phase barriers for each pole.
4. Quick-make, quick-break, operating mechanisms.
5. A trip element for each pole, thermal magnetic type with long time delay and instantaneous characteristics, a common trip bar for all poles and a single operator.
7. An operating handle which indicates closed, tripped, and open positions.
8. An overload on one pole of a multi-pole breaker shall automatically cause all the poles of the breaker to open.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the manufacturer's instructions, the NEC, as shown on the drawings, and as specified.

B. Locate panelboards so that the present and future conduits can be conveniently connected.

C. Install a printed schedule of circuits in each panelboard after approval by the Engineer. Schedules shall reflect final load descriptions, room numbers, and room names connected to each circuit breaker. Schedules shall be printed on the panelboard directory cards and be installed in the appropriate panelboards

D. Mount panelboards such that the maximum height of the top circuit breaker above the finished floor shall not exceed 1980 mm (78 inches).

E. Provide blank cover for each unused circuit breaker mounting space.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
1. Visual Inspection and Tests:
a. Compare equipment nameplate data with specifications and approved shop drawings.
b. Inspect physical, electrical, and mechanical condition.

c. Verify appropriate anchorage and required area clearances.
d. Verify that circuit breaker sizes and types correspond to approved shop drawings.
e. To verify tightness of accessible bolted electrical connections, use the calibrated torque-wrench method.
f. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 FOLLOW-UP VERIFICATION

A. Upon completion of acceptance checks, settings, and tests, the Contractor shall demonstrate that the panelboards are in good operating condition and properly performing the intended function.

END OF SECTION

SECTION 26 29 21 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This section specifies the furnishing, installation, and connection of fused and unfused disconnect switches (indicated as switches in this section), and separately-enclosed circuit breakers for use in electrical systems rated 600 V and below.

1.3 RELATED WORK

A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: Requirements that apply to all sections of Division 26.

B. Section 26 05 19, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Low-voltage conductors.

C. Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS: Requirements for personnel safety and to provide a low impedance path for possible ground faults.

D. Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS: Conduits.

E. Section 26 24 16, PANELBOARDS: Molded-case circuit breakers.

1.4 QUALITY ASSURANCE

A. Quality Assurance shall be in accordance with Paragraph, QUALIFICATIONS (PRODUCTS AND SERVICES) in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

1.5 SUBMITTALS

A. Submit in accordance with Paragraph, SUBMITTALS in Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, and the following requirements:
   1. Shop Drawings:

a. Submit sufficient information to demonstrate compliance with drawings and specifications.
b. Submit the following data for approval:
   1) Electrical ratings, dimensions, mounting details, materials, required clearances, terminations, weight, fuses, circuit breakers, wiring and connection diagrams, accessories, and device nameplate data.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.

B. International Code Council (ICC):
IBC-15.....International Building Code

C. National Electrical Manufacturers Association (NEMA):
FU l-12.....Low Voltage Cartridge Fuses
KS l-13.....Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum)

D. National Fire Protection Association (NFPA):
70-17.....National Electrical Code (NEC)

E. Underwriters Laboratories, Inc. (UL):
98-16.....Enclosed and Dead-Front Switches
248 1-11 .....Low Voltage Fuses
489-13.....Molded Case Circuit Breakers and Circuit Breaker Enclosures

PART 2 - PRODUCTS

2.1 FUSED SWITCHES RATED 600 AMPERES AND LESS

A. Switches shall be in accordance with NEMA, NEC, UL, as specified, and as shown on the drawings.

B. Shall be NEMA classified General Duty (GD) for 240 V switches, and NEMA classified Heavy Duty (HD) for 480 V switches.

C. Shall be horsepower (HP) rated.

D. Shall have the following features:
   1. Switch mechanism shall be the quick-make, quick-break type.
   2. Copper blades, visible in the open position.
   3. An arc chute for each pole.
   4. External operating handle shall indicate open and closed positions, and have lock-open padlocking provisions.
   5. Mechanical interlock shall permit opening of the door only when the switch is in the open position, defeatable to permit inspection.
   8. Ground lugs for each ground conductor.
   9. Enclosures:
      a. Shall be the NEMA types shown on the drawings.
      b. Where the types of switch enclosures are not shown, they shall be the NEMA types most suitable for the ambient environmental conditions.
      c. Shall be finished with manufacturer's standard gray baked enamel paint over pretreated steel.

2.2 UNFUSED SWITCHES RATED 600 AMPERES AND LESS

A. Shall be the same as fused switches, but without provisions for fuses.

2.3 FUSED SWITCHES RATED OVER 600 AMPERES TO 1200 AMPERES

A. Shall be the same as fused switches, and shall be NEMA classified Heavy Duty (HD).

2.4 MOTOR RATED TOGGLE SWITCHES

A. Type 1, general purpose for single-phase motors rated up to 1 horsepower.

B. Quick-make, quick-break toggle switch with external reset button and thermal overload protection matched to nameplate full-load current of actual protected motor.

2.5 CARTRIDGE FUSES

A. Shall be in accordance with NEMA FU 1.

B. Motor Branch Circuits: Class RK1, time delay.

C. Control Circuits: Class CC, fast acting.

2.6 SEPARATELY-ENCLOSED CIRCUIT BREAKERS

A. Provide circuit breakers in accordance with the applicable requirements in Section 26 24 16, PANELBOARDS.

B. Enclosures shall be the NEMA types shown on the drawings. Where the types are not shown, they shall be the NEMA type most suitable for the ambient environmental conditions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

B. Fused switches shall be furnished complete with fuses. Arrange fuses such that rating information is readable without removing the fuses.

3.2 ACCEPTANCE CHECKS AND TESTS

A. Perform in accordance with the manufacturer's recommendations. In addition, include the following:
   1. Visual Inspection and Tests:
      a. Compare equipment nameplate data with specifications and approved shop drawings.
      b. Inspect physical, electrical, and mechanical condition.
      c. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method.
      d. Vacuum-clean enclosure interior. Clean enclosure exterior.

3.3 SPARE PARTS

A. Two weeks prior to the final inspection, furnish one complete set of spare fuses for each fused disconnect switch installed on the project. Deliver the spare fuses to the Owner.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling soil.
5. Removing above- and below-grade site features
6. Removing utilities
7. Resetting site features.
8. Disconnecting, capping or sealing, and removing site utilities.
9. Protect existing site features and utilities to remain.

B. Related Sections:

1. Section 01 57 13 "Temporary Erosion and Sediment Control"
2. Section 31 20 00 "Earth Moving"

1.3 DEFINITIONS

A. Existing to Remain: Existing items of construction that are not permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or renovated and reinstalled.

B. Remove/ Remove and Dispose: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

C. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

D. Remove and Reinstall: Detach items from existing construction, stockpile, prepare for reuse, and reinstall where indicated.

E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

F. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

G. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

H. Utilities to be Abandoned: Pipes, structures, and appurtenances that are to be abandoned and left in their existing location.

I. Utilities to be Removed: Pipes, structures, and appurtenances that are to be abandoned and taken out of their existing location and legally disposed of at an off-site location.

J. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

K. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

L. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled, salvaged, or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1. Excess soil material shall be managed in accordance with Section 31 20 00 "Earth Moving".

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preconstruction Conference: Conduct conference at project site to review the following:

1. Clearing limits.
2. Trees to be protected.
3. Location of tree protection zones.
4. Tree removal marking system and requirements.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Contact Dig Safe at 811 or 888-DIG-SAFE before beginning site clearing.

C. Do not commence site clearing operations until temporary erosion-and sedimentation-control measures are in place.

D. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises as directed by the Owner.

E. Remove and Reinstall Existing Site Features. Remove, store, and protect items required to be reset upon completion of proposed construction. Clean and restore items to existing condition or better prior to resetting.

1. Restore items promptly during construction; do not leave until end of construction.

F. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

H. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Requirements for soil material are specified in Section 31 20 00 "Earth Moving."

2.2 NON-SHRINK GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition or better, as acceptable to Owner.

3.2 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.

3.3 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

   1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

   1. Notify Engineer not less than 2 days, excluding weekends and holidays, in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Engineer's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

D. Locate, identify, disconnect, relocate and reconnect utilities indicated to be relocated.

E. Unless otherwise indicated, existing utilities may be abandoned in place as follows:

   1. Pipes indicated to be abandoned shall be plugged at each end with non-shrink grout. Where applicable, pipes shall be depressurized and drained.
      a. Pipes over 12 inches in diameter shall be removed or filled completely with flowable fill.
      b. For lines longer than 100 feet, the pipe shall be cut and plugged in select locations so that no length of abandoned pipe exceeds 100 feet.
      c. Pipes that connect to existing structures should be removed within 5 feet of the structure, and the existing invert plugged with non-shrink grout.

d. Pipes that connect to existing appurtenances or other pipe(s) to remain should be cut and capped within 5 feet of the appurtenance or pipe to remain,

2. Portions of structures shall be removed for a distance of 4 feet below finished grade.

3. Where applicable, valves shall be closed and left in place. Valve stems and curb boxes shall be removed.

F. Grouting: Mix and install grout for plugging utility pipes to be abandoned-in-place.

1. Clean surfaces that will come into contact with grout.

2. Avoid air entrapment during placement of grout.

3. Place grout in pipes for a depth of not less than 24 inches and completely fill the entire diameter of the pipe.

4. Cure placed grout.

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction. Minimize disturbance and perform only as much clearing as required to complete the Work.

1. Do not remove trees, shrubs, and other vegetation indicated to remain.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

3. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.

4. Use only hand methods for grubbing within protection zones.

5. Chip removed tree branches and legally dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Do not stockpile topsoil within protection zones.

2. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Do not mix excavated pavement with other excavated materials.

3.7 RESTORATION

A. Repair or restore existing site improvements and vegetation to remain, which is damaged by construction operations, to existing condition or better as determined by the Engineer, at no additional cost to the Owner.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off-site.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 20 00 – EARTH MOVING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. This section specifies the requirements for furnishing all equipment, materials, labor, tools, and techniques for earthwork including, but not limited to, the following:

1. Site preparation.
2. Excavation.
3. Trenching.
4. Filling and backfilling.
5. Grading.
6. Disposal of unsuitable material.
7. Clean Up

B. Related Sections:

1. Section 31 10 00 "Site Clearing".
2. Section 01 57 13 "Temporary Erosion and Sedimentation Control".

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Degree of compaction: Degree of compaction is expressed as a percentage of maximum density obtained by laboratory test procedure. This percentage of maximum density is obtained through use of data provided from results of field test procedures presented in ASTM D1556, ASTM D2167, and ASTM D2922.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. OSHA: Occupational Safety and Health Administration

I. RIDOT: Rhode Island Department of Transportation

J. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 CY or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.

K. Satisfactory Soils: Free of debris, waste, frozen materials, vegetation, clay and other deleterious matter; adequately graded for satisfactory compaction.

1. On-Site Material: Native soil additionally free of organic matter, roots, and stones larger than 3 inches in any dimension, subject to approval by the Engineer.
2. Borrow: Free of rock or gravel larger than 3 inches in any dimension; and meeting Standard Specification Section M.01.01.

L. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

M. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

N. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 CLASSIFICATION OF EXCAVATION

A. Unclassified Excavation: Removal and disposal of pavements and other man-made obstructions visible on surface; utilities, and other items including underground structures indicated to be demolished and removed; together with any type of materials regardless of character of material and obstructions encountered.

B. Rock Excavation:

1. Trenches and Pits: Removal and disposal of solid, homogenous, interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits that cannot be excavated with a late-model, track-mounted hydraulic excavator; equipped with a42 inch wide, short-tip-radius rock bucket; rated at not less than 138 hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 19,000 lbf; measured according to SAE J-1179. Trenches in excess of 10 feet wide and pits in excess of 30 feet in either length or width are classified as open excavation.

2. Open Excavation: Removal and disposal of solid, homogenous, interlocking crystalline material firmly cemented, laminated, or foliated masses or conglomerate deposits that cannot be dislodged and excavated with a late-model, track-mounted loader; rated at not less than 210 hp flywheel power and developing a minimum of 48,510 lbf breakout force; measured according to SAE J-732.

3. Other types of materials classified as rock are unstratified masses, conglomerated deposits and boulders of rock material exceeding 1 cubic yard for open excavation, or exceeding one (1) cubic yard for footing and trench excavation that cannot be removed by rock excavating equipment equivalent to the above in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting.

1.5 SUBMITTALS

A. Product Data: For each type of the following products:

1. Each type of plastic warning tape.
2. Geotextile Fabric: Provide product data, including inventory tickets, roll numbers or batch identifications, packing papers and invoices.

B. Qualification Data: For qualified testing agency and licensed surveyor.

C. Material Test Reports: From testing agency indicating and interpreting test results for compliance of the following with requirements indicated. Prepare separate reports for each type and application of backfill, borrow, bedding, clean fill, granular fill, gravel base, gravel borrow, pervious fill, and stone dust.

1. Classification according to ASTM D 2487.
2. Sieve analysis according to ASTM 6913.
3. Laboratory compaction curve according to ASTM D 1557 and ASTM D 698.
4. Origin of material.
5. Classification and laboratory compaction curve for on-site soil material, in accordance with the above requirements, when requested by the Engineer.
6. Nuclear density testing according to ASTM D1557.

D. Field Test Data Reports: For the following:

1. Compaction Testing.

E. Pre-excavation photographs and videotape in the vicinity of the existing structures to document existing site features, including surfaces finishes, cracks, or other structural blemishes that might be misconstrued as damage caused by earthwork operations.

1.6 QUALITY ASSURANCE

A. Comply with applicable requirements of NFPA 495, "Explosive Materials Code."

B. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

C. Where "Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018" and issued supplements.

D. Perform excavation operations in accordance with Occupational Safety and Health Administration (OSHA) Regulations 1926.651 and 1926.652.

E. All testing conducted by the Contractor shall be conducted by a qualified testing agency certified to do business in the State of Rhode Island.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. All information and drawings of existing conditions are furnished only for the information and convenience of the Contractor. It shall be understood and agreed that the Owner does not warrant or guarantee that materials encountered during construction will be the same as those indicated by information given on the drawings. The Contractor must satisfy itself regarding character, quantities and conditions of the various materials and work to be done.

C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Engineer not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Engineer's written permission.

D. Contact Dig Safe before excavating. Proceed with excavation only after utility locator service completes marking of utility locations.

E. Extent of trench excavation and excavated areas shall be only as required to complete the work. Contractor shall not conduct work on private property unless authorized by the Owner.

F. Place excavated material, backfill and equipment a minimum of two feet from edge of excavation. Cast excavated material so as not to interfere with ordinary use of the traveled way.

PART 2 - PRODUCTS

2.1 CLEAN FILL

A. The soil materials listed in Part 2.2 shall be imported, laboratory tested, and certified as Clean Fill in accordance with the RAWP and this Section.

2.2 SOIL MATERIALS

A. General: Provide clean, borrow soil materials when sufficient satisfactory native soil materials are not available from excavations.

B. Common Borrow: Shall meet the requirements of Satisfactory Soils and shall conform to subsection M.01.01 of the Standard Specifications.

C. Bedding: Crushed stone conforming to subsection M.01.04 of the Standard Specifications.

D. Initial Backfill: Shall meet the requirements of Gravel Borrow.

E. Final Backfill: Shall meet the requirement of Satisfactory Soils.

F. Gravel Borrow: Naturally or artificially graded mixture of natural or crushed gravel, broken or crushed stone, and natural or crushed sand; Standard Specification, Subsection M.01.09; Table I, Column Ia.

1. Surplus reclaimed asphalt material may be used in gravel borrow.
2. Shall meet the requirements of Satisfactory Soils.

G. Filter Stone: Subsection M.01.09, Table 1, Column V of the Standard Specifications.

H. Crushed Stone: Shall conform to the requirements of Subsection M.01.09, Table 1, Column II of the Standard Specifications.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 4 mils thick, continuously inscribed with

B. a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

C. Identifying Colors for Utilities:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

D. Excavation Protection Systems: OSHA 1926.652.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor is responsible for preparing and following a site-specific Health and Safety Plan (HASP) in accordance with OSHA 29 CFR 1910.120. A copy must be maintained onsite at all times and be available for examination by the Owner and Engineer, if requested.

B. If the off-site disposal of soil is necessary, the Contractor shall stage the material on-site pending approval by the disposal facility and the Engineer.

3.2 HEALTH AND SAFETY

A. At a minimum, level D personnel protective equipment (PPE) must be used at all times on the site.

B. The Contractor is responsible to prepare, implement, and maintain a site specific HASP in accordance with OSHA 20 CFR 1910.120.

3.3 SITE PREPARATION

A. Clearing: Clear within limits of earthwork operations as shown, in accordance with Section 31 10 00 "Site Clearing."

B. Protect from damage, existing trees and shrubs which are not shown to be removed in construction area, in accordance with Section 31 10 00 "Site Clearing." Do not store building materials closer to trees and shrubs that are to remain, than farthest extension of their limbs.

C. Lines and Grades: Registered Professional Land Surveyor shall establish lines and grades.

1. Grades shall conform to elevations indicated on plans within the tolerances herein

specified. Generally grades shall be established to provide a smooth surface, free from irregular surface changes. Grading shall comply with compaction requirements and grade cross sections, lines, and elevations indicated. Where spot grades are indicated the grade shall be established based on interpolation of the elevations between the spot grades while maintaining appropriate transition at structures and paving and uninterrupted drainage flow into inlets.

2. Locations of existing elevations indicated on plans are approximate. Proposed spot elevations and contour lines have been developed utilizing the existing conditions survey and developed contour lines and may be approximate. Contractor is responsible to notify The Engineer of any differences between existing elevations shown on plans and those encountered on site by Surveyor described above. Notify the Engineer of any differences between existing or constructed grades, as compared to those shown on the plans.

3. Subsequent to establishment of lines and grades, Contractor will be responsible for any additional cut and/or fill required to ensure that site is graded to conform to elevations indicated on plans.

D. Disposal: All materials removed from the property shall be disposed of at a legally approved site, for the specific materials, and all removals shall be in accordance with all applicable Federal, State and local regulations. No burning of materials is permitted onsite.

3.4 EXCAVATION

A. Shoring, Sheeting and Bracing: Shore, brace, or slope, its angle of repose or to an angle considered acceptable by the Engineer, banks of excavations to protect workmen, banks, adjacent paving, structures, and utilities.

1. Design of the temporary support of excavation system is the responsibility of the Contractor.

2. Construction of the support of excavation system shall not interfere with the permanent structure and may begin only after a review by the Engineer.

3. Extend shoring and bracing to a minimum of 5 feet below the bottom of excavation. Shore excavations that are carried below elevations of adjacent existing foundations.

4. If bearing material of any foundation is disturbed by excavating, improper shoring or removal of existing or temporary shoring, placing of backfill, and similar operations, the Contractor shall underpin the existing foundation, provide a concrete fill support under disturbed foundations, as directed by the Engineer, at no additional cost to the Owner. Do not remove shoring until permanent work in excavation has been inspected and approved by the Engineer.

B. Excavation Drainage: Operate pumping equipment, and/or provide other materials, means and equipment as required to keep excavation free of water and subgrade dry, firm, and undisturbed until approval of permanent work has been received from the Engineer. Approval by the Engineer is also required before placement of the permanent work on all subgrades.

C. Subgrade Protection: Protect subgrades from softening, undermining, washout, or damage by rain or water accumulation. Reroute surface water runoff from excavated areas and do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches. When subgrade for foundations has been disturbed by water, remove disturbed material to firm undisturbed material after water is brought under control. Replace disturbed subgrade in trenches with concrete or material approved by the Engineer.

D. Utility Trenches:

1. Excavate trenches to uniform widths to provide working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

2. Trench Width: As indicated on the Contract Drawings.

3. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

   a. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   b. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
   c. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
   d. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Proofrolling:

1. After rough grade has been established in cut areas and prior to placement of fill in fill areas under structures and pavements, proofroll exposed subgrade with a fully loaded dump truck to check for pockets of soft material.

2. Proofrolling shall consist of at least two complete passes with one pass being

in a direction perpendicular to preceding one. Remove any areas that deflect, rut, or pump excessively during proofrolling, or that fail to consolidate after successive passes to suitable soils and replaced with compacted fill. Maintain subgrade until succeeding operation has been accomplished.

F.. Site Earthwork: Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation. Excavation shall be accomplished as required by drawings and specifications. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, complying with OSHA requirements, and for inspections. Remove subgrade materials that are determined by the Engineer as unsuitable, and replace with acceptable material. If there is a question as to whether material is unsuitable or not, the contractor shall obtain samples of the material, under the direction of the Engineer, and the materials shall be examined by an independent testing laboratory for soil classification to determine whether it is unsuitable or not.

G. Site Grading:

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
3. Slope grades to direct water away from buildings and to prevent ponds from forming where not designed. Finish subgrades to required elevations within the following tolerances:
   a. Lawn or Unpaved Areas: Plus or minus 1-inch.
   b. Walks: Plus or minus 1-inch.

3.5 FILLING AND BACKFILLING

A. General: Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation. For fill and backfill, use excavated materials and borrow meeting the criteria specified herein, as applicable. Borrow will be supplied at no additional cost to the Owner. Do not use unsuitable excavated materials. Do not backfill until foundation walls have been completed above grade and adequately braced, waterproofing or dampproofing applied, foundation drainage, and pipes coming in contact with backfill have been installed and work inspected and approved by the Engineer.

B. Placing: Place materials in horizontal layers not exceeding 8 inches in loose depth for

material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers and then compacted. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Place no material on surfaces that are muddy, frozen, or contain frost.

C. Compaction: Compact with approved tamping rollers, sheepsfoot rollers, pneumatic tired rollers, steel wheeled rollers, vibrator compactors, or other approved equipment (hand or mechanized) well suited to soil being compacted. Do not operate mechanized vibratory compaction equipment within 10 feet of new or existing building walls without prior approval of the Engineer. Moisten or aerate material as necessary to provide moisture content that will readily facilitate obtaining specified compaction with equipment used. Compact soil to not less than the following percentages of maximum dry density, according to ASTM D698 as specified below:

1. Fills, Embankments, and Backfill and paved areas, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material in accordance with ASTM D1557 to 95 percent of the maximum dry density.
    a. Curbs, top 6 inches, ASTM D1557 to 95 percent of the maximum dry density.
    b. Under Sidewalks, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material in accordance with ASTM D1557 to 95 percent of the maximum dry density.
    c. Landscaped areas, top 16 inches, ASTM D698 D1557 to 85 percent of the maximum dry density.
    d. Landscaped areas, below 16 inches of finished grade, ASTM D1557 to 90 percent of the maximum dry density.
2. Natural Ground (Cut or Existing)
    a. Curbs, top 6 inches, ASTM D1557 to 95 percent of the maximum dry density.
    b. Under sidewalks, top 6 inches, ASTM D155 to 95 percent of the maximum dry density.

3.6 GRADING

A. General: Uniformly grade the areas within the limits of this section, including adjacent transition areas. Smooth the finished surface within specified tolerance. Provide uniform levels or slopes between points where elevations are indicated, or between such points and existing finished grades. Provide a smooth transition between abrupt changes in slope.

B. Cut rough or sloping rock to level beds for foundations. In pipe spaces or other unfinished areas, fill low spots and level off with coarse sand or fine gravel.

C. Slope backfill outside building away from building walls for a minimum distance of 6 feet.

D. Place crushed stone or gravel fill under concrete slabs on grade, tamped, and leveled. Thickness of fill shall be 6 inches unless otherwise shown.

E. Finish subgrade in a condition acceptable to the Engineer at least one day in advance of paving operations. Maintain finished subgrade in a smooth and compacted condition until succeeding operation has been accomplished. Scarify, compact, and grade subgrade prior to further construction when approved compacted subgrade is disturbed by Contractor's subsequent operations or adverse weather.

F. Grading for Paved Areas: Provide final grades for both subgrade and base course to +/- 0.25 inches of indicated grades.

3.7 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with gravel borrow as directed.

C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.11 DISPOSAL OF UNSUITABLE AND EXCESS EXCAVATED MATERIAL

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the property.

B. Place excess excavated materials suitable for fill and/or backfill on site where directed.

C. Remove and dispose of any excess excavated materials after all fill and backfill operations have been completed.

3.12 CLEAN UP

A. Upon completion of earthwork operations, clean areas within contract limits, remove tools, and equipment. Provide site clear, clean, free of debris, and suitable for subsequent construction operations. Remove all debris, rubbish, and excess material from the property.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving.

B. Related Sections:

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Material Certificates: For each paving material, from manufacturer.

D. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the Rhode Island Department of Transportation.

B. Installer Qualifications: Imprinted-asphalt manufacturer's authorized installer who is trained and approved for installation of imprinted asphalt required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

D. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Rhode Island Department of Transportation for asphalt paving work "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition" and issued supplements.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

E. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
b. Review condition of subgrade and preparatory work.
c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO MP 1a, PG 64-28.

B. Asphalt Cement: ASTM D 3381 for viscosity-graded material ASTM D 946 for penetration-graded material.

C. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

D. Water: Potable.

E. Undersealing Asphalt: ASTM D 3141, pumping consistency.

2.3 AUXILIARY MATERIALS

A. Pavement-Marking Paint

1. Pavement markings shall consist of epoxy resin in accordance with RIDOT Section M.17.04.

2.4 MIXES

A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:

1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
2. Base Course: As indicated on Plans in accordance with RIDOT Subsection M.03.01.
3. Surface Course: As indicated on Plans in accordance with RIDOT Subsection M.03.01.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.04 to 0.06 gal./sq. yd.

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.

1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.04 to 0.06 gal./sq. yd.

C. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

1. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.

6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 175 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.

B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
    a. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

E. Replace and compact hot-mix asphalt where core tests were taken.

F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow milled materials to accumulate on-site.

END OF SECTION

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete sidewalks and pads.

B. Related Sections:

1. Section 31 20 00 "Earth Moving".

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Action Submittals:

1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For qualified ready-mix concrete manufacturer and testing agency.

D. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Admixtures.
4. Bonding agent or epoxy adhesive.
5. Joint fillers.

E. Material Test Reports:

1. Aggregates.

F. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

C. Concrete Testing Service: Owner shall engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

D. ACI Publications: Comply with ACI 301 unless otherwise indicated.

E. Regulatory Standards: Comply with materials, workmanship, and other applicable requirements of Standard Specifications: State of Rhode Island, Department of Transportation, Standard Specifications for Roads and Bridge Construction for concrete paving work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

D. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

E. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Portland cement Type I.

a. Fly Ash: ASTM C 618, Class C or Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 1 inch nominal, Standard Specifications M.02.03.

2. Fine Aggregate: Fine aggregate for concrete shall conform to the requirements of AASHTO M6 and shall consist of natural sand, manufactured sand produced from larger aggregate, or a combination thereof. Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

2.4 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry or cotton mats.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.5 RELATED MATERIALS

A. Joint Fillers: Preformed joint filler shall conform to AASHTO M153 Type II; Expanded Rubber Specification ASTM D1056, Type 2C2; or AASHTO M33 and M213.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Type V for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4,000 psi in accordance with Class XX of Standard Specifications.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus 2.0 or minus 1.0 percent for 1-inch nominal maximum aggregate size.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase and correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 31 20 00 "Earth Moving."

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
2. Provide tie bars at sides of paving strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/4 inch or more than 1/2 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch [radius. Repeat grooving of contraction joints after applying surface finishes.
    a. Tolerance: Ensure that grooved joints are within 3 inches either way from centers of dowels.
2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

3. Spacing: At no time shall the distance between contraction joints exceed five feet.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

K. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

2. Where concrete paving is adjacent to existing concrete, finish shall match existing.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing or moisture-retaining-cover curing as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.
c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch.
6. Vertical Alignment of Dowels: 1/4 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches of dowel.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 5,000 sq. ft. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 16 00 - CURBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Concrete curbing.

B. Related Sections include the following:

1. Section 31 20 00 "Earth Moving"

1.3 SUBMITTALS

A. Material Certification:

1. For concrete curb, certifying material meets the Specification requirements.

1.4 QUALITY ASSURANCE

A. Where "Standard Specifications" is used, it shall mean "Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction, Amended March 2018" and issued supplements.

PART 2 - PRODUCTS

2.1 GENERAL

A. All material shall be new and provided by the Contractor unless otherwise stated herein or approved by the Owner or Engineer.

2.2 MATERIALS

A. Concrete Curb:

1. Shall be Class Z (AE) concrete and in accordance with Subsection 906.02.2 of the Standard Specifications.

2. Exposed surfaces to have a sponge float finish.
3. Exposed edges to have ¾" chamfer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Excavate, prepare foundation, set curb, and point joints in accordance with Subsection 906.03.1 of the Standard Specifications and Division 2 Section "Earthwork".
   1. Install gravel borrow in accordance with Division 2 Section "Earthwork".
   2. Install curbing as indicated on the Contract Drawings and as recommended by manufacturer.
   3. Curb reveal to match curb reveal of adjacent curbing.

B. Concrete Curb:
   1. Minimum length of straight or circular filler pieces to be three (3) feet.
   2. Circular curb is required on curves with radii of 160 feet or less.
   3. Straight curb to be used on curves of more than 160 foot radius.
   4. Cement concrete shall only be used when the curb is set after the base and/or binder coursers are in place, otherwise the cement concrete shall be eliminated and the gravel brought up to bottom of the base course.

3.2 INSTALLATION TOLERANCES

A. Curb Alignment:
   1. 1/4-inch maximum, as determined by using a 10-foot straight edge along front face of curb.

END OF SECTION

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Chain-link fence.
2. Chain link double –leaf swing gates.

B. Related Sections:

1. Section 31 10 00 "Site Clearing" for removing and abandoning existing underground utilities.
2. Section 31 20 00 "Earth Moving."

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.

1. Fence and gate posts, rails, and fittings.
2. Chain-link fabric, reinforcements, and attachments.
3. Gates and hardware.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.

C. Samples for Verification: Prepared on Samples of size indicated below:

1. Polyvinyl Chloride (PVC) Coated Components: In 6-inch lengths for components and on full-sized units for accessories.

D. Product Certificates: For each type of chain-link fence and gate from manufacturer.

E. Product Test Reports: For framing strength according to ASTM F 1043.

F. Field quality-control reports.

G. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:

1. Polyvinyl Chloride (PVC) finishes.
2. Gate hardware.

H. Warranty: Sample of special warranty.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Dimensions of fabric and wire shall conform to ASTM A 116, ASTM A 702, and ASTM F 626. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: Per plans.

2. Steel Wire Fabric: Wire with a diameter of 0.148 inch (9 gauge).
    a. Mesh Size: 1 inch.
    b. Coating: Type IV, polyvinyl chloride (PVC) coated over zinc coated steel with 1.29 ounces per square foot zinc galvanizing applied after weaving.
        1) Color: Black, complying with ASTM F 934.
3. Selvage: Knuckled at both selvages.

2.2 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:
    1. Fence Height: Per Plans.
    2. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe.
        a. Line Post: 2.0 inches in diameter.
        b. End, Corner and Pull Post: 2.875 inches.
    3. Horizontal Framework Members: Top rails complying with ASTM F 1043.
        a. Top Rail: 1.66 inches in diameter
    4. Polymer coating over metallic coating.
        a. Color: Match chain-link fabric, complying with ASTM F 934.

2.3 TENSION WIRE

A. Polymer-Coated Steel Wire: 0.148-inch diameter, tension wire complying with ASTM F 1664, Class 2a over zinc-coated steel wire.
    1. Color: Match chain-link fabric, complying with ASTM F 934.

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and swing gate types.

B. Chain Link Fabric: Match chain link fence fabric.
    1. Gate Leaf Width: In accordance with plans.
    2. Gate Fabric Height: Match chain link fence height.

C. Pipe and Tubing:

1. Coating: Polymer coating over metallic coating.
2. Color: Match chain-link fabric, complying with ASTM F 934.
3. Gate Posts: Round tubular steel 2.875 inches in diameter.
4. Gate Frames and Bracing: Round tubular steel.

D. Frame Corner Construction: Welded or assembled with corner fittings.

E. Hardware:

1. Hinges: 180-degree outward swing.
2. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.
3. Drop Pin: 1-3/8" by 36" galvanized

2.5 FITTINGS

A. General: Comply with ASTM F 626.

B. Post Caps: Provide for each post.

1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Hot-Dip Galvanized Steel: 0.148-inch diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric.

H. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz. /sq. ft. zinc.

a. Polymer coating over metallic coating.

2. Aluminum: Mill finish.

2.6 POST FOOTINGS

A. Dimensions: 4 feet deep; 12-inch diameter.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Engineer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

3.4 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacing indicated, in firm, undisturbed soil, a minimum of four times the largest cross-section of the post and a minimum depth of 48 inches.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Concealed Concrete: Top 2 inches below grade to allow covering with surface material.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more.

D. Line Posts: Space line posts uniformly at 96 inches o.c.

E. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along bottom of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

F. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

G. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2 inches between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

H. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.

I. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c.

J. Concrete Collar: Install 12" diameter, 12" deep concrete collar with steel pipe for pin. Collar and pipe shall be set flush with pavement. Install gravel borrow base with depth of 8 inches. Pipe shall drain into gravel borrow.

3.5 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.6 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

END OF SECTION

BID No. 18-011 WELL FIELD ELECTRICAL POWER AND DISTRIBUTION SYSTEM UPGRADE

120 MILL STREET · CUMBERLAND · RHODE ISLAND

APRIL 2019

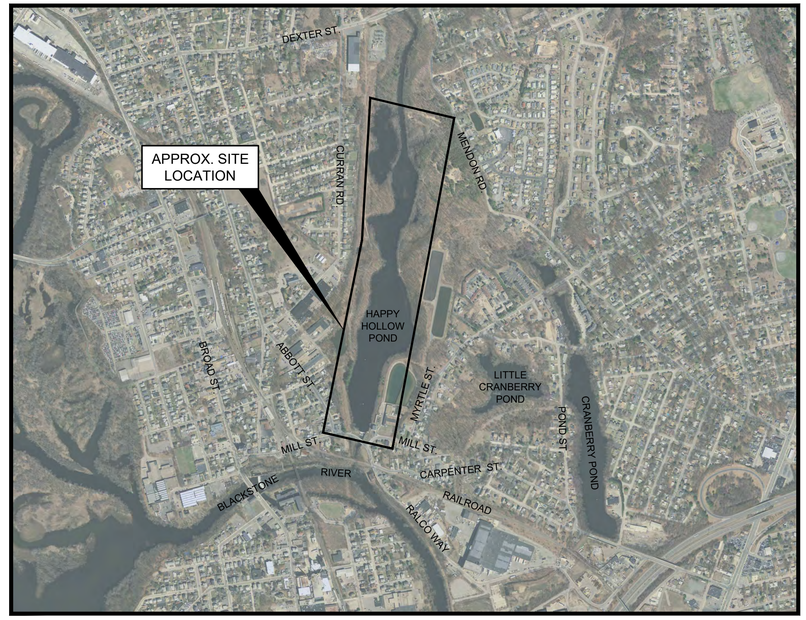
PREPARED FOR

PAWTUCKET WATER SUPPLY BOARD
85 BRANCH STREET.
PAWTUCKET, RI. 02860

PREPARED BY

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

SHEET INDEX



LOCATION MAP
SCALE: 1" = 800'

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
04/25/19

PROJ. No.: 20180576.A10
DATE: APRIL 2019

GI-001

ABBREVIATIONS:

Ø	PHASE
A	AMPERE
BLDG	BUILDING
C	CONDUIT
DISC	DISCONNECT SWITCH
DWG	DRAWING
EMT	ELECTRICAL METALLIC TUBING
FCO	FUSED CUTOUT
GFI	GROUND–FAULT INTERRUPTING
GND	GROUND
KW	KILOWATT
LBE	LOADBREAK
MCB	MAIN CIRCUIT BREAKER
NEC	NATIONAL ELECTRICAL CODE
OC	ON CENTER
PVC	POLYVINYL CHLORIDE
PWSB	PAWTUCKET WATER SUPPLY BOARD
RECPT	RECEPTACLE
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND REPLACE
REL	RELOCATE
RS	RIGID STEEL
V	VOLTS
WP	WEATHERPROOF (NEMA 4X)
XFMR	TRANSFORMER

LEGEND

FCO (3) — POLE MOUNTED FUSED CUTOUT (3) NUMBER INDICATES NUMBER OF POLES

50 E — HIGH VOLTAGE FUSE

TRANSFORMER – SIZED AS INDICATED

WP — DISCONNECT SWITCH – SIZED AS INDICATED NEMA 4R

PANELBOARD – SIZED AS INDICATED

CIRCUIT BREAKER SIZED AS INDICATED

LOADBREAK ELBOW (LBE)

LOAD INTERRUPTING SWITCH

CABLE TERMINATION

DEMOLITION LEGEND

E — NEW UNDERGROUND ELECTRICAL

E — EXISTING UNDERGROUND ELECTRICAL

J — JUNCTION BOX OR PULLBOX

PE — NEW PRIMARY UNDERGROUND DUCTBANK

PD — NEW UNDERGROUND PRIMARY DISTRIBUTION 13.8KV 3ø, 3ø CLX CABLE

NEW POLE

EXISTING POLE

OHW — EXISTING OVERHEAD LINES

S — SECONDARY

GENERAL NOTES

1. ALL ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL AND RHODE ISLAND ELECTRICAL CODES AND OTHER STATE OF RHODE ISLAND REQUIREMENTS AND THE NATIONAL ELECTRICAL SAFETY CODE C2.
2. ADDITIONAL JUNCTION / PULL BOXES SHALL BE FURNISHED AND INSTALLED AS REQUIRED.
3. ALL CONDUITS SHALL CONTAIN A GREEN SAFETY GROUND WIRE. BOND ALL PANELS, CABINETS, ENCLOSURES, CONDUITS, ETC., AS REQUIRED.
4. PROVIDE CONDUIT SLEEVES FILLED WITH AN APPROVED FIRE–RESISTANT MATERIAL WHERE FIRE–RATED WALLS ARE PENETRATED. PROVIDE WATERTIGHT CONDUIT SLEEVES WHERE EXTERIOR WALLS ARE PENETRATED EITHER ENTERING OR LEAVING A BUILDING.
5. ALL CUTTING, PATCHING AND FIRESTOPPING RELATED TO ELECTRICAL WORK SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

DEMOLITION NOTES

1. DEMOLITION OF EXISTING ELECTRICAL SYSTEM SHALL BE PERFORMED IN A PHASED SYSTEM OF DECOMMISSIONING. THE ENTIRE NEW DISTRIBUTION SYSTEM SHALL BE CONSTRICTIVELY TESTED, APPROVED AND OPERATIONAL BEFORE CUT OVER OF THE NEW SYSTEM.
2. EXISTING ELECTRICAL EQUIPMENT INDICATED ON PLANS HAS BEEN DERIVED FROM THE BEST AVAILABLE EXISTING DRAWINGS AND MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION AS REQUIRED. ANY EQUIPMENT THAT IS NOT IDENTIFIED AND CONFLICTS WITH CONSTRUCTION SHALL NOT BE DISCONNECTED AND SHALL BE BROUGHT TO THE ATTENTION OF THE PWSB / ENGINEER FOR DISPOSITION.
3. WHERE WIRING IS TO BE REMOVED, RELOCATED OR RECONNECTED, THE CONTRACTOR SHALL TAKE PRECAUTIONS AND ASSUME THAT THE CIRCUIT MAY BE ACTIVE. CONTRACTOR SHALL TEST, VERIFY AND SECURE ALL CIRCUITS BEFORE REMOVAL. UNKNOWN WIRING SHALL BE IDENTIFIED. ANY WIRING TO REMAIN SHALL BE VERIFIED BY THE CONTRACTOR, TAGGED AND IDENTIFIED AS REQUIRED.
4. EXISTING ELECTRICAL EQUIPMENT AND DEVICES INDICATED TO BE REMOVED SHALL BE REMOVED COMPLETELY INCLUDING ALL CONDUIT, WIRING AND ASSOCIATED APPURTENANCES BACK TO EXISTING SOURCE WHERE THE EXISTING SOURCE SHALL BE LABELED AS SPARE.
5. EXISTING CONDUITS TO BE REMOVED WHICH ARE EMBEDDED IN A CONCRETE SLAB SHALL HAVE THE WIRING REMOVED AND THE CONDUIT CUT FLUSH WITH CONCRETE AND SEALED IN AN APPROVED MANNER.
6. EXISTING ELECTRICAL EQUIPMENT AND WIRING TO REMAIN SHOWN SHALL BE PROTECTED FROM DAMAGE AS REQUIRED DURING THE CONSTRUCTION PERIOD AND LEFT IN GOOD WORKING ORDER AT COMPLETION. ANY EQUIPMENT DAMAGED SHALL BE REPLACED BY THE CONTRACTOR AT NO EXPENSE TO THE OWNER.
7. OWNER AND CODE REQUIRED SYSTEMS THAT ARE REQUIRED TO REMAIN ACTIVE DURING CONSTRUCTION SHALL BE TEMPORARILY WIRED AS REQUIRED TO REMAIN ACTIVE THROUGHOUT THE CONSTRUCTION PERIOD UNTIL NEW SYSTEMS ARE INSTALLED, TESTED AND ACCEPTED.
8. IN CONDITIONS WHERE IN THE OPINION OF THE CONTRACTOR IT IS NOT CLEAR WHETHER EXISTING ELECTRICAL EQUIPMENT IS TO BE REMOVED OR REMAIN, IT SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR REVIEW AND FINAL DECISION.
9. ANY DISRUPTION OF ANY ELECTRICAL SERVICE NECESSITATED BY THE ELECTRICAL RENOVATION SHALL BE COORDINATED WITH THE PWSB IN ORDER FOR PROPER NOTICE TO BE GIVEN PRIOR TO THE DISCONNECTION OF ANY SERVICE. 48 HOUR NOTICE SHALL BE PROVIDED.
10. EXISTING ELECTRICAL EQUIPMENT REMOVED SHALL BE BROKEN DOWN INTO MANAGEABLE LENGTHS FOR STORAGE, HANDLING AND DISPOSAL.
11. EXISTING ELECTRICAL EQUIPMENT REMOVED SHALL BE PROPERLY DISPOSED OF BY CONTRACTOR NO ITEMS SHALL BE TURNED OVER TO PWSB, UNLESS SPECIFICALLY IDENTIFIED.
12. WHERE EXISTING POLES ARE TO BE REMOVED ASSOCIATED GUYING AND HARDWARE SHALL BE REMOVED.
13. EXISTING POLE MOUNTED TRANSFORMERS (6) MAY CONTAIN PCB'S AND NEED TO BE REMOVED AND DISPOSED. THESE SHALL BE IDENTIFYING, TESTED, TAGGED, PROTECTIVELY WRAPPED. HAZARDOUS MATERIALS WILL BE TEMPORARILY STORED ON–SITE; DOCUMENTED, TRANSPORTED AND PROPERLY DISPOSED OF IN ACCORDANCE WITH STATE AND FEDERAL REGULATIONS. WORK SHALL BE PERFORMED BY A CERTIFIED HAZMAT CONTRACTOR.

SITE UTILITY NOTES

1. ALL EXCAVATIONS AND BACKFILL AND FOUNDATIONS SHALL BE BY THE ELECTRICAL CONTRACTOR.
2. INSTALL A COMPLETE GROUND SYSTEM IN ACCORDANCE WITH ALL CODES, AND AS INDICATED
3. DUCT BANKS SHALL BE PROVIDED WITH A 6" WIDE METALIZED CONTINUOUS WARNING TAPE INSTALLED 6" BELOW GRADE ABOVE CENTER OF DUCTBANK.
4. USE THE ACCEPTABLE METHOD OF PAVEMENT SAW–CUTTING OF THE EXISTING PAVEMENT FOR UTILITY TRENCHING. CAREFULLY SAW TWO PARALLEL 3/8 INCH WIDE BY 1 INCH DEEP CUTS FOR THE WIDTH OF THE REQUIRED UTILITY TRENCH INTO THE EXISTING PAVEMENT SURFACE ENSURING THE LEAST AMOUNT OF DISTURBANCE TO ADJACENT PAVED AREAS ALONG THE OUTER EDGES OF THE TRENCH–LINE.
5. LEGALLY DISPOSE OF ALL EXCAVATED ASPHALT BITUMINOUS PAVEMENT MATERIAL AND UNUSED EXCAVATED MATERIAL OFF–SITE AT AN APPROVED LANDFILL OR RECYCLING FACILITY.
6. UPON COMPLETION OF THE SUBSURFACE EXCAVATION TRENCHING AND UTILITY INSTALLATION, BACKFILL THE TRENCH USING SAME EXCAVATED GRAVEL MATERIAL TO A COMPACTION COMPARABLE TO PRE–EXCAVATED CONDITIONS ACCEPTABLE TO THE ENGINEER. MINIMUM 95% COMPACTION REQUIRED.
7. REPLACE IN KIND BOTH THE DEPTH AND MATERIAL TYPE AND GRADATION OF HOT MIX ASPHALT TO MATCH THAT OF THE EXCAVATED PAVEMENT MATERIAL. ASPHALT PATCHING OF THE TRENCH SHALL BE PERFORMED AT ONE TIME AND PLACED TO BE FLUSH WITH THE ADJOINING PAVEMENT EDGES ON GRADE AND ELEVATION. SURFACE SHALL BE ROLLED TO ACHIEVE MAXIMUM COMPACTION TO PROHIBIT SETTLEMENT OF THE NEW TRENCH PATCHING.
8. ITEMS INDICATED TO BE "REMOVED" SHALL BE REMOVED AND PROPERLY DISPOSED OF.
9. SITE UTILITY PLANS PLANS HAS BEEN DERIVED FROM THE BEST AVAILABLE EXISTING DRAWINGS AND MUST BE FIELD VERIFIED PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL ENGAGE AND CONTRACT WITH A SITE UTILITY LOCATION CONTRACTOR TO FIELD LOCATE AND MARK ALL UTILITIES ALONG CONDUIT OR CABLE ROUTING AND EQUIPMENT INSTALLATION LOCATIONS.
10. ALL WELL PUMP HOUSE STATIONS HAVE WATER LINES THAT MAY NOT BE INDICATED ON STATION PLANS TAKE CAUTION NOT TO DISTURB THESE LINES.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8948 REGISTERED PROFESSIONAL ENGINEER ELECTRICAL

SCALE: HORZ.: NOT TO SCALE VERT.:
DATUM: HORZ.: VERT.:
GRAPHIC SCALE 1 0 1

FUSS&O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

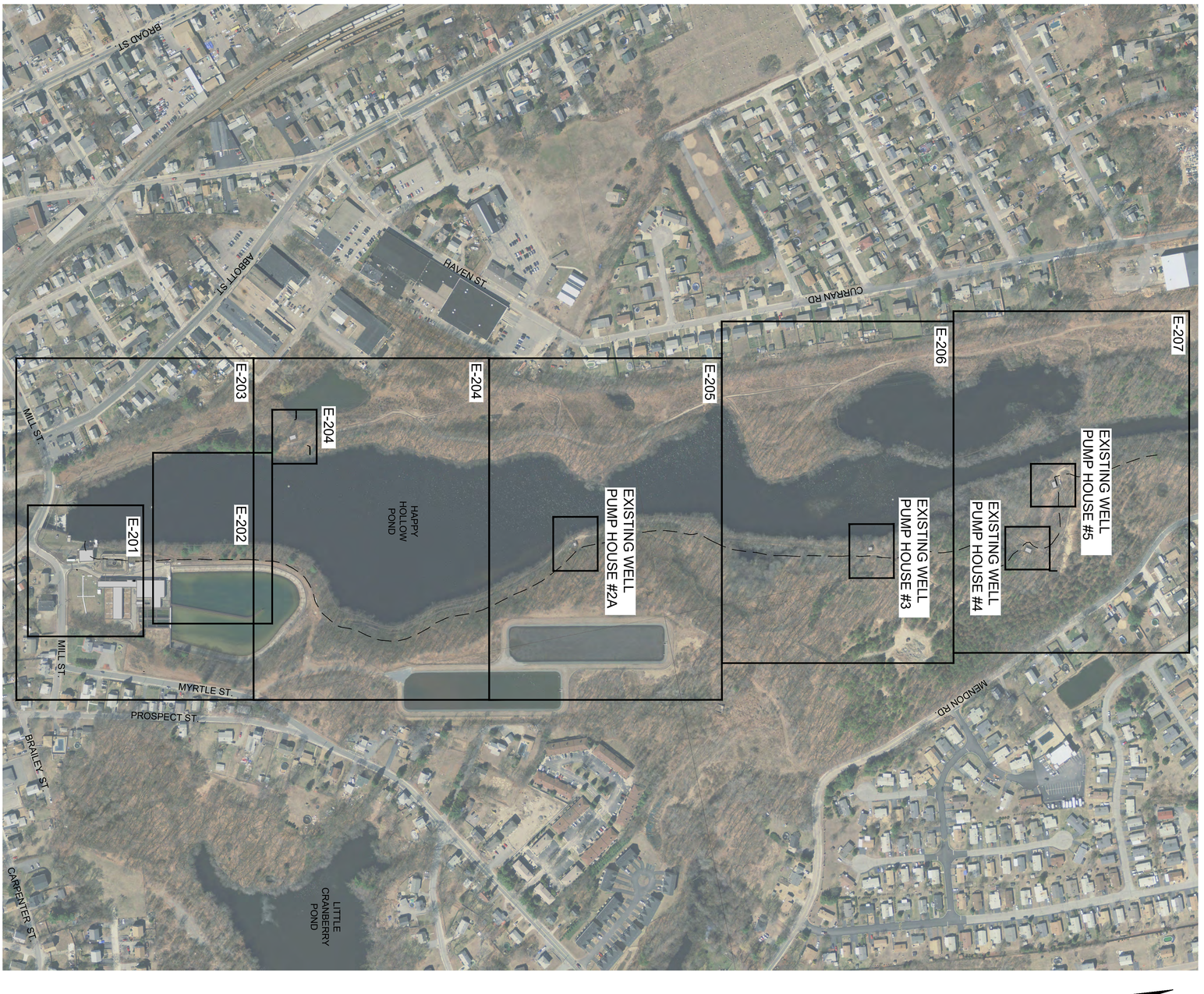
NOTES, LEGEND, & DETAILS

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-100

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-200 Plotted: Fri, April 19, 2019 - 12:28 PM User: sirons
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB



E-200

PROJ. No: 20180576.A10
DATE: APRIL 2019

PAWTUCKET WATER SUPPLY BOARD

INDEX PLAN

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

SCALE:
HORZ.: 1"= 200'
VERT.:
DATUM:
HORZ.:
VERT.:
200 0 200
GRAPHIC SCALE

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER
ELECTRICAL
04.24.2019

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

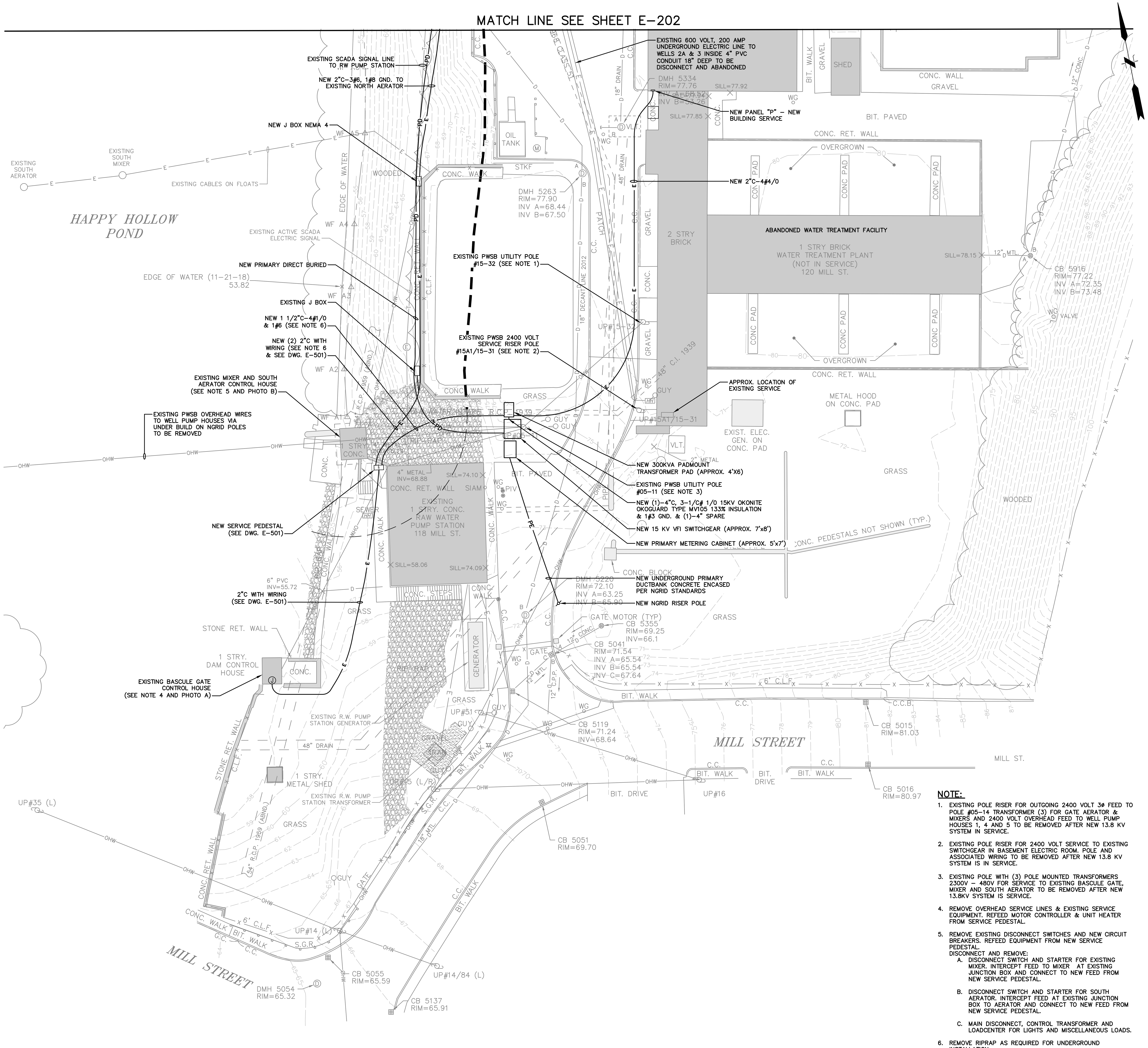

APPROXIMATE LOCATION FOR NEW SERVICE PEDESTAL; CORE DRILL WALL AS REQUIRED
JUNCTION BOX FOR SPLICE; CONNECT CONDUIT AND WIRING FROM SERVICE PEDESTAL; REFEED MIXER AND AERATOR; ADD NEW CABLE TO NORTH AERATOR;
EXISTING AERATOR CABLE TO MIXER/AERATORS
DISCONNECT AND REMOVE ALL EQUIPMENT (SEE NOTE 5)

B — PHOTOS – EXISTING MIXER AND SOUTH AERATOR CONTROL HOUSE

NOT TO SCALE

A — PHOTOS – EXISTING BASCULE GATE CONTROL HOUSE

NOT TO SCALE


MATCH LINE SEE SHEET E-202
EXISTING SCADA SIGNAL LINE TO RW PUMP STATION
NEW 2"C–3#6, 1#8 GND. TO EXISTING NORTH AERATOR
NEW J BOX NEMA 4
EXISTING SOUTH AERATOR
EXISTING SOUTH MIXER
EXISTING CABLES ON FLOATS
HAPPY HOLLOW POND
EXISTING ACTIVE SCADA ELECTRIC SIGNAL
NEW PRIMARY DIRECT BURIED
EDGE OF WATER (11–21–18) 53.82
EXISTING J BOX
NEW 1 1/2"C–4#1/0 & 1#6 (SEE NOTE 6)
NEW (2) 2"C WITH WIRING (SEE NOTE 6 & SEE DWG. E-501)
EXISTING MIXER AND SOUTH AERATOR CONTROL HOUSE (SEE NOTE 5 AND PHOTO B)
EXISTING PWSB OVERHEAD WIRES TO WELL PUMP HOUSES VIA UNDER BUILD ON NGRID POLES TO BE REMOVED
NEW SERVICE PEDESTAL (SEE DWG. E-501)
2"C WITH WIRING (SEE DWG. E-501)
STONE RET. WALL
1 STRY. DAM CONTROL HOUSE
EXISTING BASCULE GATE CONTROL HOUSE (SEE NOTE 4 AND PHOTO A)
EXISTING R.W. PUMP STATION GENERATOR
EXISTING R.W. PUMP STATION TRANSFORMER
1 STRY. METAL SHED
EXISTING 1 STRY. CONC. RAW WATER PUMP STATION 118 MILL ST.
OIL TANK
DMH 5263 RIM=77.90 INV A=68.44 INV B=67.50
EXISTING PWSB UTILITY POLE #15-32 (SEE NOTE 1)
EXISTING PWSB 2400 VOLT SERVICE RISER POLE #15A1/15-31 (SEE NOTE 2)
EXISTING 600 VOLT, 200 AMP UNDERGROUND ELECTRIC LINE TO WELLS 2A & 3 INSIDE 4" PVC CONDUIT 18" DEEP TO BE DISCONNECT AND ABANDONED
DMH 5334 RIM=77.76
NEW PANEL "P" – NEW BUILDING SERVICE
NEW 2"C–4#4/0
ABANDONED WATER TREATMENT FACILITY
1 STRY BRICK WATER TREATMENT PLANT (NOT IN SERVICE) 120 MILL ST.
2 STRY BRICK
CB 5916 RIM=77.22 INV A=72.35 INV B=73.48
APPROX. LOCATION OF EXISTING SERVICE
METAL HOOD ON CONC. PAD
EXIST. ELEC. GEN. ON CONC. PAD
NEW 300KVA PADMOUNT TRANSFORMER PAD (APPROX. 4'X6')
EXISTING PWSB UTILITY POLE #05-11 (SEE NOTE 3)
NEW (1)–4"C, 3–1/C# 1/0 15KV OKONITE OKOGUARD TYPE MV105 133% INSULATION & 1#3 GND. & (1)–4" SPARE
NEW 15 KV VFI SWITCHGEAR (APPROX. 7'x8')
NEW PRIMARY METERING CABINET (APPROX. 5'x7')
CONC. PEDESTALS NOT SHOWN (TYP.)
NEW UNDERGROUND PRIMARY DUCTBANK CONCRETE ENCASED PER NGRID STANDARDS
NEW NGRID RISER POLE
DMH 5220 RIM=72.10 INV A=63.25 INV B=65.90
CB 5355 RIM=69.25 INV=66.1
CB 5041 RIM=71.54 INV A=65.54 INV B=65.54 INV C=67.64
CB 5119 RIM=71.24 INV=68.64
CB 5015 RIM=81.03
CB 5016 RIM=80.97
CB 5051 RIM=69.70
CB 5055 RIM=65.59
CB 5137 RIM=65.91
DMH 5054 RIM=65.32
MILL STREET
MILL ST.
WOODED
GRASS
UP#35 (L)
UP#14 (L)
UP#14/84 (L)
UP#16

NOTE:

1. EXISTING POLE RISER FOR OUTGOING 2400 VOLT 3ø FEED TO POLE #05–14 TRANSFORMER (3) FOR GATE AERATOR & MIXERS AND 2400 VOLT OVERHEAD FEED TO WELL PUMP HOUSES 1, 4 AND 5 TO BE REMOVED AFTER NEW 13.8 KV SYSTEM IN SERVICE.
2. EXISTING POLE RISER FOR 2400 VOLT SERVICE TO EXISTING SWITCHGEAR IN BASEMENT ELECTRIC ROOM. POLE AND ASSOCIATED WIRING TO BE REMOVED AFTER NEW 13.8 KV SYSTEM IS IN SERVICE.
3. EXISTING POLE WITH (3) POLE MOUNTED TRANSFORMERS 2300V – 480V FOR SERVICE TO EXISTING BASCULE GATE, MIXER AND SOUTH AERATOR TO BE REMOVED AFTER NEW 13.8KV SYSTEM IS SERVICE.
4. REMOVE OVERHEAD SERVICE LINES & EXISTING SERVICE EQUIPMENT. REFEED MOTOR CONTROLLER & UNIT HEATER FROM SERVICE PEDESTAL.
5. REMOVE EXISTING DISCONNECT SWITCHES AND NEW CIRCUIT BREAKERS. REFEED EQUIPMENT FROM NEW SERVICE PEDESTAL.
   DISCONNECT AND REMOVE:
   A. DISCONNECT SWITCH AND STARTER FOR EXISTING MIXER. INTERCEPT FEED TO MIXER AT EXISTING JUNCTION BOX AND CONNECT TO NEW FEED FROM NEW SERVICE PEDESTAL.
   B. DISCONNECT SWITCH AND STARTER FOR SOUTH AERATOR. INTERCEPT FEED AT EXISTING JUNCTION BOX TO AERATOR AND CONNECT TO NEW FEED FROM NEW SERVICE PEDESTAL.
   C. MAIN DISCONNECT, CONTROL TRANSFORMER AND LOADCENTER FOR LIGHTS AND MISCELLANEOUS LOADS.
6. REMOVE RIPRAP AS REQUIRED FOR UNDERGROUND INSTALLATION.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8946 REGISTERED PROFESSIONAL ENGINEER ELECTRICAL

SCALE: HORZ.: 1"= 20' VERT.:
DATUM: HORZ.: VERT.:
GRAPHIC SCALE 20 10 0 20

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ENLARGED ELECTRICAL SITE PLAN NO. 1
BID No. 18-011 WELL FIELD ELECTRICAL POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-201

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-201 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
Plotter: NONE CTB File: FO.STB
MS VIEW: LAYER STATE:

MATCH LINE SEE SHEET E-201

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8946
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND
9/25/19

SCALE:
DATUM: HORZ.: 1"= 20'
VERT.:
HORZ.:
VERT.:
20 10 0 20
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ENLARGED ELECTRICAL SITE
PLAN NO. 2
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-202

File Path: J:\DWG\P2018\05\76A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-202 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB

MATCH LINE SEE SHEET E–204

WOODED
WOODED
OVERGROWN
UP#28–70
UP#29–70
UP#30–70
UP#31–70
POST MTL 5"
UP#28–50
OVERGROWN
UP#32–70
UP#32–71
UP#29–30
UP#33–70
STONE RET. WALL
OGUY
UP#34–70
SMH 6118
RIM=58.53
UP#35 (L)
WOODED
APPROXIMATE EDGE OF WATER
HAPPY HOLLOW POND
UNPAVED ACCESS ROAD
LIMIT OF SURVEY
LIMIT OF SURVEY
EDGE OF WATER (11–20–18)
53.71
EDGE OF WATER (11–21–18)
53.82
EXISTING 2400 VOLT 3ø OVERHEAD LINE TO WELL PUMP HOUSE #4 & #5 TO BE REMOVED
OHW
MILL STREET

WF A17
WF A16
WF A15
WF A14
WF A13
WF A12
WF A10
WF A9
WF A8
WF A6
WF A5
WF A4
WF A3
WF A2
WF A1
EDGE OF WATER (11–27–18)
54.09
EDGE OF WATER
WOODED
WOODED
EXISTING SUPPLY TO WELLS 2 & 3 DIRECT BURIAL 600 VOLTS 200 AMP (UNDERGROUND) DIRECTLY OVER 20" ACTIVE WATER MAIN; WATER MAIN TO REMAIN SPECIAL PRE-CAUTION SHALL BE TAKEN EXACT DEPTH UNKNOWN
PRIMARY DIRECT BURIED
SETTLING BASIN
NEW 2"C–3#6, 1#8 GND. TO EXISTING NORTH AERATOR
SETTLING BASIN
WOODED
ABANDONED WATER TREATMENT FACILITY
SEE ENLARGED PLAN DWG. E-201
MILL STREET

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8946
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND
9/25/19

SCALE:
HORZ.: 1"= 40'
VERT.:
DATUM:
HORZ.:
VERT.:
-40 -20 0 20 40
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ELECTRICAL SITE PLAN NO. 1
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-203

MATCH LINE SEE SHEET E–205

ENLARGED PLAN – EXISTING WELL PUMP HOUSE #1

SCALE: 1"= 20'

Ⓐ PHOTOS – EXISTING WELL PUMP HOUSE #1

NOT TO SCALE

MATCH LINE SEE SHEET E–203

No. | DATE | DESCRIPTION | DESIGNER | REVIEWER

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER ELECTRICAL
04.19.2019

SCALE:
HORZ.: 1"= 40'
VERT.:
DATUM:
HORZ.:
VERT.:
40 20 0 40
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

ELECTRICAL SITE PLAN NO. 2

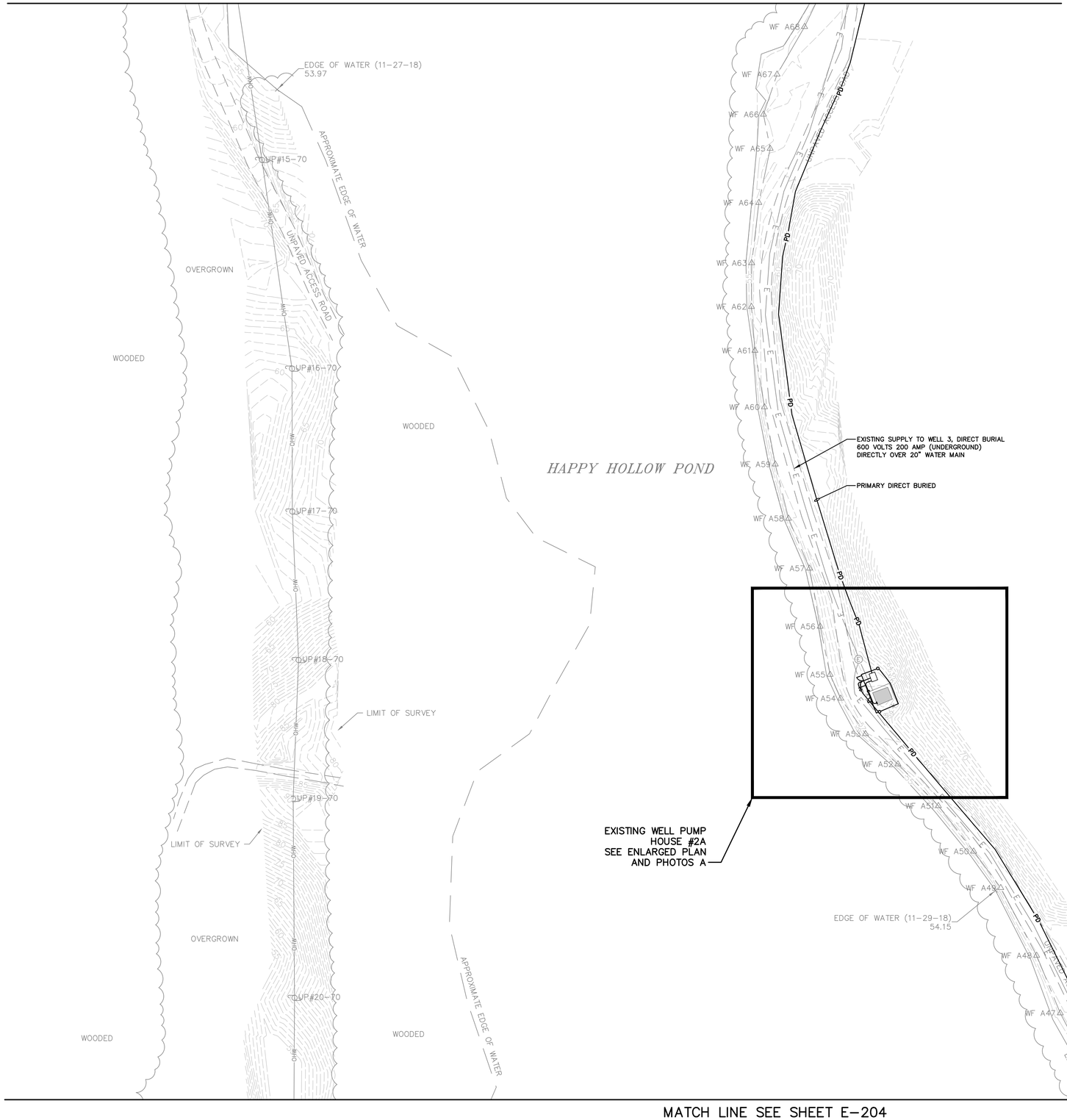
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

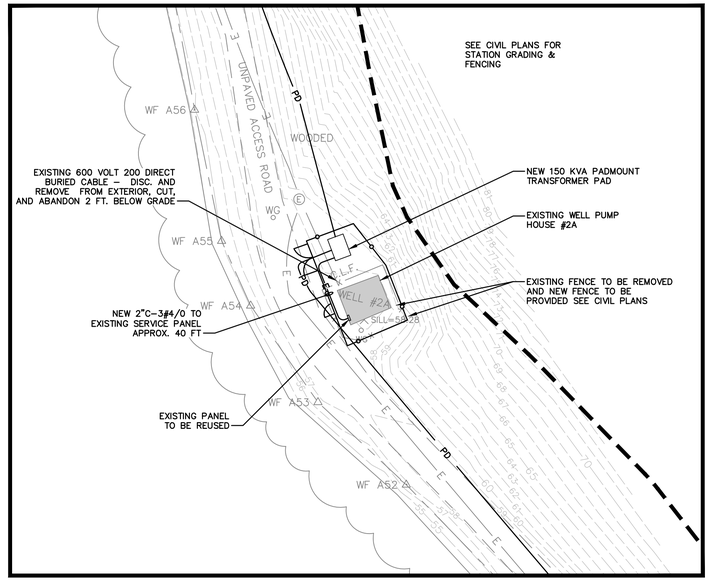
E-204

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-204 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: | LAYER STATE: | Plotter: NONE CTB File: FO.STB

MATCH LINE SEE SHEET E–206



MATCH LINE SEE SHEET E–204



ENLARGED PLAN – EXISTING WELL PUMP HOUSE #2A

SCALE: 1"= 20'

PHOTOS – EXISTING WELL PUMP HOUSE #2A

A

NOT TO SCALE

NOTES:

1. EXISTING PANEL TO REMAIN. REMOVE EXISTING FEEDER. ABANDON 2 FEET BELOW GRADE. REFEED PANEL FROM NEW TRANSFORMER. EXISTING BRANCH CIRCUITS TO REMAIN AS IS.
2. EXISTING FENCE TO BE REMOVED AND NEW FENCE INSTALLED. SEE CS SHEET SERIES.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8948 REGISTERED PROFESSIONAL ENGINEER ELECTRICAL

SCALE: HORZ.: 1"= 40' VERT.: DATUM: HORZ.: VERT.: GRAPHIC SCALE 40 20 0 40

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

ELECTRICAL SITE PLAN NO. 3

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-205

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-205 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB

MATCH LINE SEE SHEET E-207

ENLARGED PLAN – EXISTING WELL PUMP HOUSE #3

SCALE: 1"= 20'

A PHOTOS – EXISTING WELL PUMP HOUSE #3

NOT TO SCALE

NOTES:

1. REMOVE EXISTING SERVICE DISCONNECT SWITCH, ALL OTHER TO REMAIN PROVIDE NEW 600V PANEL. PROVIDE BRANCH CIRCUITS AND BREAKERS AS REQUIRED.
2. EXISTING FENCE TO BE REMOVED AND NEW FENCE INSTALLED. SEE CS SHEET SERIES.

MATCH LINE SEE SHEET E-205

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8948 REGISTERED PROFESSIONAL ENGINEER STATE OF RHODE ISLAND

SCALE: HORZ.: 1"= 40' VERT.: DATUM: HORZ.: VERT.: GRAPHIC SCALE -40 -20 0 20 40

FUSS&O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

ELECTRICAL SITE PLAN NO. 4

BID No. 18-011 WELL FIELD ELECTRICAL POWER AND DISTRIBUTION SYSTEM UPGRADE

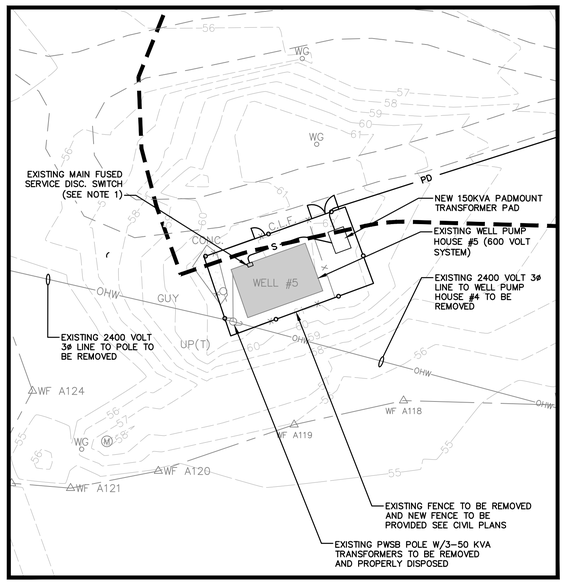
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10

DATE: APRIL 2019

E-206

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-206 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB



ENLARGED PLAN – EXISTING WELL PUMP HOUSE #5

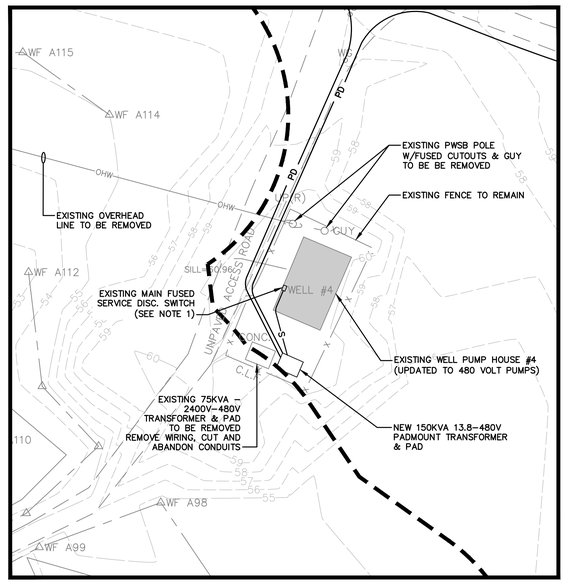
SCALE: 1"= 20'

B PHOTOS – EXISTING WELL PUMP HOUSE #5

NOT TO SCALE

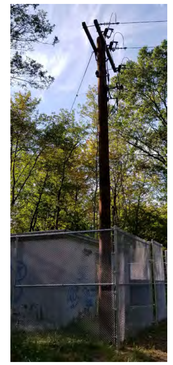
NOTES:

1. REMOVE EXISTING SERVICE DISCONNECT SWITCH, ALL OTHER TO REMAIN PROVIDE NEW 600V PANEL. PROVIDE BRANCH CIRCUITS AND BREAKERS AS REQUIRED.
2. EXISTING FENCE TO BE REMOVED AND NEW FENCE INSTALLED. SEE CIVIL SHEET SERIES.



ENLARGED PLAN – EXISTING WELL PUMP HOUSE #4

SCALE: 1"= 20'

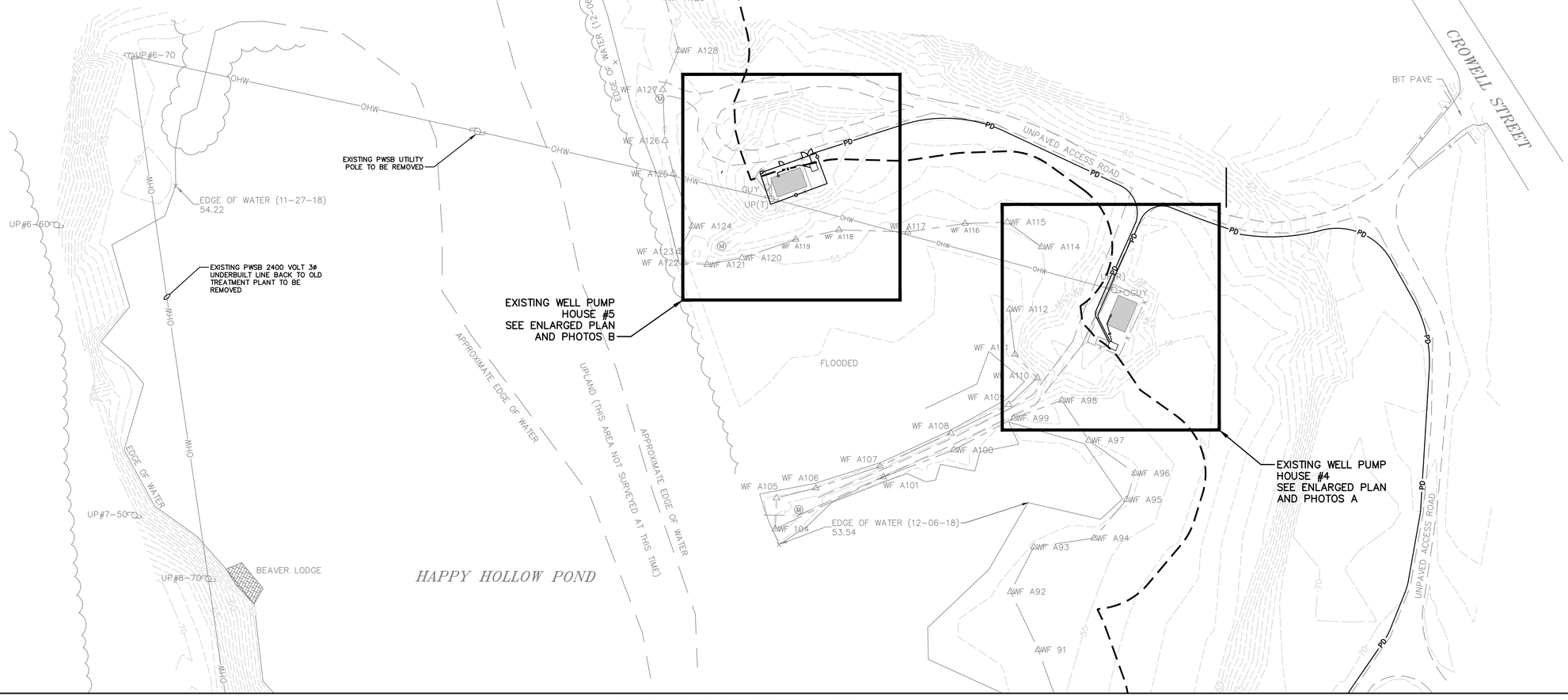


A PHOTOS – EXISTING WELL PUMP HOUSE #4

NOT TO SCALE

NOTES:

1. REMOVE EXISTING SERVICE DISCONNECT SWITCH, ALL OTHER TO REMAIN PROVIDE NEW 600V PANEL. PROVIDE BRANCH CIRCUITS AND BREAKERS AS REQUIRED.
2. EXISTING FENCE TO REMAIN.



MATCH LINE SEE SHEET E–206

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND

SCALE:
HORZ.: 1"= 40'
VERT.:
DATUM:
HORZ.:
VERT.:
GRAPHIC SCALE 40 20 0 40

FUSS&O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

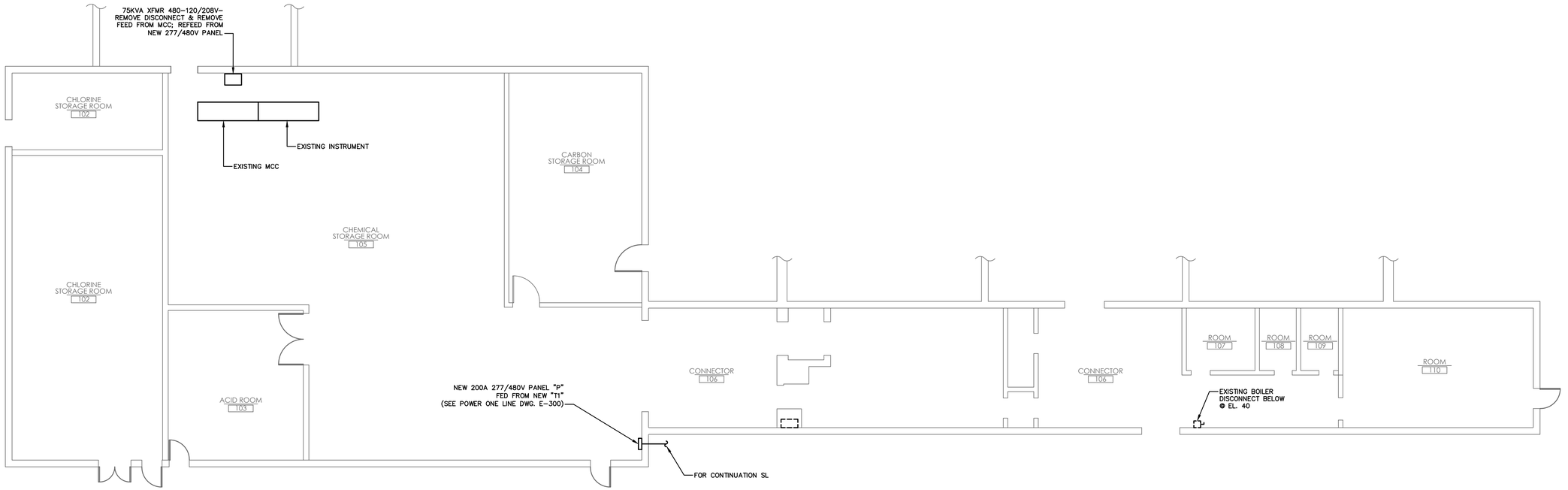
ELECTRICAL SITE PLAN NO. 5

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

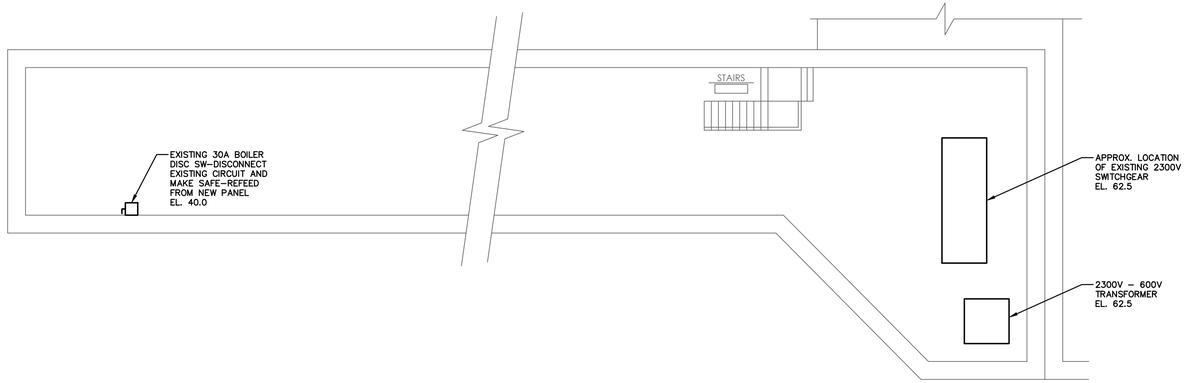
PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-207

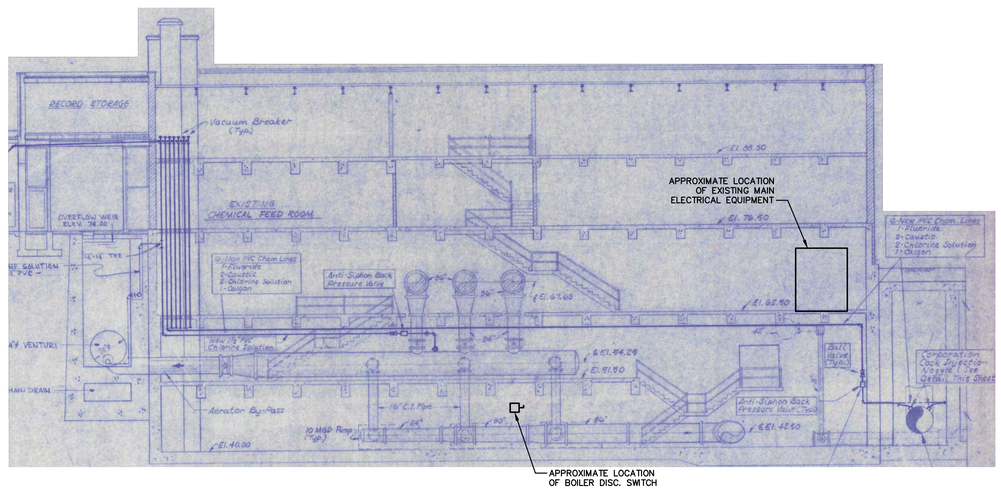
File Path: J:\DWG\P20180576A10\MEP\Electrical\20180576A10_UTL01.dwg Layout: E-207 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
Plotter: NONE CTB File: FO.STB
LAYER STATE:
MS VIEW:



A FIRST FLOOR – EXISTING BUILDING ELEV. 76.5
1/8"= 1'-0" ±



B BOILER AND PUMP ROOM – FLOOR ELEV. 40.0
1/8"= 1'-0" ±



C ABANDONED BUILDING – SECTION VIEW
NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND

SCALE:
HORZ.: 1/8"= 1'-0"±
VERT.:
DATUM:
HORZ.:
VERT.:
1/8" 0 1/8"
GRAPHIC SCALE

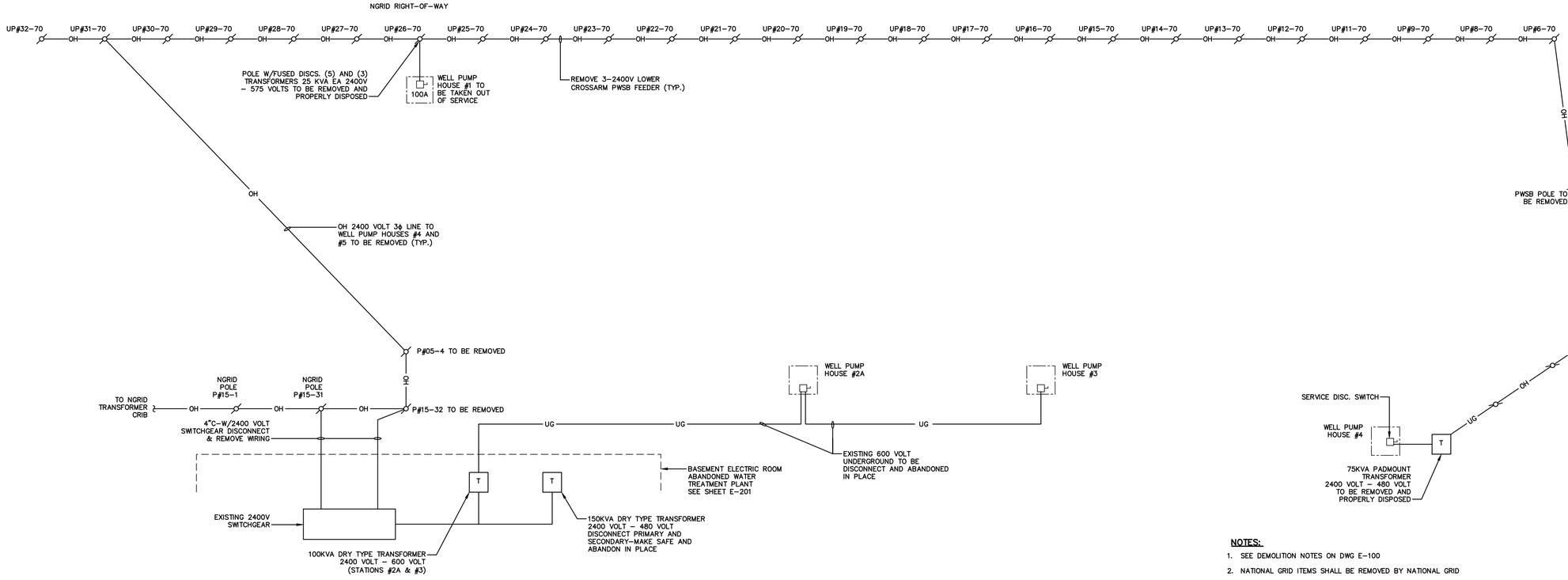
FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ABANDONED WATER TREATMENT PLANT
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-208

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_ELE02_FLR.dwg Layout: E-208 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB



1 EXISTING CONDITIONS/DEMOLITION PLAN

NOT TO SCALE

NOTES:

1. SEE DEMOLITION NOTES ON DWG E-100
2. NATIONAL GRID ITEMS SHALL BE REMOVED BY NATIONAL GRID

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8948
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND
9/25/19

SCALE:
HORZ.: NOT TO SCALE
VERT.:
DATUM:
HORZ.:
VERT.:
GRAPHIC SCALE

FUSS&O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ONE-LINE DIAGRAM
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

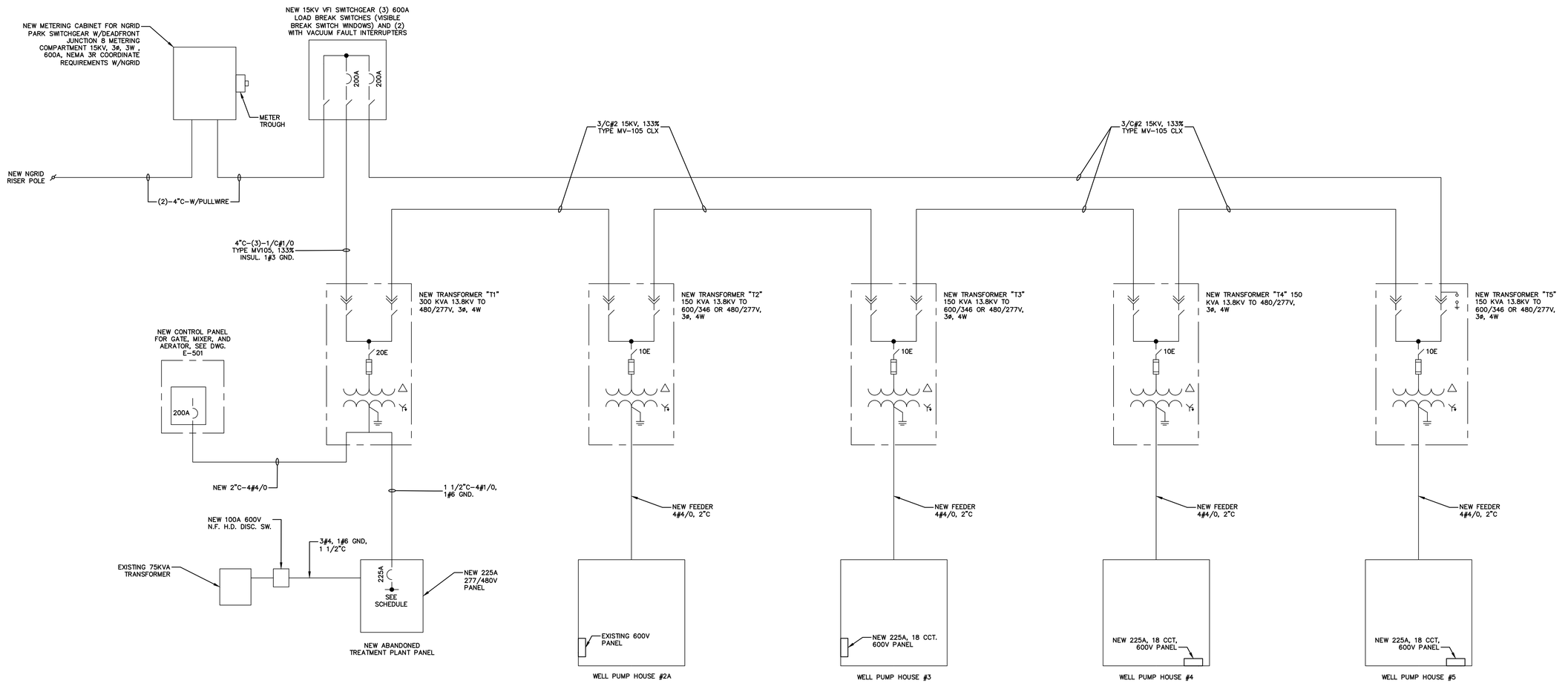
PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-300

File Path: J:\DWG\P\2018\05\76\A10\MEP\Electrical\20180576A10_ELE01.dwg Layout: E-300 Plotted: Fri, April 19, 2019 - 12:29 PM User: strons
MS VIEW: LAYER STATE: Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB

NOTES:

1. FOR GENERAL NOTES AND LEGEND SEE DWG. E-100.
2. PROVIDE NEW SECONDARY SERVICE TO NEW OR EXISTING STATION PANEL.



1 ONE-LINE DIAGRAM
NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN
No. 8946
REGISTERED PROFESSIONAL ENGINEER
STATE OF RHODE ISLAND
9/6/19

SCALE:
HORZ.: NOT TO SCALE
VERT.:
DATUM:
HORZ.:
VERT.:
GRAPHIC SCALE

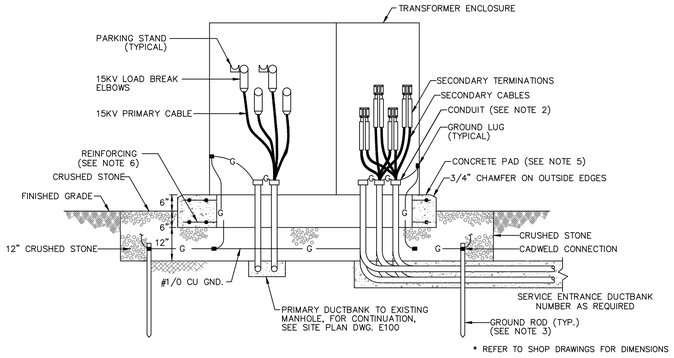
FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
ONE-LINE DIAGRAM
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

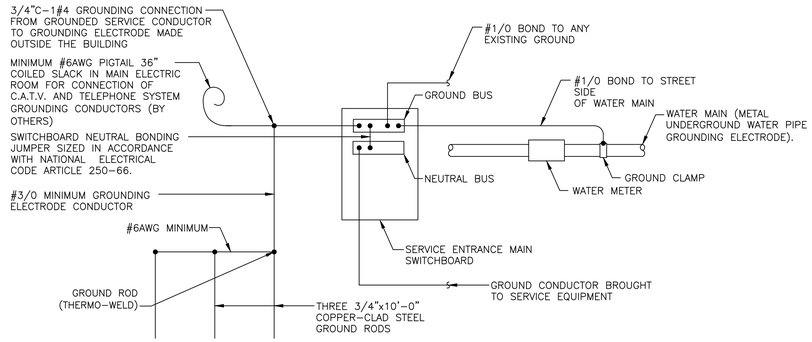
PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-301

File Path: J:\DWG\P2018\0576\A10\MEP\Electrical\20180576A10_ELE01.dwg Layout: E-301 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB

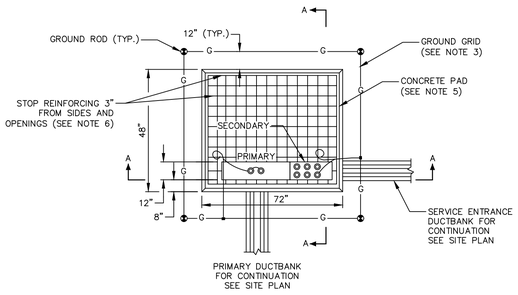


SECTION "A–A"



SYSTEM GROUNDING CONNECTIONS DIAGRAM – TYPICAL ALL SERVICES

SCALE: N.T.S.



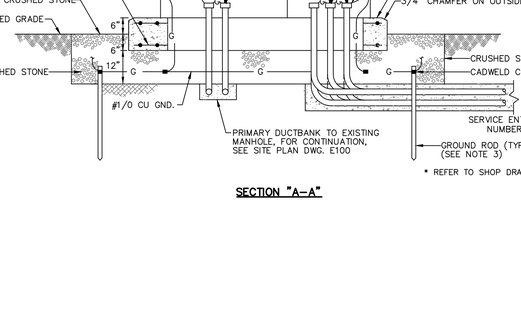
PLAN

TRANSFORMER PAD NOTES:

1. ALL WORK SHALL BE APPROVED BY THE PWSB/ENGINEER
2. CONDUIT – INSTALL AS SHOWN BEFORE SLAB IS POURED. USE 36" RADIUS BENDS, WITH COUPLINGS, NIPPLES AND GROUNDING TYPE BUSHINGS AS REQUIRED. TERMINATE AS SHOWN.
3. GROUND GRID – INSTALL AS SHOWN. INSTALL #1/0, 7–STRAND BARE COPPER WIRE LOOP 1'–0" BELOW GRADE BOND ALL EXPOSED METALLIC CONDUIT AND LEAVE 3'–0" OF SLACK WIRE ABOVE PAD FOR GROUNDING TRANSFORMER AT (2) OPPOSITE POINTS IN THE CABLE CONDUIT OPENING. INSTALL COPPER CLAD STEEL 3/4"ø X 10'–0" GROUND ROD.
4. CRUSHED STONE – SHALL BE COMPACTED AND WETTED JUST BEFORE POURING THE CONCRETE
5. .CONCRETE PAD – INSTALL CONCRETE AS SPECIFIED. ALL EXPOSED EDGES SHALL HAVE A 3/4" CHAMFER. PAD SHALL BE A MINIMUM OF 12" THICK EXACT SIZE OF PAD TO BE VERIFIED WITH SUPPLIED TRANSFORMER DIMENSIONS BEFORE PROCEEDING WITH WORK.
6. REINFORCING SHALL BE #4 GRADE 60 REBARS, 12" O.C. EACH WAY, CONFORMING TO THE LATEST STANDARDS OF ASTM STD. A–615. REINFORCING SHALL BE LOCATED AT THE BOTTOM OF THE SLAB, WITH A MINIMUM OF 3" CLEARANCE FROM THE FACE OF CONCRETE.
7. SLOPE PAD 1% TO EDGE DRAINAGE.
8. EXACT TRANSFORMER PAD DIMENSIONS SHALL BE PER APPROVED SHOP DRAWING.

TYPICAL PADMOUNT TRANSFORMER DETAIL

SCALE: N.T.S.

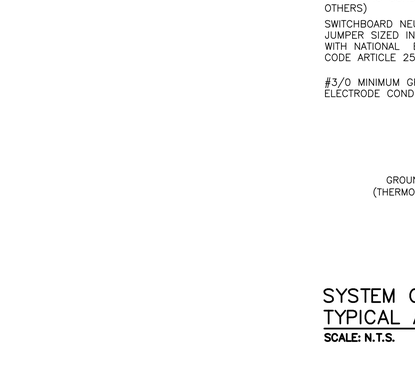


NOTES:

1. ALL DIMENSIONS ARE MINIMUM REQUIREMENTS.

PRIMARY NGRID DUCTBANK SECTION

SCALE: N.T.S.

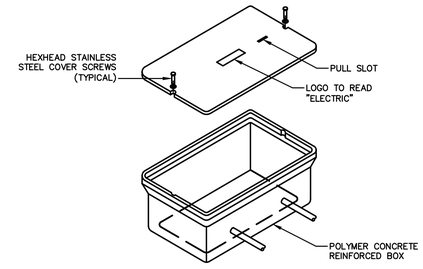


NOTES:

1. ALL DIMENSIONS ARE MINIMUM REQUIREMENTS.
2. CONCRETE ENCASEMENT FOR PRIMARY AND UNDER ROADWAY.

TYPICAL DUCTBANK SECTION

SCALE: N.T.S.

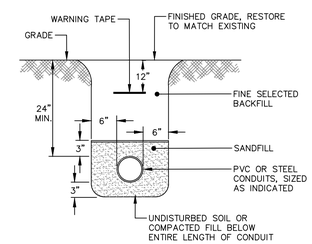


NOTES:

1. SIZE HANDHOLE IN ACCORDANCE WITH NEC 314.30 & 314.28(A).
2. ELECTRIC HANDHOLE COVER TO BE STAMPED "ELECTRIC".
3. HANDHOLE SHALL BE OPEN BOTTOM.
4. CONDUCTORS FROM POSITIVE AND NEGATIVE ARRAYS SHALL NEVER BE LOCATED IN THE SAME HANDHOLE.
5. HANDHOLE SHALL CONFORM TO ANSI/SCTE 77–2010 FOR VEHICULAR LOADING.

TYPICAL HANDHOLE DETAIL

SCALE: N.T.S.

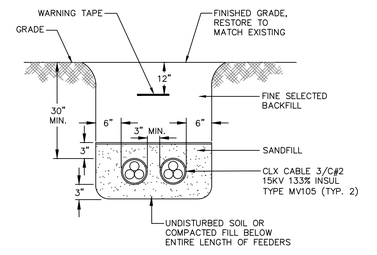


NOTES:

ALL DIMENSIONS ARE MINIMUM REQUIREMENTS.

TYPICAL SINGLE CONDUIT IN TRENCH DETAIL

SCALE: N.T.S.



NOTES:

ALL DIMENSIONS ARE MINIMUM REQUIREMENTS.

TYPICAL MEDIUM VOLTAGE DIRECT BURIED CABLES IN TRENCH DETAIL

SCALE: N.T.S.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8946 REGISTERED PROFESSIONAL ENGINEER STATE OF RHODE ISLAND

SCALE: HORZ.: AS NOTED VERT.:
DATUM: HORZ.: VERT.:
GRAPHIC SCALE 0 1

FUSS&O'NEIL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

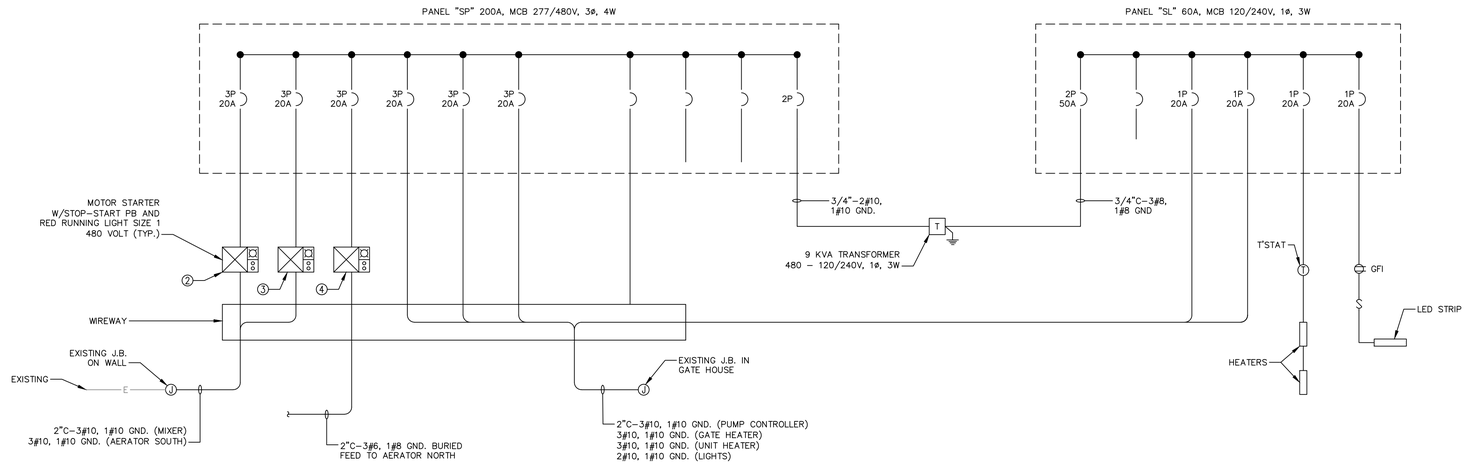
DETAILS

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

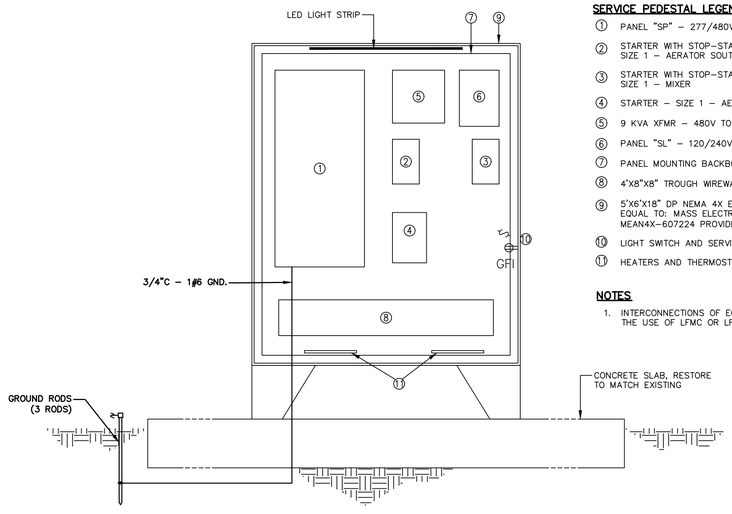
E-500

File Path: J:\DWG\P2018\0576A10\MEP\Electrical\20180576A10_DET01.dwg Layout: E-500 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB



SERVICE PEDESTAL – ONE-LINE DIAGRAM

SCALE: N.T.S.



SERVICE PEDESTAL LEGEND

1. PANEL "SP" – 277/480V, 200 AMP MCB, 30 POLE
2. STARTER WITH STOP-START P.B. & RED LED RUN LT – SIZE 1 – AERATOR SOUTH
3. STARTER WITH STOP-START P.B. & RED LED RUN LT – SIZE 1 – MIXER
4. STARTER – SIZE 1 – AERATOR NORTH
5. 9 KVA XFMR – 480V TO 240/120V
6. PANEL "SL" – 120/240V, 6 50A MCB 12 POLE
7. PANEL MOUNTING BACKBOARD W/2 COATS ENAMEL PAINT
8. 4'X8"X8" TROUGH WIREWAY CONDUITS
9. 5'X6'X18" DP NEMA 4X ENCLOSURE STAINLESS STEEL EQUAL TO: MASS ELECTRICAL APPARATUS CAT# MEAN4X-607224 PROVIDE W/STRIP HTR & TSTAT
10. LIGHT SWITCH AND SERVICE RECEPTACLE
11. HEATERS AND THERMOSTAT

NOTES

1. INTERCONNECTIONS OF EQUIPMENT SHALL BE MADE WITH THE USE OF LFMC OR LFNC. NO EXPOSED WIRING WITHIN.

SERVICE PEDESTAL INTERIOR ELEVATION

SCALE: N.T.S.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

KEVIN M. SULLIVAN No. 8948 REGISTERED PROFESSIONAL ENGINEER ELECTRICAL 5/6/19

SCALE: HORZ.: AS NOTED VERT.: DATUM: HORZ.: VERT.: GRAPHIC SCALE 0 1

FUSS&O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

DETAILS

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

E-501

File Path: J:\DWG\P2018\05\76A10\MEP\Electrical\20180576A10_DET01.dwg Layout: E-501 Plotted: Fri, April 19, 2019 - 12:29 PM User: sirons
MS VIEW: LAYER STATE: Plotter: AUTOCAD PDF (GENERAL DOCUMENTATION).PC3 CTB File: FO.STB

LEGEND

21	EXISTING CONTOUR
20	PROPOSED CONTOUR
	WATTLES
	UTILITY POLE
PD	PRIMARY DISTRIBUTION CABLE
E	UNDERGROUND ELECTRIC
PE	PRIMARY UNDERGROUND DUCTBANK
25.00	PROPOSED SPOT GRADE
	EXISTING TREE LINE
	PROPOSED CLEARING LIMIT
S	EXISTING SEWER

ABBREVIATIONS

GENERAL

APPROX	APPROXIMATE
BIT.	BITUMINOUS PAVEMENT
BW	BOTTOM OF WALL
CC	CONCRETE CURB
CCB	CAPE CODE BERM
ELEV	ELEVATION
EXIST	EXISTING
GC	GRANITE CURB
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
PCC	PRE CAST CONCRETE CURB
PROP	PROPOSED
REM	REMOVE
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
R&S	REMOVE AND STACK
TOS	TOP OF SLOPE
TW	TOP OF WALL
TYP	TYPICAL
VGC	VERTICAL GRANITE CURB

GENERAL NOTES

1. EXISTING CONDITIONS:
   A. SURVEY:
   PROPERTY BOUNDARY AND TOPOGRAPHICAL INFORMATION WERE OBTAINED FROM A SET OF PLANS ENTITLED, "EXISTING CONDITIONS SURVEY, PAWTUCKET WATER WELL FIELD POWER AND DISTRIBUTION SYSTEM UPGRADE", PREPARED BY ALPHA SURVEY GROUP, LLC., DATED DECEMBER 27, 2018.

   B. FLOOD ZONE:
   THE SUBJECT SITE LIES WITHIN ZONE A, AN AREA SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD, AND ZONE X, AN AREA OUTSIDE OF 0.2% ANNUAL CHANCE FLOOD, PER FLOOD INSURANCE RATE MAP (FIRM) PANEL NUMBERS 44007C0192G AND 44007C0194J (EFFECTIVE DATE MARCH 2, 2009), TOWN OF CUMBERLAND, RI.

   C. UTILITIES:
   THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE.

2. SITE WORK:
   A. CEMENT CONCRETE SIDEWALKS:
   ALL PORTLAND CEMENT CONCRETE USED IN THE CONSTRUCTION OF THE CEMENT CONCRETE SIDEWALKS SHALL BE CLASS XX AND CONFORM TO THE REQUIREMENTS AS SET FORTH IN SUBSECTIONS 601.01.1 AND 601.03.1 OF THE LATEST EDITION OF THE RHODE ISLAND DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

   B. LANDSCAPE AREAS:
   ALL SURFACED AREAS OR DISTURBED AREAS NOT SPECIFIED ON THE PLANS SHALL RECEIVE FOUR (4) INCHES OF TOPSOIL, SEED, MULCH, AND SHALL BE WATERED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.

GENERAL CONSTRUCTION REQUIREMENTS

1. THE CONTRACTOR SHALL VERIFY THE PROPOSED LAYOUT WITH ITS RELATIONSHIP TO THE EXISTING SITE SURVEY. THE CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS, SITE CONDITIONS, AND MATERIAL SPECIFICATIONS AND SHALL NOTIFY THE OWNER AND ENGINEER OF ANY ERRORS, OMISSIONS OR DISCREPANCIES BEFORE COMMENCING OR PROCEEDING WITH WORK.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, INSPECTIONS, BONDS, AND OTHER APPROVAL–RELATED ITEMS WITH THE TOWN OF CUMBERLAND AND THE STATE OF RHODE ISLAND. CONSTRUCTION SHALL NOT COMMENCE UNTIL SUCH PERMITS HAVE BEEN SECURED AND UNTIL THE CONTRACTOR HAS SUPPLIED THE REQUIRED NOTICES. THE OWNER HAS SECURED THE CUMBERLAND SOIL EROSION AND SEDIMENT CONTROL PLAN PERMIT AND THE RIDEM REQUEST FOR PRELIMINARY DETERMINATION.
3. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF IMPROVEMENTS FOR THIS PROJECT SHALL CONFORM TO THE CURRENT CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE RHODE ISLAND DEPARTMENT OF TRANSPORTATION.
4. DEVIATIONS OR CHANGES FROM THESE PLANS WILL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER/OWNER.
5. THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE ANY EXISTING UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF NECESSARY. THE EXISTENCE AND/OR LOCATION OF UTILITIES SHOWN ON THESE PLANS MAY BE ONLY APPROXIMATELY CORRECT, AND THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN HEREON AND ANY OTHER EXISTING UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING, AT HIS/HER EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.
6. ALL WATER, GAS, SEWER AND OTHER UTILITY SERVICES SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
7. RELOCATION OF ANY UTILITIES SHALL BE AT THE OWNER'S EXPENSE AND COMPLETED WITH THE UTILITY WORK. PRIOR TO THE START OF CONSTRUCTION THE OWNER SHALL BE NOTIFIED OF THE RELOCATIONS REQUIRED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING, WITH MATCHING MATERIALS, ANY PAVEMENT, WALKS, CURBS, ETC. THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.
9. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE.
9. CALL DIG–SAFE 811 OR 1–888–DIG–SAFE A MINIMUM OF 72 HOURS, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
11. THE STATE OF RHODE ISLAND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2010 EDITION, REVISIONS AND ALL CURRENT ADDENDA, AND THE RHODE ISLAND STANDARD DETAILS ARE MADE A PART HEREOF, AS IF ATTACHED HERETO.
12. THE CONTRACTOR SHALL REMOVE VEGETATION AS REQUIRED TO COMPLETE THE WORK. CONTRACTOR SHALL IDENTIFY TREES TO BE REMOVED PRIOR TO CONSTRUCTION AND MARK THEM WITH CONSTRUCTION TAPE FOR REVIEW BY THE OWNER. CONTRACTOR SHALL NOT REMOVE TREES UNTIL REVIEWED AND APPROVED BY THE OWNER.
13. THE CONTRACTOR SHALL RESTORE DISTURBED AREAS TO ORIGINAL CONDITION. AREAS DAMAGED DURING CONSTRUCTION SHALL BE RESODDED, RESEEDED, OR OTHERWISE RESTORED TO THEIR ORIGINAL STATE. TREES AND OTHER EXISTING VEGETATION SHALL BE RETAINED WHEREVER FEASIBLE. ALL PAVED SURFACES SHALL BE SAW–CUT AND CONCRETE WALKS SHALL BE REMOVED AND RESTORED TO THE NEXT EXISTING JOINT.
14. THE LIMITS OF ALL CLEARING AND DISTURBANCE SHALL BE MINIMIZED AND SHALL BE WITHIN THE PROPOSED AREA OF CONSTRUCTION. AREAS OUTSIDE OF CONSTRUCTION LIMITS SHALL NOT BE DISTURBED.
15. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, AND DEBRIS SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
16. ALL WORK IS TO TAKE PLACE ON OR ABUTTING PROPERTIES OWNED OR CONTROLLED BY THE CITY OF PAWTUCKET ACTING THROUGH THE PAWTUCKET WATER SUPPLY BOARD. ALL OPERATIONS AND ACTIVITIES SHALL BE CONFINED TO THE LIMITS AS DEPICTED ON THE DRAWINGS.
17. CONTRACTOR IS HEREBY PUT ON NOTICE THAT THE PROJECT SITE CONTAINS ACTIVE PUBLIC WATER SUPPLY FACILITIES AND OTHER UTILITY INFRASTRUCTURE. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS AND EMPLOY ADEQUATE MEANS AND METHODS TO ENSURE THE SAFETY AND INTEGRITY OF THESE FACILITIES AND INFRASTRUCTURE AS WELL AS ABUTTING PROPERTIES TO THE SITES CONTAINING STRUCTURES.
18. THE CONTRACTOR SHALL MAINTAIN A SET OF RECORD AS BUILT DRAWINGS OF UTILITIES AND STRUCTURES TO BE SUBMITTED TO OWNER AT THE END OF PROJECT.
19. PRIOR TO BIDDING THE PROJECT AND BEGINNING ANY WORK THE CONTRACTOR SHALL VISIT THE PROJECT SITE FOR INSPECTION TO VERIFY AND DOCUMENT EXISTING CONDITIONS. ANY NOTED DISCREPANCIES BETWEEN THE DRAWINGS AND ACTUAL FIELD CONDITIONS THAT AFFECT THE PROPOSED WORK SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE OWNER.
20. THE LOCATIONS OF PROPOSED EQUIPMENT, UTILITY LINES AND RELATED APPURTENANCES SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR AND APPROVED BY THE OWNER.
21. CONTRACTOR SHALL PROVIDE ADEQUATE MEANS AND METHODS OF SITE ACCESS TO AUTHORIZED PERSONNEL OF THE OWNER DURING THE COURSE OF THE PROJECT FOR PURPOSES OF NORMAL OPERATION AND MAINTENANCE OF THE WATER SYSTEM.
22. ALL WORKMANSHIP AND MATERIALS / EQUIPMENT SHALL BE GUARANTEED FOR ONE YEAR FROM DATE OF START UP AND OPERATION.

WATERSHED PROTECTION/ FRESHWATER WETLANDS

1. CONTRACTOR SHALL COMPLY WITH THE SITE–SPECIFIC SOIL EROSION AND SEDIMENT CONTROL PLAN.
2. ACCESS TO SENSITIVE ENVIRONMENTAL AREAS SHALL BE RESTRICTED. LOCATE ALL CONSTRUCTION EQUIPMENT AND MATERIALS AWAY FROM REGULATED AREAS.
3. MINIMIZE THE AREA AND DURATION OF DISTURBANCE WITHIN REGULATED AREAS, INCLUDING PERIMETER WETLANDS. MINIMIZE USE OF HEAVY EQUIPMENT IN REGULATED AREAS AND USE THE SMALLEST EQUIPMENT PRACTICAL THAT IS NECESSARY TO COMPLETE THE SCOPE OF WORK.
4. REFUELING OF VEHICLES AND EQUIPMENT SHALL BE CONDUCTED A MINIMUM OF 200 FEET FROM ALL WETLANDS AND WATER COURSES. A SIGN SHALL BE POSTED WITH SPILL RESPONSE PROCEDURES AND LOCAL FIRE OFFICIALS AND RIDEM INCIDENT RESPONSE PHONE NUMBERS.
5. ALL DEMOLITION DEBRIS, HAZARDOUS MATERIALS AND OTHER MATERIALS SHALL BE PLACED IN CONTAINERS AND REMOVED OFF SITE AS THE WORK PROGRESSES.
6. MAINTENANCE AND SERVICING OF VEHICLES AND EQUIPMENT AT THE PROJECT SITE IS NOT PERMITTED.
7. A SUPPLY OF ABSORBENT SPILL RESPONSE MATERIAL E.G. BOOMS, BLANKETS, ETC. SHALL BE AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES IN THE EVENT OF A RELEASE OF HAZARDOUS MATERIALS.

REFERENCE: RIGIS AERIAL IMAGERY, DATED 2014.

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SHAWN M. MARTIN — No. 7487 — REGISTERED PROFESSIONAL ENGINEER (CIVIL) — STATE OF RHODE ISLAND

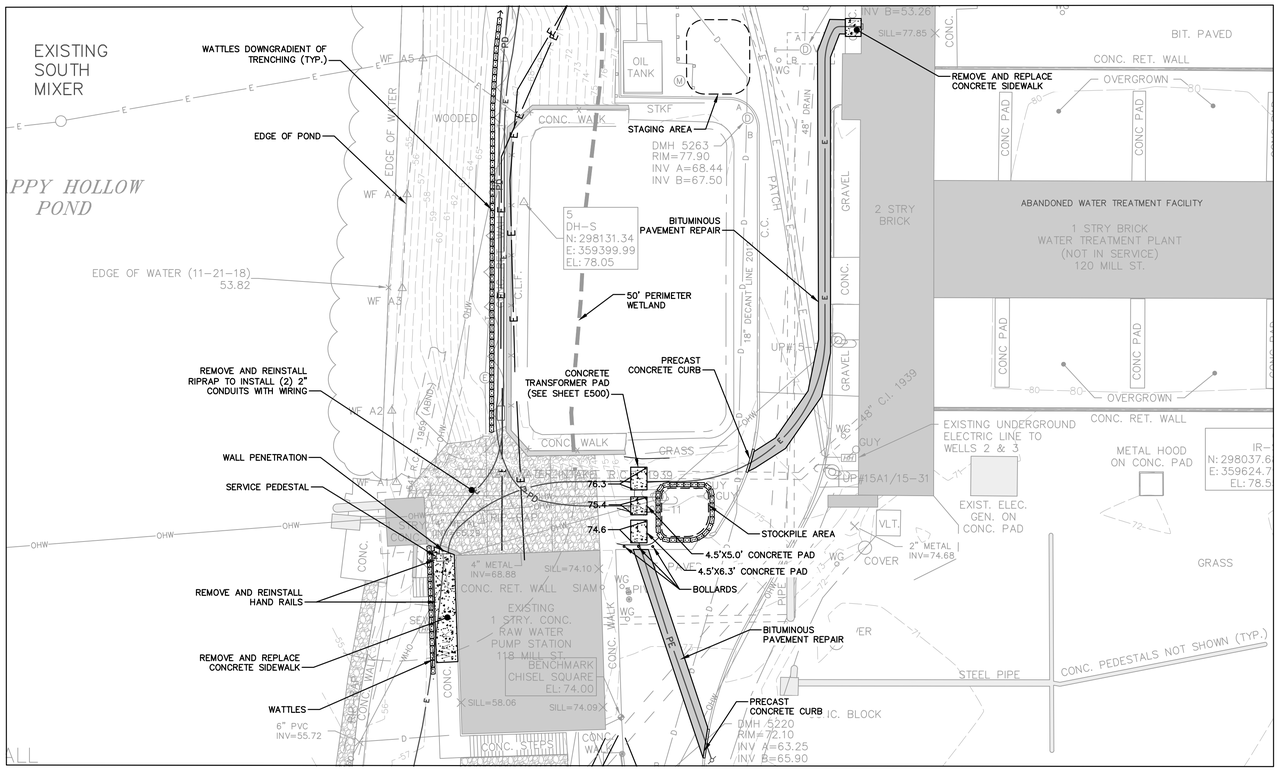
SCALE: HORZ.: 1"= 200' VERT.:
DATUM: HORZ.: NAD83 VERT.: NAVD88
GRAPHIC SCALE 200 0 200

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD
CIVIL INDEX PLAN, NOTES, & LEGEND
BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

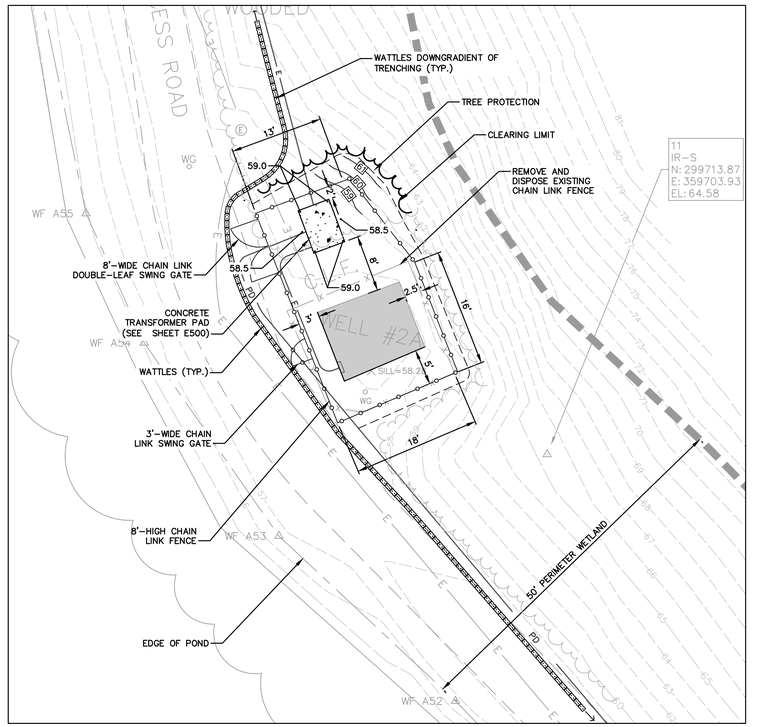
PROJ. No.: 20180576.A10
DATE: APRIL 2019

CS-200



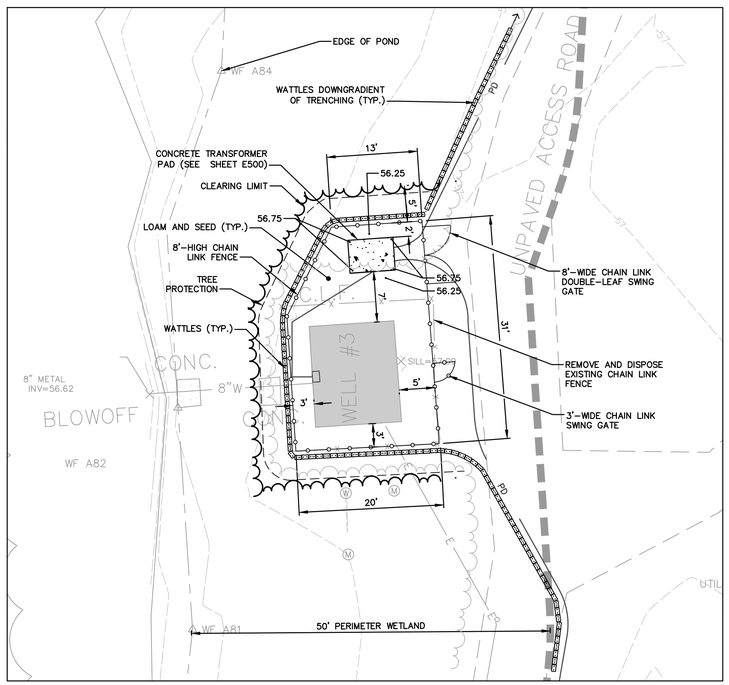
EXISTING RAW WATER PUMP STATION

SCALE: 1"= 20'



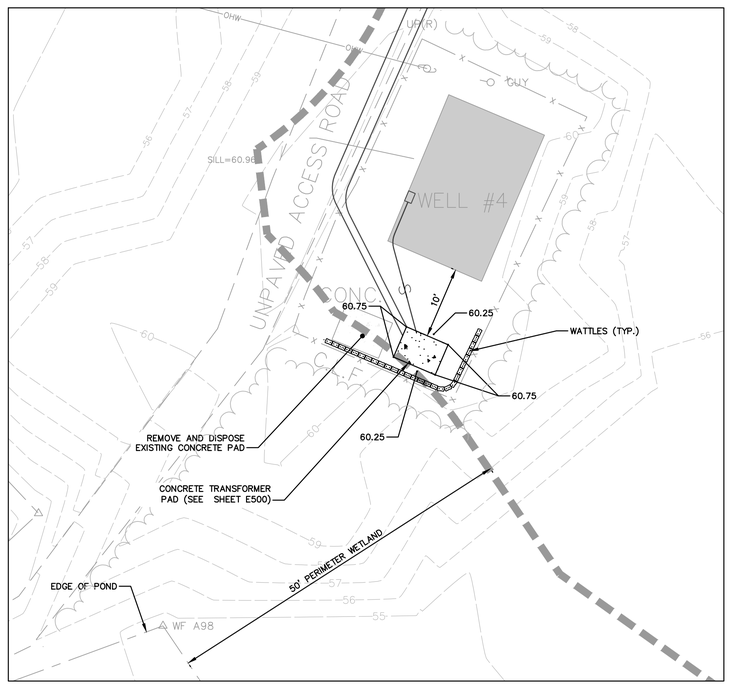
EXISTING WELL PUMP HOUSE #2A

SCALE: 1"= 10'



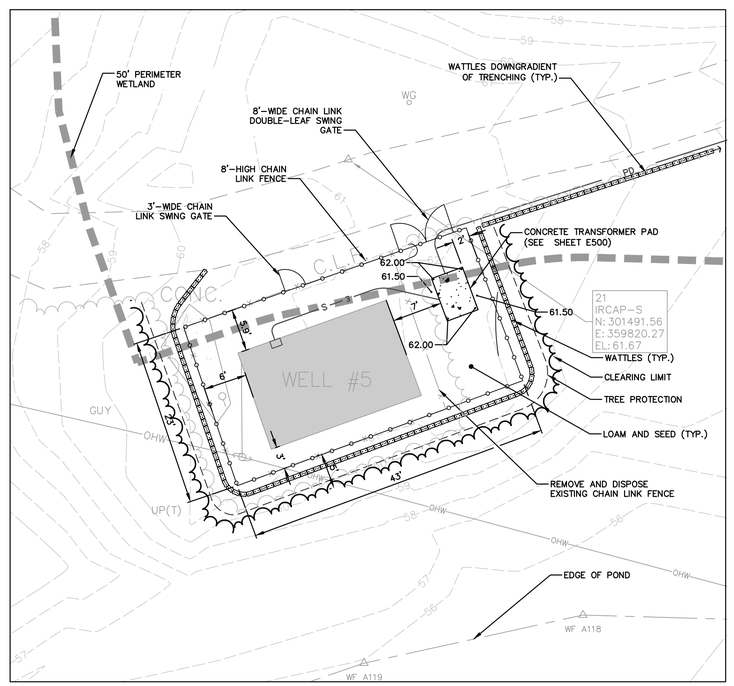
EXISTING WELL PUMP HOUSE #3

SCALE: 1"= 10'



EXISTING WELL PUMP HOUSE #4

SCALE: 1"= 10'



EXISTING WELL PUMP HOUSE #5

SCALE: 1"= 10'

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SHAWN M. MARTIN
No. 7487
REGISTERED PROFESSIONAL ENGINEER (CIVIL)
STATE OF RHODE ISLAND

SCALE:
HORZ.: AS NOTED
VERT.:
DATUM:
HORZ.: NAD83
VERT.: NAVD88
0
GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

SITE PLAN ENLARGEMENTS

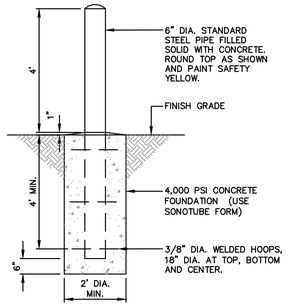
BID No. 18-011 WELL FIELD ELECTRICAL POWER AND DISTRIBUTION SYSTEM UPGRADE

120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

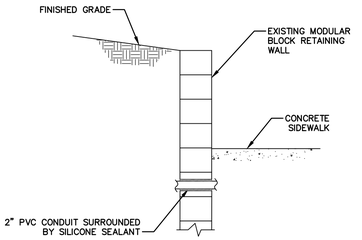
CS-201

File Path: J:\DWG\P2018\0576\A10\Civil\Plan\20180576A10_STP01.dwg Layout: CS-201 Plotted: Fri, April 19, 2019 - 9:47 AM User: cviera
MS VIEW: LAYER STATE: Plotter: NONE CTB File: FO.STB



BOLLARD

NOT TO SCALE

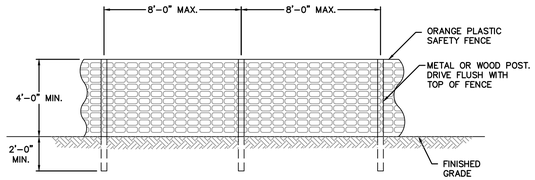


NOTE:

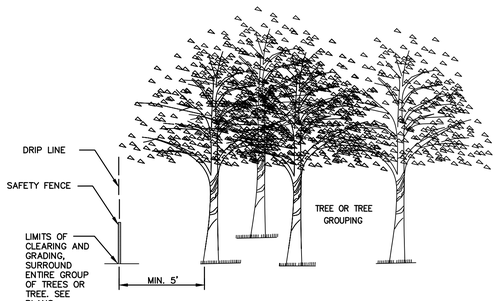
EACH WALL PENETRATION SHALL BE CORED THROUGH A SEPARATE MODULAR BLOCK UNIT.

WALL PENETRATION

NOT TO SCALE

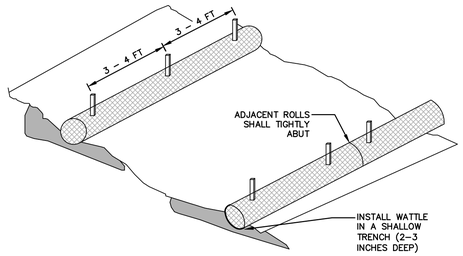


SAFETY FENCE

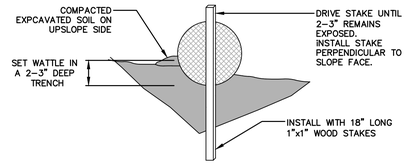


TREE PROTECTION

NOT TO SCALE



INSTALLATION



ENTRENCHMENT

NOTES:

1. WATTLES SHALL BE TRENCHED APPROXIMATE 2-3 INCHES AND STAKED SUCH THAT WATTLES DIRECTLY CONTACT SOIL AND PRECLUDE UNDERMINING OR BLOWOUTS. THE TRENCH SHALL BE APPROXIMATELY 9 INCHES WIDE. STAKES SHALL BE DRIVEN THROUGH THE CENTER OF THE WATTLE AT A SPACING OF 3-4 FEET ON CENTER AND NO GREATER THAN 6' FROM THE EACH END OF THE WATTLE. STAKES SHALL BE 1-INCH BY 1-INCH WOODEN STAKES WITH A LENGTH OF 18 INCHES. COMPACT SOIL EXCAVATED TO CREATE TRENCH ON UPHILL SIDE SIDE.
2. ENDS OF ADJACENT WATTLES SHALL BE TIGHTLY BUTTED OR OVERLAPPED SO THAT NO OPENING EXISTS FOR WATER TO PASS THROUGH. WATTLES SHALL BE FREE OF DAMAGE OR DEFECTS WHEN DELIVERED TO THE SHIPPER. NO VEHICLES SHALL BE DRIVEN OVER WATTLES.
3. WATTLES SHALL BE 12-INCH SEDIMAX-SW12™ MANUFACTURED BY NORTH AMERICAN GREEN, OR APPROVED EQUAL.

WATTLES

NOT TO SCALE

EROSION CONTROL

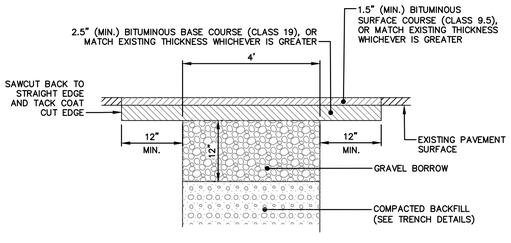
1. DISTURBANCE OF SOIL SURFACES IS REGULATED BY STATE LAW AND LOCAL ORDINANCE. ALL WORK SHALL COMPLY WITH THE FOLLOWING CRITERIA TO PREVENT OR MINIMIZE SOIL EROSION.
2. THE INSTALLATION AND MAINTENANCE OF EROSION CONTROL DEVICES IS THE RESPONSIBILITY OF THE CONTRACTOR. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL INSTALL ALL EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLAN, OR AS DIRECTED BY THE OWNER OR OWNERS REPRESENTATIVE.
3. THE CONTRACTOR SHALL USE THE LATEST EDITION OF THE "STATE OF RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK" IN CONSTRUCTING THE EROSION AND SEDIMENT CONTROLS INDICATED ON THE PLANS. ALL EROSION AND SEDIMENT CONTROL MEASURES OR WORKS AND REHABILITATION MEASURES MUST CONFORM TO OR EXCEED THE SPECIFICATIONS OR STANDARDS SET OUT IN THIS HANDBOOK.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE TIMELY INSTALLATION, INSPECTION, MAINTENANCE, AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF PERMANENT MEASURES UNTIL CONSTRUCTION OF THE PROJECT IS COMPLETED OR UNTIL IT IS ACCEPTED BY THE OWNER. THE OWNER IS RESPONSIBLE THEREAFTER.
5. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CLEAN ROADS, CONTROL DUST, AND TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SITE AND ALL ROADS BE MAINTAINED IN A MUD- AND DUST-FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, WATER AND/OR CRUSHED STONE OR COARSE GRAVEL, SUBJECT TO THE APPROVAL OF THE ENGINEER.
7. THE CONTRACTOR SHALL INSTALL AND MAINTAIN PERIMETER SEDIMENT CONTROL BARRIERS AS SHOWN ON THE SITE PLANS AND AS REQUIRED TO PREVENT SEDIMENT FLOW TO STORM DRAINS, SURFACE WATERS, AND REGULATED AREAS. PERIMETER CONTROLS SHALL REMAIN IN EFFECTIVE CONDITION UNTIL UP-GRADIENT DISTURBED AREAS HAVE BEEN STABILIZED. REMOVE ACCUMULATED SEDIMENT BEHIND PERIMETER SEDIMENT CONTROL BARRIERS WHEN ONE-HALF THE ORIGINAL HEIGHT OF THE BARRIER BECOMES FILLED WITH SEDIMENT. REPLACE BARRIER IMMEDIATELY IF BARRIER DECOMPOSED OR BECOMES INEFFECTIVE. REMOVE PERIMETER CONTROLS AT THE COMPLETION OF CONSTRUCTION AND DISPOSE OFFSITE.
6. SEDIMENT CONTROL FOR UTILITY CONSTRUCTION AREAS OUTSIDE OF DESIGNED CONTROLS.
   A. FOR TRENCH EXCAVATIONS, EXCAVATED TRENCH MATERIALS SHALL BE PLACED ON HIGH SIDE OF THE TRENCH. WHERE SITE CONSTRAINTS REQUIRE PLACEMENT OF EXCAVATED MATERIALS DOWN-GRADIENT OF TRENCH EXCAVATIONS, WATTLES SHALL BE PLACED DOWN-GRADIENT OF WORK.
   B. WATTLES SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF DISTURBED AREAS WITHIN THE 50-FOOT PERIMETER WETLAND AND AREAS INTENDED TO REMAIN DISTURBED FOR MORE THAN ONE (1) DAY.
7. STOCKPILES FOR CONSTRUCTION DEBRIS AND MATERIALS SHALL BE, TO THE EXTENT PRACTICAL, LOCATED OUTSIDE WETLAND AREAS AND ASSOCIATED BUFFERS AND SHALL BE SURROUNDED BY STAKED HAY BALES OR WATTLES.
8. INSTALL AND MAINTAIN SEDIMENTATION TRAPS WITHIN THE LIMIT OF SURFACE DISTURBANCE, AS REQUIRED FOR CONTROL OF DEWATERING FLOWS. NO WATERS HANDLED DURING THE CONSTRUCTION PROCESS SHALL BE DISCHARGED DIRECTLY INTO REGULATED AREAS.
9. TEMPORARY VEGETATIVE COVER SHALL BE APPLIED TO ANY DISTURBED AREAS (INCLUDING SOIL STOCKPILE AREAS) THAT HAVE NOT YET REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED, UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS. TEMPORARY SEEDING MAY BE APPLED ANYTIME BETWEEN MARCH 1 THROUGH JUNE 15 AND AUGUST 15 THROUGH OCTOBER 1.

   THIS TEMPORARY VEGETATIVE COVER SHALL CONSIST OF 60% OF ANNUAL OR PERENNIAL RYEGRASS AND 40% OF MILLET OR SUDANGRASS OR 100% OF WINTER RYE. ANNUAL OR PERENNIAL RYEGRASS SHALL BE PLANTED AT A RATE OF 1.5 POUNDS PER 1,000 SQUARE FEET, WINTER RYE SHALL BE PLANTED AT A RATE OF 2.5 POUNDS PER 1,000 SQUARE FEET, AND MILLET OR SUDANGRASS SHALL BE PLANTED AT A RATE OF 1.0 POUND PER 1,000 SQUARE FEET.

   LIMESTONE AND FERTILIZER SHALL BE APPLIED ACCORDING TO SOIL TEST RECOMMENDATIONS OFFERED BY THE UNIVERSITY OF MASSACHUSETTS SOIL TESTING LABORATORY. IF SOIL TESTING IS NOT FEASIBLE ON SMALL OR VARIABLE SITES, OR WHERE TIMING IS CRITICAL, FERTILIZER MAY BE APPLIED AT THE RATE OF 300 POUNDS PER ACRE OR 7.5 POUNDS PER 1,000 SQUARE FEET OF 10-10-10 OR EQUIVALENT. APPLY LIMESTONE (EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDE) AS FOLLOWS: (1) 3 TONS PER ACRE (OR 135 POUNDS PER 1,000 SQUARE FEET) FOR CLAY, CLAY LOAM AND HIGH ORGANIC SOIL, (2) 2 TONS PER ACRE (OR 90 POUNDS PER 1,000 SQUARE FEET) FOR SANDY LOAM, LOAM, OR SILT LOAM, AND (3) 1 TON PER ACRE (OR 45 POUNDS PER 1,000 SQUARE FEET) LOAMY SAND OR SAND. TEMPORARY VEGETATIVE COVER SHALL BE INSTALLED AS OUTLINED IN THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK.
10. AREAS WHICH HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHALL BE MULCHED IMMEDIATELY FOLLOWING SEEDING IN ADDITION TO AREAS WHICH CANNOT BE SEEDED WITHIN THE RECOMMENDED SEEDING DATES AND ANY SOIL STOCKPILE AREAS. TEMPORARY MULCHING SHOULD BE PERFORMED AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS.

    ALL MULCHES MUST BE INSPECTED PERIODICALLY, IN PARTICULAR AFTER RAINSTORMS, TO CHECK FOR RILL EROSION. WHERE EROSION IS OBSERVED, ADDITIONAL MULCH MUST BE APPLIED. IF NETTING IS USED, THE NET SHALL BE INSPECTED AFTER RAINSTORMS FOR DISLOCATION OR FAILURE. IF WASHOUTS OR BREAKAGE OCCUR, THE NET MUST BE REINSTALLED AS NECESSARY AFTER REPAIRING DAMAGE TO SLOPE. INSPECTIONS SHALL TAKE PLACE UNTIL GRASSES ARE FIRMLY ESTABLISHED. GRASS IS CONSIDERED TO BE FIRMLY ESTABLISHED AT A MINIMUM HEIGHT OF THREE (3) INCHES.

    STRAW OR HAY MULCH, WOOD FIBER MULCH, AND HYDROMULCH ARE RECOMMENDED. STRAW OR HAY MULCH SHOULD BE APPLIED AT A RATE OF 2 TONS PER ACRE, WOOD FIBER MULCH SHOULD BE APPLIED AT A RATE OF 1,500-2,000 POUNDS PER ACRE, OR HYDROMULCH APPLIED AT A RATE OF 1,500 POUNDS PER ACRE. WOOD FIBER MULCH SHOULD NOT BE USED ALONE IN THE WINTER OR DURING HOT, DRY WEATHER. STRAW OR HAY MULCH MUST BE ANCHORED IMMEDIATELY AFTER SPREADING TO PREVENT WINDBLOWING. MULCH ANCHORING SHOULD ALSO BE USED ON SLOPES GREATER THAN THREE (3) PERCENT AND CONCENTRATED FLOW AREAS SUCH AS DIVERSION AND WATERWAY CHANNELS.
11. IF PERMANENT OR TEMPORARY SEEDING CANNOT BE COMPLETED IMMEDIATELY OR WITHIN THE RECOMMENDED SEEDING DATES, USE THE TEMPORARY MULCHING MEASURE TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.
12. ANY EXISTING OR PROPOSED STORMWATER DRAINAGE STRUCTURES THAT MAY BE SUBJECT TO SEDIMENTATION SHALL BE PROTECTED WITH STAKED HAYBALES, SILT FENCE, SILT SACKS, OR OTHER APPROVED MEASURES THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD.
13. ALL EXCESS EXCAVATED MATERIALS, EXCESS FILL, EXCESS CONSTRUCTION MATERIALS, AND DEBRIS SHALL BE REMOVED FROM THE SITE AND SHALL BE DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS.
14. WASTE DISPOSAL: MATERIALS WHICH COULD BE A POTENTIAL SOURCE OF STORMWATER POLLUTION SUCH AS GASOLINE, DIESEL FUEL, HYDRAULIC OIL, ETC., SHALL BE STORED AT THE END OF EACH DAY IN A STORAGE TRAILER OR COVERED LOCATION AND TAKEN OFF-SITE AND PROPERLY DISPOSED OF. ALL TYPES OF WASTE GENERATED AT THIS SITE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH STATE LAW AND/OR REGULATIONS.
15. CONTROL OF ALLOWABLE NON-STORMWATER DISCHARGES: IF ALLOWABLE NON-STORM WATER DISCHARGES ARE OCCURRING AT THE SITE, SUCH DISCHARGES SHALL BE VISUALLY OBSERVED AND RECORDED AS OUTLINED BELOW AND IN ACCORDANCE WITH PART II OF THE RIPDES GENERAL PERMIT. THE LIST OF EXPECTED SOURCES OF ALLOWABLE NON-STORM WATER DISCHARGES FOR THIS PROJECT ARE AS FOLLOWS: (1) DISCHARGE FROM VEHICLE WASHDOWN WHERE NO DETERGENTS ARE USED, (2) EXTERNAL BUILDING WASHDOWN WHERE NO DETERGENTS ARE USED, (3) THE USE OF WATER TO CONTROL DUST, (4) FIRE HYDRANT FLUSHINGS, (5) LAWN WATERING, (6) POTABLE WATER SOURCES INCLUDING WATERLINE FLUSHINGS, (8) IRRIGATION DRAINAGE, (9) PAVEMENT WASHWATERS WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE NOT OCCURRED (UNLESS ALL SPILLED MATERIALS HAVE BEEN REMOVED) AND WHERE NO DETERGENTS ARE USED, AND (10) FOUNDATION OR FOOTING DRAINS WHERE FLOWS ARE NOT CONTAMINATED WITH PROCESS SUCH AS SOLVENTS OR CONTAMINATED BY CONTACT WITH SOILS WHERE SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAS OCCURRED.
16. GOOD HOUSEKEEPING: THE PROJECT SITE SHALL PROVIDE FOR THE MINIMIZATION OF EXPOSURE OF CONSTRUCTION DEBRIS (INCLUDING, BUT NOT LIMITED TO, INSULATION, WIRING, PAINTS AND PAINT CANS, SOLVENTS, WALL BOARD, ETC.) TO PRECIPITATION BY MEANS OF DISPOSAL AND/OR PROPER SHELTER OR COVER. CONSTRUCTION WASTE MUST BE PROPERLY DISPOSED OF IN ORDER TO AVOID EXPOSURE TO PRECIPITATION AT THE END OF EACH WORKING DAY.

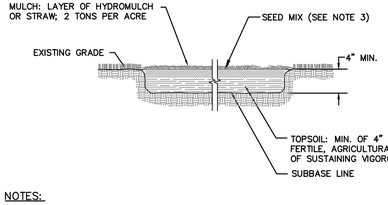


NOTE:

UNSUITABLE MATERIAL WITHIN SUBGRADE SHALL BE REMOVED AND REPLACED WITH GRAVEL BORROW.

BITUMINOUS PAVEMENT REPAIR

NOT TO SCALE

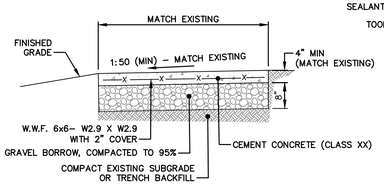


NOTES:

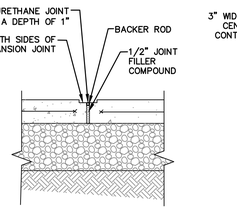
1. REUSE SURFACE SOIL STOCKPILED ON-SITE. VERIFY SUITABILITY OF STOCKPILED SURFACE SOIL TO PRODUCE TOPSOIL. CLEAN SURFACE SOIL OF ROOTS, PLANTS, SOD, STONES, CLAY LUMPS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH.
   1.1. SUPPLEMENT WITH IMPORTED OR MANUFACTURED TOPSOIL FROM OFF-SITE SOURCES WHEN QUANTITIES ARE INSUFFICIENT, OBTAIN TOPSOIL DISPLACED FROM NATURALLY WELL-DRAINED CONSTRUCTION OR MINING SITES WHERE TOPSOIL OCCURS AT LEAST 4 INCHES DEE.
2. TOPSOIL SHALL CONFORM TO ASTM D5268, WITH PH BETWEEN 5.5 AND 7, A MINIMUM OF 6 PERCENT ORGANIC MATERIAL CONTENT, FREE OF STONES 0.5-INCH OR LARGER AND FREE OF OTHER EXTRANEOUS MATERIALS. SHALL NOT BE OBTAINED FROM AGRICULTURAL LAND, BOGS, OR MARSHES.
3. SEED MIXES SHALL BE AS FOLLOWS:
   3.1. WOODED AREAS AND 50' PERIMETER WETLAND SHALL BE SEEDED WITH NEW ENGLAND WETLAND PLANTS, INC., "NEW ENGLAND CONSERVATION/WILDLIFE MIX".
   3.2. EXISTING LAWN AREAS SHALL BE SEEDED WITH "NO-MOW GRASS" MIX BY PRAIRIE NURSERY.

LOAM AND SEED

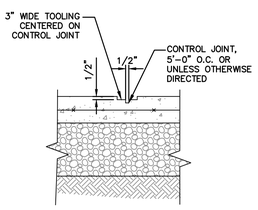
NOT TO SCALE



SECTION



EXPANSION JOINT



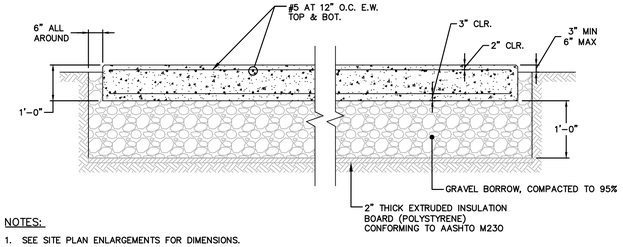
CONTROL JOINT

NOTES:

1. PROVIDE EXPANSION JOINTS WITH 1/2" PREMOLDED JOINT FILLER AND EXPANSION JOINT SEALANT AT MIN. 20 FT. O.C. AND AT FACE OF BUILDINGS OR FIXED OBJECTS.
2. PROVIDE TOOLED CONTROL JOINTS AT 5' O.C.
3. FINISH SHALL MATCH EXISTING.
4. UNSUITABLE MATERIAL WITHIN SUBGRADE SHALL BE REPLACED WITH GRAVEL BORROW.

CONCRETE SIDEWALK

NOT TO SCALE

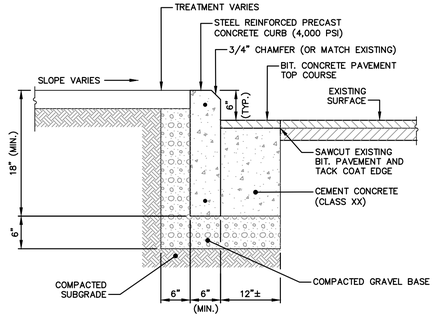


NOTES:

1. SEE SITE PLAN ENLARGEMENTS FOR DIMENSIONS.
2. ALL CONCRETE WORK SHALL CONFORM TO ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS".
3. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60 AND BE DETAILED IN ACCORDANCE WITH ACI 315 "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES".
4. ALL REINFORCING BARS SHALL BE CONTINUOUS AND LAPPED A MINIMUM OF 48 BAR DIAMETERS AT ALL SPLICES, CORNERS, AND INTERSECTIONS UNLESS NOTED OTHERWISE.
5. ALL CONCRETE SHALL DEVELOP A COMPRESSIVE STRENGTH OF 4,000 PSI IN 28 DAYS. CONCRETE SHALL HAVE A MAXIMUM AGGREGATE SIZE OF 3/4 INCH, A MINIMUM CEMENT CONTENT OF 560 LBS/CU. YD., AND A MAXIMUM SLUMP OF 4 INCHES.
6. ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A 3/4 INCH CHAMFER UNLESS NOTED.
7. SIZES AND LOCATIONS OF ALL REQUIRED EMBEDDED ITEMS, SUCH AS ANCHOR BOLTS, PIPING SLEEVES, HOLDOWN ANCHORS, ETC., SHALL BE COORDINATED WITH THE ELECTRICAL PLANS.

CONCRETE PAD

NOT TO SCALE



PRECAST CONCRETE CURB

NOT TO SCALE

No.	DATE	DESCRIPTION	DESIGNER	REVIEWER

SHAWN M. MARTIN — No. 7487 — STATE OF RHODE ISLAND — REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SCALE: HORZ.: AS NOTED VERT.:
DATUM: HORZ.: VERT.:
0 GRAPHIC SCALE

FUSS & O'NEILL
317 IRON HORSE WAY, SUITE 204
PROVIDENCE, RI 02908
401.861.3070
www.fando.com

PAWTUCKET WATER SUPPLY BOARD

SITE DETAILS

BID No. 18-011 WELL FIELD ELECTRICAL
POWER AND DISTRIBUTION SYSTEM UPGRADE
120 MILL STREET CUMBERLAND, RHODE ISLAND

PROJ. No.: 20180576.A10
DATE: APRIL 2019

CD-501

File Path: J:\DWG\P2018\05776A10\Civil\Plan\20180576A10_STP01.dwg Layout: CD-501 Plotted: Fri, April 19, 2019 - 9:47 AM User: cvivera
Plotter: NONE CTB File: FO.STB
LAYER STATE:
MS VIEW: