CITY OF PAWTUCKET

REQUEST FOR PROPOSALS

RFP #27-004

Parkside Pump Station & Pinecrest Pump Station Improvements

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1.0 - Bid/Solicitation Information

Schedule

Pre-Bid/Proposal Conference: ☐ No ☒ Yes

November 18, 2026 @ 11:00 AM

******* Non-Mandatory *******

Location:

250 Armistice Blvd.
Pawtucket, RI 02860

Requests for Further Information:

November 27, 2026 @ 4:00 PM

Requests for information or clarification must be made electronically to the attention of:

Eric Hammerschlag, City Engineer
E-mail: ehammerschlag@pawtucketri.gov

AND

Chris Cronin, P.E., Project Manager

Email: ccronin@BETA-inc.com

BETA Group, Inc.

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

Addendum Issued:

December 2, 2026

RFP Submission Deadline:

December 10, 2026 at 12:00 PM

Late submittals will not be considered.

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

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

Bids will be publicly opened on December 10, 2026 at 4:00 PM during a scheduled Purchasing Board meeting. Please note that the bid opening will be held at 100 Freight Street, Pawtucket, RI.

Bonds/Surety Required

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 five percent (5%) of the bid price.

Bonds Required:

Bid Bond: ☐ No ☒ Yes

Fidelity Bond: ☒ No ☐ Yes

Performance and Payment Bond: ☐ No ☒ Yes
(Submit upon award of contract)

Bidder is required to provide a performance and payment bond as outlined in the City's General Terms & Conditions of Purchase (Appendix B of this RFP) in an amount not less than one hundred percent (100%) of the bid price.

The successful bidder will be required to furnish all insurance documentation as outlined in the attached Purchasing Rules & Regulations and General Terms & Conditions of Purchase.

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.

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 RFP 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

- It is the vendor's responsibility to examine all specifications and site 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 vendors/Bidders must register with SAM.gov. No Bids can be accepted without an active registration. All Sub-contractors must be registered as well. SAM.gov Entity ID# must be provided.
- 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 RFP deadline.
- Prior to the proposal deadline established for this RFP, 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 proposal shall be made after the RFP deadline.
- 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.**
- At the time and place fixed for the opening of Bids, the Owner will cause to be opened and publicly read aloud every Bid received within the time set for receiving Bids, irrespective of any irregularities therein. Bidders and other persons properly interested may be present, in person or by representative.
- It is intended that an award pursuant to this Request 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 proposal.

- Bidders are advised that all materials submitted to the City of Pawtucket for consideration in response to this Request for Proposals 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 RFP shall become the property of the City of Pawtucket upon delivery to the Purchasing Agent.
- Bids will be opened publicly at a regularly scheduled purchasing board meeting, the date of which is the same as the RFP submission deadline provided in Section 1.0.
- Interpretations or Addenda: No oral interpretation will be made to any Bidder as to the meaning of the Contract Documents or any part thereof. Every request for such an interpretation shall be made in writing to the City of Pawtucket (hereinafter called the "Owner"). Any inquiry received seven or more days prior to the date fixed for opening of Bids will be given consideration. Every interpretation made to a Bidder will be in the form of an Addendum to the Contract Documents, and when issued, will be on file in the office of the Owner at least five days before Bids are opened. Addenda will be issued on the City's Website. It is the bidder's responsibility to check the site for up-to-date addenda and question responses. All such Addenda shall become part of the Contract and all Bidders shall be bound by such Addenda, whether or not received by the Bidders.

- Each Bidder shall, upon request of the Owner, submit a detailed financial statement on a form furnish by the Owner for that purpose. The Owner shall have the right to take such steps as it deems necessary to determine the ability of the Bidder to perform his obligations under the Contract and the Bidder shall furnish the Owner all such information and data for this purpose as it may request. The right is reserved to reject any Bid where an investigation of the available evidence or information does not satisfy the Owner that the Bidder is qualified to carry out properly the terms of the Contract**.**

3.0 - Overview

3.1 Project Overview

The project consists of the retrofitting and rehabilitation of two existing sewer pumping stations. A summary of the work included in this project is as follows:

1. Provision and installation of wastewater bypass pumping systems.
2. Demolition of the existing pump stations.
3. Provision & Installation of new submersible sewage pumps, valves, piping, top slabs with hatches and structural walls.
4. Provision & Installation of new electrical control panel enclosures, wet well junction boxes & pole mounted light fixtures.
5. Provision & Installation of new generator and generator pad. (Pinecrest)
6. Provision of a portable generator. (Parkside)

Other work at each pump station location includes installation of electrical conduit and wiring to & from the new electrical enclosure, wet well and lighting fixture. In addition, installation of force main piping modifications and restoration of project area are also included within this contract. Restoration includes but is not limited to new chain link fence, gate, grass pavers and pavement as shown on the plans.

3.1.1 Project Funding

This project is funded through the City's Sewer Bond.

3.2 Project Background

The purpose of this project is to retrofit the existing pump stations to improve accessibility, safety, and operational reliability while maintaining the existing service capacity. The existing stations each serve a portion of the local sanitary sewer collection system and are responsible for conveying wastewater from a low-lying service area to the downstream gravity sewer system. Due to the constrained layouts and the existing submersible pump configurations, maintenance personnel currently face restricted access to pumps, piping, and electrical components within the wet well and control areas. This limited accessibility increases maintenance difficulty, prolongs service operations, and may contribute to operational risks during emergency repairs or pump failures.

In addition to accessibility concerns, the existing pumps at both stations operate at a flow rate that results in velocities within the force main that are below the generally recommended threshold of approximately 3 ft/s.

Upon completion, the rehabilitated pump stations will provide improved maintainability and operational performance while continuing to serve the surrounding sewer collection system effectively. The project is made possible by funds from the City of Pawtucket through the City's Sewer Bond allocations. The administration of the construction of the project will be managed by the City of Pawtucket & BETA Group, Inc.

4.0 - Scope of Work

4.1 Location

The locations of the proposed construction activities ("the Project") are shown on the Site Plans Issued for Bid included in this RFP as Appendix G. In general terms, the location of the Project can be described as follows:

- Parkside Pump Station: Within the right of way, adjacent to the Ten Mile River between residential properties 52 Stafford Street and 143 Parkside Avenue.
- Pinecrest Pump Station: Within the PLAT 1B LOT 290, adjacent to the Ten Mile River between residential properties 142 Crest Drive and 150 Crest Drive.

4.2 General Requirements

4.2.1 Project Schedule

- Bids Due and Opening Date: 12/10/26 (refer to noted submission times in this RFP)
- Project Award: 1/14/2027
- Project Begins: 1/28/2027
- Substantial Completion: 12/17/2027
- Final Completion: 12/31/2027

4.2.2 Hours of Work

The Contractor shall be permitted to work on-Site from 7:00 AM to 5:30 PM, Monday through Friday. The Contractor may be permitted to work during extended hours outside of this time, but only upon receipt of the DPW's express written authorization.

4.2.3 Pricing

UNIT PRICES: The unit price for each of the several items in the Proposal of each Bidder shall include its pro rata share of overhead and profit so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price Bid represents the Total Bid. The price submitted for items requiring a lump sum Bid shall also include all overhead and profit and represents the total Bid. Any Bid not conforming to this requirement may be rejected as unresponsive. Special attention of all Bidders is called to this provision, for should conditions make it necessary to revise the quantities or unit price, no limit will be fixed for such increased or decreased quantities nor extra compensation allowed, provided the net monetary value of all such additive and subtractive changes in quantities of such items or work (i.e., difference in cost) shall not increase or decrease the original contract price by more than twenty-five percent (25%) except for work not covered in the Contract Documents.

4.2.4 Prevailing Wage Requirements

Bidders are advised that payment of the local prevailing wage, as established by the Rhode Island Department of Labor and Training, is a requirement of this project, as outlined in Appendices B & H. A copy of the current prevailing wage decision is included in

this document as Appendix C. Where a contract will be entered pursuant to competitive bidding procedures, a modification, notice of which is published on the Wage Determination web site at https://sam.gov/content/home; or in the Federal Register less than 10 days before the opening of bids shall be effective unless the agency finds that there is not a reasonable time still available before bid opening to notify bidders of the modification and a report of the finding is inserted in the contract file. Bidders are expected to account for the prevailing wage rates applicable to this project in the formulation of their bid.

All contractors and sub-contractors are required to use the Rhode Island Certified Weekly Payroll and the RI Statement of Compliance form. Use of company payroll forms or other state (MA, CT, etc.) forms is not acceptable. Only employees of the contractor should be listed on the RI Certified Weekly Payroll forms. Subcontractors must do their own separate RI Certified Weekly Payroll form listing all of their workers working on the Prevailing Wage job-site.

Federal forms may be used for Department of Transportation projects only. However, if a complaint is being investigated, the DLT will require the contractor under investigation to resubmit the requested payroll information on the Rhode Island Certified Weekly Payroll form for all hours worked on that Department of Transportation project being investigated.

4.2.5 Payment Requisitions

The Contractor shall prepare draft requisitions for payment for the Project Engineer's review and approval and revise the requisitions as necessary prior to submission to the Owner. Payment requisitions shall be prepared using AIA Standard Forms G702 and G703.

The Owner reserves the right to withhold 5% of each progressive request for payment as retainage. The Owner shall release retainage payments per the terms outlined in Section 12.0 of this RFP.

4.2.6 Experience

The City will require all general contractors and subcontractors have a minimum of 5 years' experience doing similar type of work. This experience should be listed in the form supplied in Section 11 and or attach a separate sheet listing your company's experience and that of subcontractors performing work.

4.3 Scope Detail

The scope of work is defined comprehensively in the Technical Specifications and Plans issued for bid, which are incorporated into this RFP as Appendices F and G, respectively.

In general terms, the Project includes, but is not limited to, the following construction activities:

- Mobilize project sites and provide controls as necessary to ensure public safety and facilitate construction;
- Maintenance and further installation of erosion and sediment control devices;

- Provision and installation of wastewater bypass pumping systems;
- Removal and proper disposal of existing unclassified material including saw cutting, pavement, concrete;
- Complete required demolition and construction of improvements to modify existing Pump Stations into new submersible stations;
- Provision and installation of structural cast in place concrete walls & associated formwork;
- Provision and installation of new submersible sewage pumps and all associated electrical work and appurtenances;
- Provision and installation of new 4” ductile iron sewage force main to the limits shown on the plans;
- Provision and installation of new Pump Station Top Slabs with vents and hatches;
- Provision and installation of new Pump Station electrical equipment and enclosures;
- Provision and installation of new chain link fence and gates;
- Provision and installation of new generator and equipment pad (Pinecrest);
- Provision of portable generator and connection cable (Parkside);
- Bituminous concrete pavement cut and repair;
- Pavement patching and replacement;
- Loam installation for disturbed areas within the site;
- Grass Paver installation (Pinecrest);
- Management and disposal of all excess soil generated during construction;
- Demobilize and final cleanup of the site including removal of remaining erosion and sediment control devices and any remaining sediment, pavement sweeping;

5.0 - Insurance

The vendor shall maintain and keep in force such comprehensive general liability insurance as shall protect them from claims which may arise from operations under any contract entered into with the City of Pawtucket, whether such operations be by themselves or by anyone directly or indirectly employed by them.

The amounts of insurance shall be not less than $1,000,000.00 combined single limit for any one occurrence covering both bodily injury and property damage, including accidental death.

The City of Pawtucket shall be named as additional insured on the vendor's General Liability Policy.

The vendor shall maintain and keep in force such Workers' compensation insurance limits as required by the statutes of the State of Rhode Island, and Employer's Liability with limits no less than $500,000.

The vendor shall maintain and keep in force such Automobile Liability Insurance Combined Single Limit not less than $1,000,000 each occurrence for bodily Injury and property damage including non-owned and/or hired vehicle coverage.

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 attorneys 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 Insureds 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

All bids must be submitted on the forms supplied in Section 11.0 and shall be subject to all requirements of the Contract Documents, including these instructions to bidders. All bids must be regular in every respect and no interlineations, excisions or special conditions shall be made or included in the Bid Form by the Bidder. Pricing must include all costs as specified in this solicitation.

The Owner may consider as irregular any Bid on which there is an alteration of or departure from the Bid Form hereto attached and at its option may reject the same.

Bid Documents, including the Bid, the Bid Bond, the Non-Collusion Affidavit, the Anti-Kickback Acknowledgment, and the Statement of Bidder's Qualifications (if requested) shall be enclosed in a sealed envelope which shall be clearly labeled with the words, **"Parkside Pump Station & Pinecrest Pump Station Improvements, RFP #27-004**", as well as name of Bidder, and date of bid opening.

All Bid Forms must be signed.

If the Contract is awarded, it will be awarded by the Owner to a responsible Bidder on the basis of the lowest qualified bid price and the selected Alternative Bid items, if any.

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 RFP, 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 RFP, please list their name(s), contractor license #, address and phone number, and specific description of the subcontract work to be performed. See Proposed Subcontractors form. Subcontractors will be required to list their experience doing similar work that are contracted to do.

Two (2) copies of your proposal—one (1) original hard copy and one digital (1) copy on thumb drive or similar format—must be submitted at the time of submission. Proposals must be in the following format

Bid Form (Section 11 *"ENTIRE SECTION")*
Anti-Kickback Acknowledgement (Appendix A)
Company overview
- Length of time your firm has been in business
- Length of time at current address

All licensing (List types and business license number(s)), certification and permits as required in the Scope of Work

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 RFP.

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 Vendor who submits a proposal in response to this RFP and to award a contract based upon the results of those negotiations alone. The City reserves the right to consider as unqualified to do the work of general construction any Bidder who does not habitually perform with his own forces the major portions of the work involved in construction of the Improvements embraced in this Contract.

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.

Proposals will be evaluated in three (3) 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 RFP.
2. The second phase is an in-depth analysis and review based on criteria below and their associated weights.

Evaluation Criteria	Importance
Experience/Qualifications	20%
References	10%
Price	70%

3. The third is a comparison of each proposal's weighted evaluation relative to the costs proposed.

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.

For purposes of evaluating the bid, The City will use the price referenced above in Evaluation Criteria as the price noted in Section 11 Bid Form, which will be the base bid plus ALL alternates if any, and allowances. The City will select alternates as the budget allows.

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 City reserves the right to pay the selected Vendor via credit card at its sole discretion.

11.0 – Bid Form

RFP #27-004 – Parkside Pump Station & Pinecrest Pump Station Improvements

Date: _____

Submitted By: _____

(Include Name, Address and Telephone No.) _____

_____

_____

Tel._____ Email _____

Name and remittance address that will appear on invoices:	Physical address of business:
_____	_____
_____	_____
_____	_____
_____	_____

General Information

Is your firm a sole proprietorship doing business under a different name? ____Yes _____ No

If yes, please indicate sole proprietorship, a name, and the name you are doing business under.

_____

_____

Is your firm incorporated? ____Yes _____ No

Will any of the work spelled out in this bid be outsourced? ____Yes _____ No

If so, please explain below:

_____

_____

_____

Have you or your firm been subject to suspension, debarment or criminal conviction by the City of Pawtucket, the State of Rhode Island, or any other jurisdiction?
Yes: _____ No: _____

Have the City of Pawtucket and/or the State of Rhode Island ever terminated contracts with your firm for cause?
Yes: _____ No: _____

Has your firm ever withdrawn from a contract with the City of Pawtucket and/or the State of Rhode Island during its performance?
Yes: _____ No: _____

Have you or your firm been involved in litigation against the City of Pawtucket and/or the State of Rhode Island.
Yes: _____ No: _____

If you answered yes to any of the foregoing, please explain the circumstances below. If you or your firm has been involved in litigation against the City of Pawtucket and/or the State of Rhode Island, please include the case caption, case number and status. (If more space is needed, please attach separate sheet and submit with the bid.)

_____

_____

_____

Is your company bonded? Yes ____ No ____

Please describe the nature and extent of all insurance coverage:

_____

_____

_____

Addenda

The following Addenda have been received. The noted modifications to the Bidding Documents have been considered and all costs are included in the Bid Sum.

Addendum #1, Dated:_____

Addendum #2, Dated:_____

Addendum #3, Dated:_____

References

Please list at least four (4) companies with whom you have contracted to provide similar services. Preferably, references should be municipalities which are of approximate size as the City of Pawtucket, and a website address should be included if available.

Reference #1

Company Name: _____

Contact Person: _____ Telephone #: _____

Contract Dates: _____ To _____

Website Address: _____

Reference # 2

Company Name: _____

Contact Person: _____ Telephone #: _____

Contract Dates: _____ To _____

Website Address: _____

Reference # 3

Company Name: _____

Contact Person: _____ Telephone #: _____

Contract Dates: _____ To _____

Website Address: _____

Reference # 4

Company Name: _____

Contact Person: _____ Telephone #: _____

Contract Dates: _____ To _____

Website Address: _____

Pricing Proposal

RFP #27-004

Parkside Pump Station and Pinecrest Pump Station Improvements

1.00 OFFER:

A. Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by BETA Group, Inc. and the City of Pawtucket, we, the undersigned, hereby offer to enter into a Contract to perform the Work, **RFP #27-004 – Parkside Pump Station & Pinecrest Pump Station Improvements,** for the amount indicated below, subject to the additions and deductions according to the terms of the Contract Documents and as stated below. The undersigned will provide all necessary and proper material, machinery, equipment, facilities, and means to complete the Work.

B. The undersigned hereby understands that the City of Pawtucket (Owner) has the right to reject any and all bids and to award the contract in the best interests of the Owner. The Owner reserves the right to award the entire project or delete portions of the work to funds available, whichever is in the best interest of the Owner.

C. The undersigned also understands that the contract must be carried out in strict accordance with the contract documents.

D. Total Price below should include Base Bid Items 1-5 and allowances.

Total Price: ……. U. S. Dollars,
(amount in words)

($.....) in lawful money of the United States of America and,
(in figures)

We have included herewith, the unit price bid forms, bid alternates information, and the required security deposit or Bid Bond as required by the Instruction to Bidders.

For purposes of evaluating the bid, the price noted above will be the base bid plus ALL alternates. The City will select alternates as the budget allows.

In the event of a discrepancy between the unit price and the extended price (quantity multiplied by unit price) entered by the Bidder, the **unit price shall govern**. The extended price and total bid will be corrected by the Owner to reflect the product of the unit price and the quantity stated in the Bid Form. The corrected total shall be used in determining the lowest responsive and responsible bidder.

BASE BID

BID ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT BID PRICE	TOTAL COST
1	Parkside Pump Station Improvements	LS	1	_____	_____
				_____	_____
2	Pinecrest Pump Station Improvements	LS	1	_____	_____
				_____	_____
3	Management of Excess Soil	LS	1	_____	_____
				_____	_____
4	Disposal of Excess Soil CATEGORY I	TON	10	_____	_____
				_____	_____
5	Disposal of Excess Soil CATEGORY II	TON	10	_____	_____
				_____	_____

TOTAL BASE BID _____

TOTAL BASE BID IN WORDS _____

Note: The sum of Total Base Bid shown above and all Allowances (1 – 7) shall match Total Price shown on the first page of this bid form. All project costs including labor, equipment, materials, overhead, and profit to complete the Work shall be included. Refer to Appendix F – Specification Section 01025 for a description of the bid items listed above as well as additional information.

1.01 ALLOWANCES:

Allowances are not included in the Total Base Bid but are included in the Total Price. The Bidder agrees to carry the quantities of materials listed below for the duration of the contract. The Owner reserves the right to remove these items from the contract totally or in part and to adjust the contract sum to reflect the actual costs of the construction authorized by the Owner.

ALLOWANCE NO. 1 Allowance for Removal of Unsuitable Material: An allowance of Ten-Thousand Dollars ($10,000.00) shall be provided to address this item. This allowance is intended to cover costs associated with the removal and disposal of unsuitable material, such as defective gravel base, brick, stone mortar, blocks, cobblestone, curbing, concrete footing and other waste debris that is not scheduled for removal under the other sections of the specifications. The Contractor shall contact the Engineer/Owner's Representative in the event unsuitable material is encountered. Unsuitable material shall not be removed from the site without inspection and approval by the Owner's Representative. Removal requires certification of quantities by the Contractor. The Contractor shall provide documentation of the days and manhours required. The amount reimbursed will be the amount that is stated on the Time & Materials receipt(s). Unused allowance for unsuitable material removal shall be reimbursed to the Owner.

$ 10,000.00 — Lump Sum

Ten Thousand dollars — In Words

ALLOWANCE NO. 2 Furnish and Install Clean Gravel Borrow Fill: An allowance of Ten-Thousand Dollars ($10,000.00) shall be provided to address this item. This allowance is intended to cover costs associated with furnishing and installing clean gravel fill. Clean gravel fill shall only be used when additional fill material is required upon the removal of unsuitable material. The Contractor shall provide documentation of the material cost and manhours required. Clean gravel fill shall not be installed without inspection and approval by the Owner's Representative. Upon approval of the excavation, the Contractor shall backfill all excavated areas to the proposed line and grade using clean gravel borrow fill. Fill shall be clean of foreign matter, vegetative matter, and organic of compressible soils. All imported clean fill found to be contaminated shall be removed from the site and replaced with clean fill at the Contractor's expense. Installation requires certification of quantities by the Contractor. The amount reimbursed will be the amount that is stated on the Time & Materials receipt(s). Unused allowance for unsuitable material removal shall be reimbursed to the Owner.

$ 10,000.00	Ten Thousand dollars
Lump Sum	In Words

ALLOWANCE NO. 3 Permit Allowance: A permit allowance of Four-Thousand Dollars ($4,000.00) shall be provided to address this item. The Contractor shall be responsible for payment of all permit fees and shall request reimbursement thru payment requisitions. The Contractor shall provide documentation that the permit fees have been paid prior to reimbursement. The amount reimbursed will be the amount that is stated on the permit receipt(s). Unused allowances not expended for permitting shall be reimbursed to the Owner.

$ 4,000.00	Four Thousand Dollars
Lump Sum	In Words

ALLOWANCE NO 4. Materials Testing Services: An allowance of Fifteen Thousand ($15,000.00) shall be provided to address this item. The Contractor shall be responsible for reviewing proposed work operations with the Engineer/Owner's Representative and shall coordinate and ensure the Owner the ability to request or conduct tests of materials utilized on the site. The amount reimbursed will be the amount that is stated on the testing receipt(s). Unused allowances not expended for Materials Testing Services shall be reimbursed to the Owner.

$ 15,000.00	Six Thousand dollars
Lump Sum	In Words

ALLOWANCE NO 5. Police Detail for Traffic Protection: An allowance of Five-Thousand Dollars ($5,000.00) shall be provided to address this item. The Contractor shall be responsible for reviewing proposed work operations with the Engineer/Owner's Representative and shall coordinate and ensure the proper police detail is present to maintain orderly traffic flow and provide the necessary traffic protection.
The Contractor shall provide documentation of the days and manhours required. The amount reimbursed will be the amount that is stated on the permit receipt(s). Unused allowances not expended for Police Detail for Traffic Protection shall be reimbursed to the Owner.

$ 5,000.00	Five Thousand dollars
Lump Sum	In Words

ALLOWANCE NO 6. Epoxy Injection Grout: An allowance of Twenty-Thousand ($20,000.00) shall be provided to address this item. The Contractor shall be responsible for reviewing proposed work operations with the Engineer/Owner's Representative and shall coordinate with a licensed water proofing professional to provide and install hydrophobic and/or hydrophilic urethane injection grout as required to seal the existing structure. The amount reimbursed will be the actual amount invoiced by the water proofing contractor. Unused allowances not expended for Epoxy Injection shall be reimbursed to the Owner.

$ 20,000.00	Twenty Thousand dollars
Lump Sum	In Words

ALLOWANCE NO 7. Miscellaneous Utility Relocation: An allowance of Twenty-Thousand ($20,000.00) shall be provided to address this item. This allowance is intended to cover costs associated with proposed modifications to the water, gas and electric service that may result in additional fees from the utility provider. This allowance will NOT include any costs associated with services rendered for routine utility markings, repair damages incurred as a result of the Contractor's operations, relocations of utilities done at the Contractor's request and/or convenience, or any other unauthorized services rendered by utility companies. The Contractor shall be responsible for reviewing proposed work operations with the Engineer/Owner's Representative and shall coordinate all work with respective utility companies or departments to prevent any delay in the work specified to be done under these contract documents. The amount reimbursed will be the actual paid amount invoiced by the authority in question as approved by the Engineer. Unused allowances not expended for Miscellaneous Utility Relocation shall be reimbursed to the Owner.

$ 20,000.00	Twenty Thousand dollars
Lump Sum	In Words

2.00 ACCEPTANCE:

If this Bid is accepted within the time stated in the contract documents, and we fail to commence the Work, the Bid Bond shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the Bid Bond or the difference between this Bid and the Bid upon which the Contract is executed.

In the event our Bid is not accepted within the time stated in the contract documents, the required Bid Bond shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

The City of Pawtucket reserves the right to increase or decrease the quantities stated in the bid at the unit prices quoted.

3.00 BID FORM SIGNATURE(S)

The Corporate Seal of

_____

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

was hereunto affixed in the presence of:

_____

(Authorized signing officer Title)

(Seal)

_____

(Authorized signing officer Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of_____)
) .ss
County of_____)

_____,
being first duly sworn, deposes and says that;

(1) He is_____(owner, partner, officer, representative or agent)_____of

_____, the BIDDER that has submitted the attached bid;

(2) He is fully informed respecting the preparation and contents of the attached Bid and all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said BIDDER nor any of its officers, partners, owners, agents, representatives, employees, or parties in interest, including the affiant, has in any way colluded, conspired or agreed, directly or indirectly, with any other BIDDER, firm or person to submit a collusive or sham bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such a contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other BIDDER, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overhead, profit or cost element of the Bid price or the Bid price of any other BIDDER, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the Local Government or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the BIDDER or any of its agents, representatives, owners, employees or parties in interest including this affiant.

(Signed)_____
_____
(Title)

Subscribed and sworn to before me
This_____Day of_____, 20_____
_____
_____

My Commission Expires_____

CERTIFICATE OF COMPLIANCE WITH TAX LAWS

I, _____ of _____, certify under
(principal) *(corporation)*
pains and penalties of perjury that said corporation has complied with all the laws of the State of Rhode Island and Providence Plantations relating to taxes.

_____ _____
Date Signature

_____
Title

_____
Federal Tax Identification Number

END OF SECTION

12 – General Conditions – AIA Document A201

GENERAL CONDITIONS

AIA DOCUMENT A201, 2007 EDITION

PART I – GENERAL

DESCRIPTION

A. AIA Document A201, General Conditions of the Contract for Construction, Sixteenth Edition, 2007.

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
« -»
« »

THE OWNER:
(Name, legal status and address)
« »« »
« »

THE ARCHITECT:
(Name, legal status and address)
« »« »
« »

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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User Notes: (1198933826)

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These

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obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

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§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

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.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

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§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

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§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

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§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods,

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techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

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§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

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§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

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§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be

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reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as

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the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to

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make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

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§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

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§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents; or
.3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

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§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY
If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS
§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from

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performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages 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 Owner. An

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additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

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§ 11.3.3 LOSS OF USE INSURANCE
The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION
The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

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§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct

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the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

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§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

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§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise,

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or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in th Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually

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agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

END SECTION AIA A201

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12.1 – Addendum To General Conditions – AIA Document A201

GENERAL CONDITIONS

A. Standard Form: The General Conditions of the Contract forming a part of the Contract Documents and of these Specifications, consists of AIA Document A201, 2007 Edition.

B. Modifications and Additions: Where Contract Documents refer to General Conditions, such reference shall be interpreted to include Addendum to General Conditions.

C. Where contract documents refer to “architect”, such reference shall be interpreted to be “engineer”.

CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

A. If conflicts or discrepancies occur in the Contract Documents, interpretations will be based on the following priorities:

1. Awarding Authority-Contractor Agreement.
2. Addenda, with those of later date having precedence over those of earlier date.
3. The Supplementary Conditions.
4. The General Conditions of the Contract for Construction.
5. Drawings and Specifications.

B. For an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality or greater quantity of work shall be provided according to the Architect's interpretation.

ARTICLE 2 - OWNER

Sub-paragraph 2.1.2- delete in its entirety

ARTICLE 7 – CHANGES IN THE WORK

Sub-paragraph 7.3.4- delete in its entirety

ARTICLE 11 – INSURANCE AND BONDS

Sub-paragraph 11.3- delete in its entirety.

13 – Supplementary Conditions

100.0 CLAIMS FOR EXTRA COST

100.1 If the Contractor claims that any instructions by Drawings or otherwise involve extra cost or extension of time, they shall, within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute the work, submit their protest thereto in writing to the Owner stating clearly and in detail the basis of his objections. No such claim will be considered unless so made.

100.2 Claims for additional compensation for extra work, due to alleged errors in ground elevations, contour lines, site location, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material or performing more work than would be reasonably estimated from the Drawings and map issued.

100.3 Any discrepancies which may be discovered between actual conditions and those represented by the Drawings and maps shall at once be reported to the Owner and work shall not proceed except at the Contractor's risk, until written instructions have been received by them from the Owner.

100.4 If, on the basis of the available evidence, the Owner determines that an adjustment of the Contract Price and/or Time is justifiable, the procedure shall be as provided in Section 110 hereof.

101.0 TERMINATION, DELAYS, AND LIQUIDATED DAMAGES

101.1 Termination of Contract. If the Contractor refuses or fails to prosecute the work with such diligence as will insure its completion within the time specified in these Contract Documents, or as modified as provided in these Contract Documents, the Owner by written notice to the Contractor, may terminate the Contractor's right to proceed with the work. Upon such termination, the Owner may take over the work and prosecute the same to completion of the work and the Contractor shall also be liable to the Owner in its completion of the work and the Contractor shall also be liable to the Owner for liquidated damages for any delay in the completion of the work as provided below. If the Contractor's right to proceed is so terminated, the Owner may take possession of and utilize in completing the work, such materials, tools, equipment, and plant as may be on the site of the work and necessary therefore.

101.2 Liquidated Damages for Delays. If the work be not completed within the time stipulated in Section 402 hereof, including any extensions of time for excusable delays as herein provided, the Contractor shall pay to the Owner as fixed, agreed, and liquidated damages (it being impossible to determine the actual damages occasioned by the delay) for each calendar day of delay, until the work is completed, the amount as set forth in Section 403 hereof and the Contractor and his sureties shall be liable to the Owner for the amount thereof.

101.3 Excusable Delays. The right of the Contractor to proceed shall not be terminated nor shall the Contractor be charged with liquidated damages for any delays in the completion of the work due.

101.3.1 To any acts of the Government, including controls or restrictions upon or requisitioning of materials, equipment, tools, or labor by reason of war, National Defense, or any other national emergency.

101.3.2.1 To any acts of the Owner.

101.3.3 To causes not reasonably foreseeable by the parties to this Contract at the time of the execution of the Contract which are 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 another Contractor in the performance of some other contract with the Owner, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and weather of unusual severity such as hurricane, tornadoes, cyclones and other extreme weather conditions; and

101.3.4 To any delay of any subcontractor occasioned by any of the causes specified in subparagraphs 1, 2 and 3 of this paragraph 101.3.

Provided, however, that the Contractor promptly notify the Owner within ten (10) days in writing of the cause of the delay. Upon receipt of such notification, the Owner shall ascertain the facts and the cause and extent of delay. If, upon the basis of the facts and the terms of this contract, the delay is properly excusable, the Owner shall extend the time for completing the work for a period of time commensurate with the period of excusable delay.

102.0 SAMPLES, CERTIFICATES AND TESTS

102.1 The Contractor shall submit all material or equipment samples, certificates, affidavits, etc. as called for in the contract documents or required by the Owner promptly after award of the Contract and acceptance of the Contractor's bond. No such material or equipment shall be manufactured or delivered to the site, except at the Contractor's own risk, until the required samples or certificates have been approved in writing by the Owner. Any delay in the work caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of the contract time.

Each sample submitted by the Contractor shall carry a label giving the name of the Contractor, the property for which it is intended, and the name of the producer. The accompanying certificate or letter from the Contractor shall state that the sample complies with contract requirements, shall give the name and brand of the products, its place or origin, the name and address of the producer and all specifications or other detailed information which will assist the Owner in passing upon the acceptability of the sample promptly. It shall also include the statement that all materials or equipment furnished for use in the project will comply with the samples and/or certified statements.

102.2 Approval of any materials shall be general only and shall not constitute a waiver of the Owner's right to demand full compliance with Contract requirements. After actual deliveries, the Owner will have such check tests made as they deem necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment or accessories, which fail to meet check tests have been incorporated in the work, the Owner will have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by the Contractor as is equitable.

102.3 Except as otherwise specifically stated in the Contract, the costs of sampling and testing will be divided as follows:

102.3.1 The Contractor shall furnish without extra cost, including packing and delivery charges, all samples required for testing purposes except those samples taken on the project by the Owner;

102.3.2. The Contractor shall assume all costs of re-testing materials which fail to meet contract requirements;

102.3.3 The Contractor shall assure all cost of testing materials offered in substitution of those found deficient; and

102.3.4 The Owner will pay all other expenses.

103.0 PERMITS AND CODES

103.1 The Contractor shall give all notices required by and comply with all applicable laws, ordinances, and codes of the Local Government. All construction work and/or utility installations shall comply with all applicable ordinances, and codes including all written waivers. Before installing any work, the Contractor shall examine the Drawings and Technical Specifications for compliance with applicable ordinances and codes and shall immediately report any discrepancy to the Owner. Where the requirements of the Drawings and Technical Specifications fail to comply with such applicable ordinances or codes, the

Owner will adjust the Contract by Change Order to conform to such ordinances or codes (unless waivers in writing covering the difference have been granted by the governing body or department) and make appropriate adjustment in the Contract Price or stipulated unit prices.

Should the Contractor fail to observe the foregoing provisions and proceed with the construction and/or install any utility at the variance with any applicable ordinance or code, including any written waivers (notwithstanding the fact that such installation is in compliance with the Drawings and Technical Specifications), the Contractor shall remove such work without cost to the Owner, but a Change Order will be issued to cover only the excess cost the Contractor would have been entitled to receive if the Change had been made before the Contractor commenced work on the items involved.

103.2 The Contractor shall at their own expense, secure and pay to the appropriate department of the Local Government the fees or charges for all permits for street pavement, sidewalks, sheds, removal of abandoned water taps, sealing of house connection drains, pavement cuts, buildings, electrical, plumbing, water, gas and sewer permits required by the local regulatory body or any of its agencies.

103.3 The Contractor shall comply with applicable local laws and ordinances governing excavations and the disposal of surplus excavation, materials, debris and rubbish on or off the Project Area and commit no trespass on any public or private property in any operation due to or connected with the Improvements embraced in this Contract.

104.0 CARE OF WORK

104.1 The Contractor shall be responsible for all damages to person or property that occur as a result of their fault or negligence in connection with the prosecution of the work and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance, whether or not the same has been covered in whole or in part by payments made by the Owner.

104.2 The Contractor shall provide, where necessary and as requested by the Owner, sufficient competent watchmen, both day and night, including Saturdays, Sundays, and holidays, from the time the work is commenced until final completion and acceptance.

104.3 In an emergency affecting and safety of life, limb or property, including adjoining property, the Contractor without special instructions or authorization from the Owner is authorized to act at their discretion to prevent such threatened loss or injury, and they shall so act. They shall likewise act if instructed to do so by the Owner. Any compensation claimed by the Contractor on account of such emergency work will be determined by the Owner as provided in Section 110 hereof.

104.4 The Contractor shall avoid damage as a result of their operations to existing sidewalks, streets, curbs, pavements, utilities, (except those which are to be replaced or removed), adjoining property, etc., and they shall at their own expense completely repair any damage thereto caused by their operations.

104.5 The Contractor shall shore up, brace, underpin, secure, and protect as may be necessary, all foundations and other parts of existing structures adjacent to, adjoining, and in the vicinity of the site, which may be in any way affected by the excavations or other operations connected with the construction of the Improvements embraced in this Contract. The Contractor shall be responsible for the giving of any and all required notices to any adjoining or adjacent property Owner or other party before the commencement of any work. The Contractor shall indemnify and save harmless the Owner from any damages on account of settlements or the loss of lateral support of adjoining property and from all loss or expense and all damages for which the Owner may become liable in consequence of such injury of damage to adjoining and adjacent structures and their premises.

105.0 ACCIDENT PREVENTION

105.1 The Contractor shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occur as a result of his prosecution of the work. The safety provisions of applicable laws and building and construction codes shall be observed and the Contractor shall take or cause to be taken such additional safety and health measures as the Owner may determine to be reasonably necessary. Machinery, equipment and all hazards shall be guarded in accordance with the safety provisions of the “Manual of Accident prevention in Construction” published by the Associates General Contractors of America, Inc., to the extent that such provisions are not in conflict with applicable local laws.

105.2 The Contractor shall maintain an accurate record of all cases of death, occupational disease, or injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under the Contract. The Contractor shall promptly furnish the Owner with reports concerning these matters.

105.3 The Contractor shall indemnify and save harmless the Owner from any claims for damages resulting from property damage, personal injury and/or death suffered or alleged to have been suffered by any person as a result of any work conducted under this Contract.

106.0 USE OF PREMISES

106.1 The Contractor shall confine their equipment, storage of materials and construction operations to the Contract limits as shown on the Drawings and as prescribed by ordinances or permits, or as may be desired by the Owner and shall not unreasonably encumber the site or public rights of way with his materials and construction equipment.

106.2 The Contractor shall comply with all reasonable instructions of the Owner and the ordinances and codes of the Local Government, regarding signs, advertising, traffic, fires, explosives, danger signals, barricades and fire prevention.

107.0 REMOVAL OF DEBRIS, CLEANING, ETC.

The Contractor shall, periodically or as directed during the progress of the work, remove and legally dispose of all surplus excavated material and debris, and keep the Project Area and public rights of way reasonably clear. Upon completion of the work, the Contractor shall remove all temporary construction facilities, debris and unused materials provided for the work, and put

the work site of the work and public rights of way in a neat and clean condition. Trash burning on the site of the work will be subject to prior approval of the Owner and existing State and Local regulations.

108.0 INSPECTION

108.1 All materials and workmanship shall be subject to inspection, examination, or test by the Owner and the Engineer at any and all times during manufacture of construction and at any and all places where such manufacture or construction is carried on. The Owner shall have the right to reject defective material and workmanship or require its correction. Unacceptable workmanship shall be satisfactorily corrected. Rejected material shall be promptly segregated and removed from the Project Area and replaced with material or specified quality without charge therefore. If the Contractor fails to proceed at once with correction of rejected workmanship or defective material, the Owner may by Contract or otherwise have the defects remedied or rejected materials removed from the Project Area and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.

108.2 The Contractor shall furnish promptly all materials reasonably necessary for any tests, which may be required. (See Section 102 hereof). All tests by the Owner will be performed in such manner as not to delay the work unnecessarily and will be made in accordance with the provisions of the Technical Specifications.

108.3 The Contractor shall notify the Owner sufficiently in advance of backfilling or concealing any facilities to permit proper inspection. If any facilities are concealed without approval or consent of the Owner, the Contractor shall uncover for inspection and recover such facilities all at their own expense, when so requested by the Owner.

Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by uncovering the same, the Contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any important or essential respect, due to fault of the Contractor or their subcontractors, the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 percent of such costs to cover superintendence, general expenses and profit, shall be allowed by the Contractor and they shall, in addition, if completion of the work of the entire Contract has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.

108.4 Inspection of materials and appurtenances to be incorporated in the Improvements embraced in this Contract may be made at the place of production, manufacture of shipment, whatever the quantity justifies it, and such inspection and acceptance, unless otherwise stated in the Technical Specifications, shall be final, except as regards (1) latent defects, (2) departures from specific requirements of the Contract, (3) damage or loss in transit, or (4) fraud or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of materials as a whole or in part will be made at the Project Site.

108.5 Neither inspection, testing, approval nor acceptance of the work in whole or in part, by the Owner or its agents shall relieve the Contractor of their sureties of full responsibility for materials furnished or work performed not in strict accordance with the Contract.

109.0 REVIEW BY THE OWNER

The Owner, its authorized representatives and agents and the Representative for the Secretary (as defined under GENERAL CONDITIONS, PART II) shall, at all times, have access to, and be

permitted to observe and review all work, materials, equipment, payrolls, personnel records, employment conditions, material invoices, and other relevant data and records pertaining to this Contract, provided, however, that all instructions and approval with respect to the work will be given to the Contractor only by the Owner through its authorized representatives or agents.

110.0 FINAL INSPECTION

110.1 When the Improvements embraced in this Contract are substantially completed, the Contractor shall notify the Owner in writing that the work will be ready for final inspection on a definite date, which shall be stated in the notice. The notice will be given at least ten (10) days prior to the date stated for final inspection, and bear the signed concurrence of the representative of the Owner having charge of inspection. If the Owner determines that the status of the Improvements is as represented, it will make the arrangements necessary to have final inspection commenced on the date stated in the notice, or as soon thereafter as is practicable. The inspection party will include representatives of each department of the Local Government having in charge Improvements of like character when such Improvements are later to be accepted by the Local Government.

111.0 DEDUCTION FOR UNCORRECTED WORK

If the Owner deems it not expedient to require the Contractor to correct work not done in accordance with the Contract Documents, an equitable deduction from the Contract Price will be made by agreement between the Contractor and the Owner and subject to settlement, in case of dispute, as herein provided.

112.0 INSURANCE

See Section 5.0 Insurance for information.

113.0 PATENTS

The Contractor shall hold and save the Owner its officers, and employees, harmless from liability of any nature of kind, including costs 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 unless otherwise specifically stipulated in the Technical Specifications.

114.0 WARRANTY OF TITLE

No material, supplies, or equipment to be installed or furnished under this Contract shall be purchased subject to any chattel mortgage or under a conditioned sale, lease-purchase or other agreement by which an interest therein or in any part thereof is retained by the seller or supplier. The Contractor shall warrant good title to all materials, supplies, and equipment installed or incorporated in the work and upon completion of all work, shall deliver the same together with all improvements and appurtenances constructed or placed thereon by them to the Owner free from any claims, liens, or charges. Neither the Contractor nor any person, firm or corporation furnishing any material or labor for any work covered by this Contract shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by the Contractor for their protection or any rights under any law permitting such persons to look to funds due the Contractor in the hands of the Owner. The provisions of this paragraph shall be inserted in all subcontracts and materials contracts and notice of its provisions shall be given to all persons furnishing materials for the work when no formal Contract is entered into for such materials.

115.0 GENERAL GUARANTY

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use of the Improvements embraced in this Contract by the Owner or the public shall constitute an acceptance of work not done in accordance with the Contract or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall promptly remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of twelve (12) months from the date of final acceptance of the work. The Owner will give notice of defective materials and work with reasonable promptness.

116.0 CONTRACTOR TO MAKE OWN EXAMINATION

Plans, calculations, estimates of quantities, and any statements made in the Instructions to Bidders or otherwise as to the conditions under which the work is to be performed are not guaranteed by the Owner to be correct or to be a complete representation of all existing data on conditions affecting work, and the Contractor agrees that they have made their examination and will make no claim for damages on account of any errors, inaccuracies or omissions that may be found.

The Contractor shall not take any advantage or have any claim for damages on account of any discrepancy, error or omission in any plans, calculations, estimates of quantities, or any statement made in the Instructions to Bidders or otherwise as to the conditions under which the work is to be performed, and they shall report such discrepancy, error or omission to the Owner in writing as soon as it comes to their knowledge, and before proceeding with work related to such discrepancy, error or omission. Any correction or modification of the plans or specifications may be made by the Owner when necessary, in their opinion, for the proper fulfillment of their purpose or for their proper interpretation.

200.0 OMITTED

300.0 OMITTED

402.0 TIME FOR COMPLETION

The work which the Contractor is required to perform under this Contract shall be commenced at the time stipulated by the Owner in the Notice to Proceed to the Contractor.

The rate of progress shall be such that the whole work shall be performed in accordance with the terms of this contract within the number of calendar days after the date of execution of the contract as herein stipulated, unless the expected as any part may be delayed under the provisions of this contract. The work shall be pursued in a continuous, diligent, and uniform manner throughout the project until completion.

It is agreed that the rates of progress herein required has been purposely made low enough to allow for the ordinary delays incident to construction work of this character. No extension of time will be made for ordinary delays, inclement weather and accidents, and the occurrence of such will not relieve the Contractor from the necessity of maintaining this rate of progress.

If delays are caused by acts of God, acts of Government or State, strikes extra work, floods or other contingencies clearly beyond the control or responsibility of the Contractor, the Contractor shall be entitled to so much additional time wherein to perform and complete this contract on his part as the Engineer shall certify in writing to be just.

403.0 LIQUIDATED DAMAGES

In case the Contractor fails satisfactorily to complete the entire work contemplated and provided for under this contract on or before the date of completion determined as described above, the Owner shall deduct from the payments due to the Contractor each month the sum of $250.00 for each calendar day (Sundays and legal holidays excluded) of delay, which sum is agreed upon not as a penalty, but as fixed and liquidated damages, said damages shall be deducted from any other moneys due or to become due the Contractor, and in case such damages exceed the amount of all moneys due or to become due, the Contractor then the Contractor or his Surety shall pay the balance to the Owner.

404.0 RESPONSIBILITIES OF CONTRACTOR

404.1 Except as otherwise specifically stated in the Contract Documents, and Technical Specifications, the Contract shall provide and pay for all materials, tools, labor, equipment, water, light, heat, power, transportation, superintendence, temporary construction of every nature, charges, levies, fee or other expenses, and all other services and facilities of every nature whatsoever necessary for the performance of the Contract and to deliver all improvements embraced in this Contract complete in every respect within the specified time.

404.2 All materials, workmanship, methods and practices shall conform to the current Standards of the American Water Works Association, the Rhode Island Standard Specifications for Road and Bridge Construction, 2010 edition, including all corrections, all issued compilation of approved specifications, and addendum to date and all general requirements and special requirements contained in this project specifications. All work zone traffic control shall be in accordance with the manual on uniform traffic control devices, 2009 edition.

404.3 The Contractor shall be responsible for detailed layout, all stakeout and grade control, and shall employ a registered engineer or a registered land surveyor for this purpose as may be necessary. The Owner will provide engineering and inspection.

404.4 The Contractor shall verify dimensions shown on the plans and if any inconsistencies or discrepancies should be noted on the Drawings and the Specifications, he/she shall immediately notify the Owner. The Contractor will be held responsible for any errors resulting from his/her failure to exercise the aforementioned precaution.

404.5 As soon as the Contract is executed, the Contractor shall order any materials necessary and not supplied by the Owner, submit construction schedules as hereinafter specified, and otherwise anticipate the Notice to Proceed. When the Owner gives the Notice to Proceed, the work of construction shall begin at the time stipulated therein and shall be completed within the Time for Completion specified.

404.6 It is the Contractor's responsibility to make his/her own investigation and related assumptions and to *satisfy himself as to subsurface conditions and to insure that these are reflected in the prices bid*. No change or extra to the price will be accepted due to subsurface conditions or utility locations.

The determination of location and subsequent maintenance and protection of existing subsurface and above ground utilities are the sole responsibility of the Contractor; claims resulting from damage to such by the Contractor will be settled by the Contractor at his/her expense in accordance with the Contract.

404.7 The Contractor shall, at his/her own expense, take out all necessary permits from the county, municipal, or other public authorities; shall give all notices required by law or ordinances; and shall post all bonds and pay all fees and charges incident to the due and lawful prosecution of the work covered by this Contract.

404.8 RESPONSIBILITY FOR MATERIAL FURNISHED BY OWNER: The Contractor's responsibility for material furnished by the Owner shall begin upon Contractor's acceptance at the point of delivery to him. All such material shall be examined, and material defective in manufacture and/or otherwise damaged shall be rejected by the Contractor at the time and place of delivery to him and replaced by the Owner. Material furnished by the Owner which is accepted by the Contractor, but is discovered prior to final acceptance of the work, (1) to be defective in manufacture, shall be replaced by the Owner; (2) to have been damaged before or after acceptance by the Contractor, shall be replaced by the Contractor. Once accepted by the Contractor at the point of delivery to him, all defective and/or damaged material discovered prior to final acceptance of the work shall be removed by the Contractor and he shall install, at his own expense, the material replaced, in its stead, by the Owner or Contractor. In such case, the Contractor shall furnish all labor, equipment, and material incidental to replacement and necessary for the completion of the work to the satisfaction of the Engineer.

404.9 RESPONSIBILITY FOR SAFE STORAGE: The Contractor shall be responsible for the safe storage of all material furnished to or by him and accepted by him until it has been incorporated in the completed project.

405.0 COMMUNICATIONS

405.1 All notices, demands, requests, instructions, approvals, proposals and claims must be in writing.

405.2 Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Agreement (or at such other offices as the Contractor may from time to time designate in writing to the Owner), or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for translation, in each case addressed to such office.

405.3 All papers; required to be delivered to the Owner shall, unless otherwise specified in writing to the Contractor, be delivered to the CITY OF PAWTUCKET, DEPARTMENT OF PUBLIC WORKS, 250 Armistice Boulevard, Pawtucket, Rhode Island, 02860; any notice to or demands upon the Owner shall be sufficiently given if so delivered, or if deposited in the United States mail in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any telegraph company for transmission to said Owner at such address, or to such other representative of the Owner or to such other address, as the Owner may subsequently specify in writing to the Contractor for such purpose.

405.4 Any such notice shall be deemed to have been given as of the time of actual delivery or (in the case of mailing when the same should have been received in due course of post, or in the case of telegram) at the time of actual receipt, as the case may be.

406.0 PARTIAL USE OF SITE IMPROVEMENTS

The Owner, at its elections may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected, and can be accepted as complying with the Technical Specifications and if in its opinion, each such section is reasonably safe, fit and convenient, for the use and accommodation for which it was intended, provided;

406.1 The use of such sections of the Improvements shall in no way impede the completion of the remainder of the work by the Contractor.

406.2 The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.

406.3 The use of such sections shall in no way relieve the Contractor or his liability due to having used defective materials or to poor workmanship.

406.4 The period of guarantee shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

407.0 OMITTED

408.0 OMITTED

409.0 EMPLOY SUFFICIENT LABOR AND EQUIPMENT

If, in the opinion of the Engineer, the Contractor is not employing sufficient labor or equipment to complete this contract within the time specified the Owner may, after giving written notice, require said Contractor to employ such additional labor and equipment as may be necessary to enable said work to progress properly.

410.0 INTOXICATING LIQUORS

The Contractor shall not sell and shall neither permit or suffer the introduction or use of intoxicating liquors upon or about the work embraced in this contract.

411.0 ACCESS TO WORK

The Owner and the Engineer, and their agents and employees may, for purposes already specified and for any other purpose, enter upon the work and the premises used by the Contractor, and the Contractor shall provide safe and proper facilities therefor.

412.0 TIME OF BEGINNING WORK

412.1 Except as herein provided, the Contractor shall commence work at such points as the Engineer may approve, within ten (10) days after the execution of this contract by the Owner.

412.2 Such time of starting may be postponed by written agreement between the Owner and the Contractor because of expected delays in receipt of materials and equipment, or if the season be unsuitable for commencement of the work, or because of other contingency clearly beyond the control or responsibility of the Contractor. Unless stipulated otherwise in said agreement, the Contractor shall commence work at such points as the Engineer may direct or approve, within 10 days after the receipt of a written order from the Owner to start work.

413.0 PROVISIONS FOR TRAFFIC

413.1 The Contractor shall not close or obstruct any portion of a street without obtaining permits for from the proper municipal authorities. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Owner.

413.2 Streets, roads, private ways, and walks shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made. He shall conduct his construction operations such that interference with the flow of traffic will be held to a minimum.

413.3 The Contractor shall cooperate in every way possible with the municipal authorities maintaining a flow of traffic through the site. The Contractor shall notify the Pawtucket Fire Department when any street is to be closed regardless of the length of time or time of day.

413.4 All detours shall be signed and lighted as directed by the City of Pawtucket.

414.0 COORDINATION WITH OUTSIDE PARTIES

414.1 The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. He shall at his own expense, wherever necessary or required, maintain fences, furnish watchmen, maintain lights and take such other precautions as may be necessary to protect life and property.

414.2 The Contractor shall take all responsibility for the protection of the work and for preventing injuries to persons and damage to property and utilities on or about the work. He shall not be relieved of his responsibility by any right of the City to give permission or issue orders relating to any part of the work, or by any such permission given or orders issued, or by failure of the Engineer to give such permission or issue such orders. The Contractor shall bear all losses resulting to him or to the Owner on account of the amount of character of the work, or because nature of the land in or on which the work is done is different from what was estimated or expected, or on account of the weather, elements or other causes. The Contractor shall assume the defense of all claims or whatsoever character against the Contractor of the Owner, and indemnify, save harmless and insure the Owner, its officers or agents, against all claims arising out of injury or damage to persons, corporation, or property, whether said claims are for unavoidable damage or not, and from all claims relating to labor and materials furnished for the work. The Contractor shall not be required to indemnify the Owner against damage or claims occasioned by acts of the Owner, except otherwise provided in the articles relative to patents and responsibilities.

415.0 DELAY BY OWNER

The Owner may delay the beginning of the work or any part thereof, if the necessary lands or rights-of-way, or materials for such work shall not have been obtained. The Contractor shall have no claim for damages on account of such delay, but shall be entitled to so much additional time wherein to perform and complete this contract on his part as the City shall certify in writing to be just.

416.0 OMITTED

417.0 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

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, then upon the application of either party, the contract shall forthwith be physically amended to make such insertion.

418.0 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 and Health Act of 1970, Public Law 91-596;

(2) Part 1910 - Occupation 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.

In the event of any inconsistencies between the above laws and regulations and the provisions of these documents, the laws and regulations shall prevail.

419.0 NOTIFICATION OF EXCAVATION TO UTILITIES

The Contractor shall provide a minimum of two working days notice to "Dig Safe" (1-800-225-4977) and any other appropriate utility before the Contractor begins excavation.

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:

_____

(submit at time of bid submission)

Appendix B

CITY OF PAWTUCKET
GENERAL TERMS AND CONDITIONS OF PURCHASE

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.

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 37-2-2 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 agreements or 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 projects.

The rates of pay set forth under this contract, are the minimum to be paid during the life of the Contract. It is therefore, the responsibility of Bidders to inform themselves as to local labor conditions, such as the length of work day and work week, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustments of rates.

Certified weekly payrolls and statement of compliance forms are required from contractors and subcontractors. Submit on State of Rhode Island Department of Labor and Training forms.

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

All construction contractors, independent tradesmen, or firms providing any type of maintenance, repair, or other type of service to be performed on City of Pawtucket premises, buildings, or grounds are required to purchase and maintain coverage with a company or companies licensed to do business in the state as follows:

a. Comprehensive General Liability Insurance
Combined Single Limit not less than $1,000,000 each occurrence for bodily Injury and property damage.
- Independent Contractors;
- Contractual - including construction hold harmless and other types of contracts or agreements in effect for insured operations;
- Products and Completed Operations;
- Personal Injury (with employee exclusion deleted)

b. Automobile Liability Insurance

Combined Single Limit not less than $1,000,000 each occurrence for bodily Injury and property damage including non-owned and/or hired vehicle coverage.

OR

Bodily Injury, per person, $500,000/ Bodily Injury, $1,000,000 per accident/ Property Damage, $500,000 per accident including non-owned and/or hired vehicle coverage.

c. Workers' Compensation Insurance
As required by the General Laws of Rhode Island.
- Employers liability $500,000

The City of Pawtucket shall be named as an additional insured on the vendor's Comprehensive General Liability Policy and Automobile Liability Policy.

The City of Pawtucket's Purchasing Agent reserves the right to consider and accept alternate forms and plans of insurance or to require additional or more extensive coverage for any individual requirement. Successful bidders shall provide certificates of coverage, reflecting the City of Pawtucket as an additional insured, to the City of Pawtucket Purchasing Office, forty-eight (48) hours prior to the commencement of work, as a condition of award. Failure to comply with this provision shall result in rejection of the offeror's bid.

31. BID SURETY

When requested, a bidder must furnish a Bid Bond or Certified Check for 5% 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.

Appendix C

General Wage Rate Decision
Davis Bacon

The current wage determination (Heavy Construction, Providence County), as obtained from the Rhode Island Department of Labor and Training on today's date, is bound as part of this Project Manual.

Wage Decision Obtained on 11/4/2026 from SAM.gov

"General Decision Number: RI20260001 10/1/2026

Modification #5

State: Rhode Island

Construction Types: Building, Heavy (Heavy and Marine) and Highway

"General Decision Number: RI20260001 10/01/2026

State: Rhode Island

Construction Types: Building, Heavy and Highway

Counties: Rhode Island Counties of
Bristol, Kent, Newport, Providence and
Washington

Includes Marine Construction Projects

Modification Number	Publication Date
2	01/30/2026
3	05/18/2026
4	07/30/2026
5	10/01/2026

ASBE0006-006 09/01/2024

	Rates	Fringes
HAZARDOUS MATERIAL HANDLER (INCLUDES PREPARATION, WETTING, STRIPPING, REMOVAL SCRAPPING, VACUUMING, BAGGING & DISPOSING OF ALL INSULATION MATERIALS, WHETHER THEY CONTAIN ASBESTOS OR NOT, FROM MECHANICAL SYSTEMS)	$ 49.91	36.63

ASBE0006-008 09/01/2024

	Rates	Fringes
ASBESTOS WORKER/INSULATOR (INCLUDES APPLICATION OF ALL INSULATING MATERIALS, PROTECTIVE COVERINGS, COATINGS & FINISHES TO ALL TYPES OF MECHANICAL SYSTEMS)	$ 49.91	36.63

BOIL0029-001 01/01/2025

	Rates	Fringes
BOILERMAKER	$ 50.62	28.82

BRRI0003-001 06/01/2022

	Rates	Fringes
BRICKLAYER, STONEMASON, POINTER, CAULKER & CLEANER	$ 46.86	29.14

BRRI0003-002 09/01/2022

	Rates	Fringes
MARBLE SETTER, TERRAZZO WORKER & TILE SETTER	$ 46.54	30.34

BRRI0003-003 09/01/2022

	Rates	Fringes
MARBLE, TILE & TERRAZZO FINISHER	$ 38.78	29.61

CARP0330-001 06/02/2025

	Rates	Fringes
DIVER (WHEN NOT DIVING OR TENDING THE DIVER, THE DIVER AND DIVER TENDER SHALL RECEIVE THE PILEDRIVER RATE. DIVER TENDERS SHALL RECEIVE $1.00 PER HOUR ABOVE THE PILE DRIVER RATE WHEN TENDING THE DIVER.)	$ 60.83	30.50
DIVER TENDER (WHEN NOT DIVING OR TENDING THE DIVER, THE DIVER AND DIVER TENDER SHALL RECEIVE THE PILEDRIVER RATE. DIVER TENDERS SHALL RECEIVE $1.00 PER HOUR ABOVE THE PILE DRIVER RATE WHEN TENDING THE DIVER.)	$ 48.68	30.50
CARPENTER: INCLUDES SOFT FLOOR LAYER (WORK ON FREE-STANDING STACKS, CONCRETE SILOS & PUBLIC UTILITY ELECTRICAL POWER HOUSES, WHICH ARE OVER 35 FT. IN HEIGHT WHEN CONSTRUCTED: $.50 PER HOUR ADDITIONAL. WORK ON EXTERIOR CONCRETE SHEAR WALL GANG FORMS, 45 FT. OR MORE ABOVE GROUND ELEVATION OR ON SETBACK: $.50 PER HOUR ADDITIONAL.)	$ 47.88	30.50
PILEDRIVER (WORK ON FREE-STANDING STACKS, CONCRETE SILOS & PUBLIC UTILITY ELECTRICAL POWER HOUSES, WHICH ARE OVER 35 FT. IN HEIGHT WHEN CONSTRUCTED: $.50 PER HOUR ADDITIONAL. WORK ON EXTERIOR CONCRETE SHEAR WALL GANG FORMS, 45 FT. OR MORE ABOVE GROUND ELEVATION OR ON SETBACK: $.50 PER HOUR ADDITIONAL. THE DESIGNATED PILEDRIVER, KNOWN AS THE ""MONKEY"": $1.00 PER HOUR ADDITIONAL	$ 41.53	29.35
WELDER (WORK ON FREE-STANDING STACKS, CONCRETE SILOS & PUBLIC UTILITY ELECTRICAL POWER HOUSES, WHICH ARE OVER 35 FT. IN HEIGHT WHEN CONSTRUCTED: $.50 PER HOUR ADDITIONAL. WORK ON EXTERIOR CONCRETE SHEAR WALL GANG FORMS, 45 FT. OR MORE ABOVE GROUND ELEVATION OR ON SETBACK: $.50 PER HOUR ADDITIONAL.)	$ 48.68	30.50

CARP1121-002 04/21/2025

	Rates	Fringes
MILLWRIGHT	$ 45.72	31.50

ELEC0099-002 06/01/2025

	Rates	Fringes
ELECTRICIAN (WORK OF A HAZARDOUS NATURE, OR WHERE THE WORK HEIGHT IS 30 FT. OR MORE FROM THE FLOOR, EXCEPT WHEN WORKING OSHA-APPROVED LIFTS: 20% PER HOUR ADDITIONAL. WORK IN TUNNELS BELOW GROUND LEVEL IN COMBINED SEWER OUTFALL: 20% PER HOUR ADDITIONAL.)	$ 56.11	24.74
TELEDATA SYSTEM INSTALLER (WORK OF A HAZARDOUS NATURE, OR WHERE THE WORK HEIGHT IS 30 FT. OR MORE FROM THE FLOOR, EXCEPT WHEN WORKING OSHA-APPROVED LIFTS: 20% PER HOUR ADDITIONAL. WORK IN TUNNELS BELOW GROUND LEVEL IN COMBINED SEWER OUTFALL: 20% PER HOUR ADDITIONAL.)	$ 42.09	19.71

ELEV0039-001 01/01/2025

	Rates	Fringes
ELEVATOR MECHANIC (ADDTIONAL FRINGE TO BE PAID A. PAID HOLIDAYS: NEW YEARS DAY; MEMORIAL DAY; INDEPENDENCE DAY; LABOR DAY; VETERANS' DAY; THANKSGIVING DAY; THE FRIDAY AFTER THANKSGIVING DAY; AND CHRISTMAS DAY. B. EMPLOYER CONTRIBUTES 8% BASIC HOURLY RATE FOR 5 YEARS OR MORE OF SERVICE OF 6% BASIC HOURLY RATE FOR 6 MONTHS TO 5 YEARS OF SERVICE AS VACATION PAY CREDIT.)	$ 64.52	38.44

ENGI0057-001 12/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 1: CRANES, LIGHTERS, BOOM TRUCKS AND DERRICKS. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY		

FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY,
VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY
EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A
HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.)
(HAZMAT WORK: $2.00 PER HOUR ADDITIONAL.
TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 51.30 29.95
POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER
TREATMENT PLANTS, PUMPING STATIONS, TUNNELS,
CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES,
SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION
WORK: GROUP 2: DIGGING MACHINE, ROSS CARRIER,
LOCOMOTIVE, HOIST, ELEVATOR, BIDWELL-TYPE MACHINE,
SHOT & WATER BLASTING MACHINE, PAVER, SPREADER,
GRADERS, FRONT END LOADER (3 YDS. AND OVER),
VIBRATORY HAMMER & VACUUM TRUCK, ROADHEADERS,
FORKLIFTS, ECONOMOBILE TYPE EQUIPMENT, TUNNEL
BORING MACHINES, CONCRETE PUMP AND ON SITE CONCRETE
PLANTS. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET
AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00;
210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $
5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND
OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400
FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW
YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY
FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY,
VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY
EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A
HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.)
(HAZMAT WORK: $2.00 PER HOUR ADDITIONAL.
TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 49.30 29.95
POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER
TREATMENT PLANTS, PUMPING STATIONS, TUNNELS,
CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES,
SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION
WORK: GROUP 3: OILERS ON CRANES. (BOOM LENGTHS,
INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180
FEET AND OVER + $ 3.00; 210 FEET AND OVER + $
4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND
OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350
FEET AND OVER + $ 9.00; 400 FEET AND OVER +
$10.00); (PAID HOLIDAYS: NEW YEAR'S DAY,
PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO
WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS
SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK:
$2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK:
$5.00 PER HOUR ADDITIONAL.).....$ 44.92 29.95
POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER

TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 4: OILER ON CRAWLER BACKHOE. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.) ...$ 42.07 29.95

POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 5: BULLDOZER, BOBCATS, SKID STEER LOADER, TRACTOR, SCRAPER, COMBINATION LOADER BACKHOE, ROLLER, FRONT END LOADER (LESS THAN 3 YDS.), STREET AND MOBILE-POWERED SWEEPER (3-YD. CAPACITY), 8-FT. SWEEPER MINIMUM 65 HP). (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 48.35 29.95

POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 6: WELL-POINT INSTALLATION CREW. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND

OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 39.15 29.95

POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 7: UTILITY ENGINEERS AND SIGNAL PERSONS. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 33.15 29.95

POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES, SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 8: HEATER, CONCRETE MIXER, STONE CRUSHER, WELDING MACHINE, GENERATOR AND LIGHT PLANT, GAS AND ELECTRIC DRIVEN PUMP AND AIR COMPRESSOR. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 45.00 29.95

POWER EQUIPMENT OPERATOR: POWER PLANTS, SEWER TREATMENT PLANTS, PUMPING STATIONS, TUNNELS, CAISSONS, PIERS, DOCKS, BRIDGES, WIND TURBINES,

SUBTERRANEAN & OTHER MARINE AND HEAVY CONSTRUCTION WORK: GROUP 9: BOAT & TUG OPERATOR. (BOOM LENGTHS, INCLUDING JIBS: 150 FEET AND OVER + $ 2.00; 180 FEET AND OVER + $ 3.00; 210 FEET AND OVER + $ 4.00; 240 FEET AND OVER + $ 5.00; 270 FEET AND OVER + $ 7.00; 300 FEET AND OVER + $ 8.00; 350 FEET AND OVER + $ 9.00; 400 FEET AND OVER + $10.00); (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY, CHRISTMAS DAY. ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 48.92 29.95

ENGI0057-003 12/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 1: CRANES, LIGHTERS, BOOM TRUCKS AND DERRICKS. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.)	$ 50.57	29.95
POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 2: DIGGING MACHINE, ROSS CARRIER, LOCOMOTIVE, HOIST, ELEVATOR, BIDWELL-TYPE MACHINE, SHOT & WATER BLASTING MACHINE, PAVER, SPREADER, FRONT END LOADER (3 YDS. AND OVER), VIBRATORY HAMMER AND VACUUM TRUCK. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK		

IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.)

.....$ 48.57 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 3: TELEHANDLER EQUIPMENT, FORKLIFT, CONCRETE PUMP & ON-SITE CONCRETE PLANT. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 48.35 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 4: FIREMAN & OILER ON CRANES. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 44.35 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 5: OILER ON CRAWLER BACKHOE. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND

OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 41.50 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 6: BULLDOZER,SKID STEER LOADERS,BOBCATS, TRACTOR, GRADER, SCRAPER,COMBINATION LOADER BACKHOE, ROLLER, FRONT END LOADER (LESS THAN 3 YDS.), STREET AND MOBILE POWERED SWEEPER (3 YDS. CAPACITY), 8-FT. SWEEPER (MINIMUM 65 HP). (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 47.65 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 7: WELL POINT INSTALLATION CREW. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $ 2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 47.22 29.95

POWER EQUIPMENT OPERATOR: BUILDING CONSTRUCTION: GROUP 8: HEATER, CONCRETE MIXER, STONE CRUSHER, WELDING MACHINE, GENERATOR FOR LIGHT PLANT, GAS AND ELECTRIC DRIVEN PUMP & AIR COMPRESSOR. (BOOM LENTHS, INCLUDING JIBS: 150 FT. AND OVER: + $

2.00; 180 FT. AND OVER: + $ 3.00; 210 FT. AND OVER: + $ 4.00; 240 FT. AND OVER: + $ 5.00; 270 FT. AND OVER: + $ 7.00; 300 FT. AND OVER: + $ 8.00; 350 FT. AND OVER: + $ 9.00; 400 FT. AND OVER: + $10.00) (PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY. A: ANY EMPLOYEE WHO WORKS 3 DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY.) (HAZMAT WORK: $2.00 PER HOUR ADDITIONAL. TUNNEL/SHAFT WORK: $5.00 PER HOUR ADDITIONAL.).....$ 44.54 29.95

ENGI0057-005 12/01/2025

	Rates	Fringes
POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 1: CRANES, PILE DRIVERS, LIGHTERS, BOOM TRUCKS, HOISTS, DERRICKS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.)	$ 46.45	29.95
POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 2: DIGGING MACHINES, EXCAVATORS, LOCOMOTIVES, JOHN HENRY'S, DIRECTIONAL DRILLING MACHINES, COLD PLANERS, RECLAIMERS, PAVERS, SPREADERS, GRADERS, FRONT-END LOADERS (3YDS & OVER), VACUUM TRUCK, DRILL/BORING MACHINE OPERATORS, VERMEER SAW, WATER BLASTER, HYDRAULIC-DEMOLITION ROBOT, ROSS CARRIERS, CONCRETE PUMP OPERATORS, ASPHALT/MATERIAL TRANSFER MACHINES, ROTATING TELEHANDLERS, SPMT TYPE EQUIPMENT. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.) DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY	$ 44.45	29.95
POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION		

PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 3: WELLPOINT INSTALLATION AND DRILL/BORING MACHINE ASSISTANTS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.).....$ 39.15 29.95

POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 4: UTILITY ENGINEERS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.).....$ 25.75 29.95

POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 5: SIGNAL PERSONS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.).....$ 33.15 29.95

POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 6: OILERS ON CRANES AND DECKHANDS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY, PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY, THANKSGIVING DAY & CHRISTMAS DAY.).....$ 39.73 29.95

POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 7: COMBINATION LOADER / BACKHOES, FRONT-END LOADERS (LESS THAN 3 YDS.), FORKLIFT, BULLDOZERS, SCRAPERS, BOATS, ROLLERS, SKID STEER LOADERS (REGARDLESS OF ATTACHMENTS), STREET SWEEPERS, MECHANICS, WELDERS,

OPERATORS IN MATERIALS YARDS, SHOPS AND GARAGES.
(ANY EMPLOYEE WHO WORKS THREE DAYS IN THE WEEK IN
WHICH A HOLIDAY FALLS SHALL BE PAID FOR THE
HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY,
PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY & CHRISTMAS DAY.).....$ 43.43 29.95
POWER EQUIPMENT OPERATOR: HIGHWAY CONSTRUCTION
PROJECTS; WATER AND SEWERLINE PROJECTS WHICH ARE
INCIDENTAL TO HIGHWAY CONSTRUCTION PROJECTS; AND
BRIDGE PROJECTS THAT DO NOT SPAN WATER: GROUP 8:
GAS AND ELECTRIC DRIVE HEATERS, CONCRETE MIXERS,
LIGHT PLANTS, WELDING MACHINES, PUMPS AND
COMPRESSORS. (ANY EMPLOYEE WHO WORKS THREE DAYS IN
THE WEEK IN WHICH A HOLIDAY FALLS SHALL BE PAID FOR
THE HOLIDAY. PAID HOLIDAYS: NEW YEAR'S DAY,
PRESIDENT'S DAY, MEMORIAL DAY, JULY FOURTH, VICTORY
DAY, LABOR DAY, COLUMBUS DAY, VETERANS DAY,
THANKSGIVING DAY & CHRISTMAS DAY.).....$ 38.70 29.95

 IRON0037-001 09/16/2025

	Rates	Fringes
IRONWORKER	$ 43.03	33.53

 LABO0271-001 12/03/2023

	Rates	Fringes
LABORER (BUILDING CONSTRUCTION): GROUP 1: Laborer, Carpenter Tender, Mason Tender, Cement Finisher Tender, Scaffold Erector, Wrecking Laborer, Asbestos Removal [Non-Mechanical Systems	$ 37.00	26.90
LABORER (BUILDING CONSTRUCTION): GROUP 2: Asphalt Raker, Adzemen, Pipe Trench Bracer, Demolition Burner, Chain Saw Operator, Fence & Guard Rail Erector, Setter of Metal Forms for Roadways, Mortar Mixer, Pipelayer, Riprap & Dry Stonewall Builder, Highway Stone Spreader, Pneumatic Tool Operator, Wagon Drill Operator, Tree Trimmer, Barco-Type Jumping Tamper, Mechanical Grinder Operator	$ 37.00	26.90
LABORER (BUILDING CONSTRUCTION): GROUP 3: Pre-Cast Floor & Roof Plank Erectors	$ 37.00	26.90
LABORER (BUILDING CONSTRUCTION): GROUP 4: Air Track Operator, Hydraulic & Similar Self-Powered Drill, Block Paver, Rammer, Curb Setter, Powderman & Blaster	$ 37.00	26.90
LABORER (BUILDING CONSTRUCTION): GROUP 5: Toxic Waste Remover	$ 39.00	26.90

LABO0271-002 11/27/2022

	Rates	Fringes
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): COMPRESSED AIR: GROUP 1:Mucking machine operator, tunnel laborer, brake person, track person, miner, grout person, lock tender, gauge tender, miner: motor person & all others in compressed air	$ 55.40	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): COMPRESSED AIR: GROUP 2: Change house attendant, powder watchperson, top person on iron	$ 52.93	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): COMPRESSED AIR: GROUP 3: Hazardous waste work within the ""HOT"" zone.....	$ 42.45	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): FREE AIR: GROUP 1: Grout person - pumps, brake person, track person, form mover & stripper (wood & steel), shaft laborer, laborer topside, outside motorperson, miner, conveyor operator, miner welder, heading motorperson, erecting operator, mucking machine operator, nozzle person, rodperson, safety miner, shaft & tunnel, steel & rodperson, mole nipper, concrete worker, form erector (wood, steel and all accessories), cement finisher (this type of work only), top signal person, bottom person (when heading is 50' from shaft), burner, shield operator and TBM operator.....	$ 46.00	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): FREE AIR: GROUP 2: Change house attendant, powder watchperson	$ 45.00	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): FREE AIR: GROUP 3: Hazardous waste work within the ""HOT"" zone.	$ 42.45	24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): GROUP 1: Laborer; Carpenter tender; Cement finisher tender; Wrecking laborer; Asbestos removers [non-mechanical systems]; Plant laborer; Driller in quarries.....	$ 33.05	24.05
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): GROUP 2: Adzeperson; Asphalt raker; Barcotype jumping tamper; Chain saw operators; Concrete and power buggy operator; Concrete saw operator; Demolition burner; Fence and guard rail erector; Highway stone spreader; Laser beam operator; Mechanical grinder operator; Mason tender; Mortar mixer; Pneumatic tool operator; Riprap and dry stonewall builder; Scaffold erector; Setter of metal forms for roadways; Wagon drill operator; Wood chipper operator; Pipelayer; Pipe trench bracer	$ 35.75	24.85
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): GROUP 3: Air track drill operator; Hydraulic and similar powered drills; Brick paver; Block paver; Rammer		

and curb setter; Powderperson and blaster.....$ 36.50 24.85
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): GROUP 4:
Flagger & signaler.....$ 29.00 24.85
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): GROUP 5:
Toxic waste remover .....$ 37.50 24.85
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): OPEN AIR
CAISSON, UNDERPINNING WORK AND BORING CREW: BOTTOM
MAN.....$ 41.50 24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): OPEN AIR
CAISSON, UNDERPINNING WORK AND BORING CREW: TOP MAN
& LABORER.....$ 35.60 24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): TEST
BORING: DRILLER.....$ 41.95 24.15
LABORER (HEAVY AND HIGHWAY CONSTRUCTION): TEST
BORING: LABORER.....$ 41.95 24.15

PAIN0011-005 06/01/2025

	Rates	Fringes
PAINTER (BRUSH AND ROLLER)	$ 39.57	26.60
PAINTER (EPOXY, TANKS, TOWERS, SWING STAGE & STRUCTURAL STEEL)	$ 41.57	26.60
PAINTER (SPRAY, SAND & WATER BLASTING)	$ 42.57	26.60
PAINTER (TAPER)	$ 38.82	25.80
PAINTER (WALL COVERER)	$ 38.57	25.80

PAIN0011-006 06/01/2024

	Rates	Fringes
GLAZIER (SWING STAGE: $1.00 PER HOUR ADDITIONAL. PAID HOLIDAYS: LABOR DAY & CHRISTMAS DAY.)	$ 41.63	26.15

PAIN0011-011 06/01/2024

	Rates	Fringes
PAINTER (BRIDGE WORK)	$ 57.85	26.40

PAIN0035-008 06/01/2011

	Rates	Fringes
SIGN PAINTER	$ 24.79	13.72

PLAS0040-001 01/01/2025

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (BUILDING CONSTRUCTION) (CEMENT MASON: WORK ON FREE SWINGING SCAFFOLDS UNDER 3 PLANKS WIDTH AND WHICH IS 20 OR MORE FEET ABOVE GROUND AND ANY OFFSET STRUCTURE:		

$.30 PER HOUR ADDITIONAL.).....$ 44.75 29.10

PLAS0040-002 01/01/2025

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (HEAVY AND HIGHWAY CONSTRUCTION).....	$ 40.45	25.30

PLAS0040-003 01/01/2025

	Rates	Fringes
PLASTERER.....	$ 45.52	29.43

PLUM0051-002 08/25/2025

	Rates	Fringes
PLUMBERS AND PIPEFITTERS.....	$ 54.34	34.50

ROOF0033-004 12/01/2025

	Rates	Fringes
ROOFER.....	$ 47.49	31.44

SFRI0669-001 04/01/2025

	Rates	Fringes
SPRINKLER FITTER.....	$ 53.76	33.44

SHEE0017-002 06/01/2025

	Rates	Fringes
SHEET METAL WORKER.....	$ 44.42	41.94

TEAM0251-001 05/01/2025

	Rates	Fringes
TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 1: PICK-UP TRUCKS, STATION WAGONS, & PANEL TRUCKS (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S		

PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 31.86 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 2: TWO-AXLE ON LOW BEDS (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.01 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 3: TWO-AXLE DUMP TRUCK (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.06 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 4: THREE-AXLE DUMP TRUCK (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND

CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.11 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 5: FOUR- AND FIVE-AXLE EQUIPMENT. (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.21 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 6: LOW-BED OR BOOM TRAILER. (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL

BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.61 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 7: TRAILERS WHEN USED ON A DOUBLE HOOK UP (PULLING 2 TRAILERS). (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.)
.....$ 32.81 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 8: SPECIAL EARTH-MOVING EQUIPMENT, UNDER 35 TONS.(ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER APPLICABLE RATE.) .....$ 32.31 34.51

TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP 9: SPECIAL EARTH-MOVING EQUIPMENT, 35 TONS OR

OVER. (ADDITIONAL FRINGE TO BE PAID: PAID HOLIDAYS:
NEW YEAR'S DAY, MEMORIAL DAY, INDEPENDENCE DAY,
LABOR DAY, THANKSGIVING DAY AND CHRISTMAS DAY, PLUS
PRESIDENTS' DAY, COLUMBUS DAY, VETERAN'S DAY & V-J
DAY, PROVIDING THE EMPLOYEE HAS WORKED AT LEAST ONE
DAY IN THE CALENDAR WEEK IN WHICH THE HOLIDAY
FALLS. EMPLOYEE WHO HAS BEEN ON THE PAYROLL FOR 1
YEAR OR MORE BUT LESS THAN 5 YEARS AND HAS WORKED
150 DAYS DURING THE LAST YEAR OF EMPLOYMENT SHALL
RECEIVE 1 WEEK'S PAID VACATION; 5 TO 10 YEARS - 2
WEEKS' PAID VACATION; 10 OR MORE YEARS - 3 WEEK'S
PAID VACATION.) (EMPLOYEES ON THE SENIORITY LIST
SHALL BE PAID A ONE HUNDRED DOLLAR ($100.00) BONUS
FOR EVERY FOUR HUNDRED (400) HOURS WORKED, UP TO A
MAXIMUM OF FIVE HUNDRED DOLLARS ($500.00)) (ALL
DRIVERS WORKING ON A DEFINED HAZARD MATERIAL JOB
SITE SHALL BE PAID A PREMIUM OF $2.00 PER HOUR OVER
APPLICABLE RATE.) .....$ 32.56 34.51
TRUCK DRIVER: HEAVY AND HIGHWAY CONSTRUCTION: GROUP
10: TRACTOR TRAILER. (ADDITIONAL FRINGE TO BE PAID:
PAID HOLIDAYS: NEW YEAR'S DAY, MEMORIAL DAY,
INDEPENDENCE DAY, LABOR DAY, THANKSGIVING DAY AND
CHRISTMAS DAY, PLUS PRESIDENTS' DAY, COLUMBUS DAY,
VETERAN'S DAY & V-J DAY, PROVIDING THE EMPLOYEE HAS
WORKED AT LEAST ONE DAY IN THE CALENDAR WEEK IN
WHICH THE HOLIDAY FALLS. EMPLOYEE WHO HAS BEEN ON
THE PAYROLL FOR 1 YEAR OR MORE BUT LESS THAN 5
YEARS AND HAS WORKED 150 DAYS DURING THE LAST YEAR
OF EMPLOYMENT SHALL RECEIVE 1 WEEK'S PAID VACATION;
5 TO 10 YEARS - 2 WEEKS' PAID VACATION; 10 OR MORE
YEARS - 3 WEEK'S PAID VACATION.) (EMPLOYEES ON THE
SENIORITY LIST SHALL BE PAID A ONE HUNDRED DOLLAR
($100.00) BONUS FOR EVERY FOUR HUNDRED (400) HOURS
WORKED, UP TO A MAXIMUM OF FIVE HUNDRED DOLLARS
($500.00)) (ALL DRIVERS WORKING ON A DEFINED HAZARD
MATERIAL JOB SITE SHALL BE PAID A PREMIUM OF $2.00
PER HOUR OVER APPLICABLE RATE.) ...$ 32.36 34.51

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.
==========
Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any
solicitation was issued) on or after January 1, 2017. If this
contract is covered by the EO, the contractor must provide
employees with 1 hour of paid sick leave for every 30 hours

they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than SU, UAVG, SA, or SC denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers.

0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The SU identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

SU wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The SA identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the SA identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via

email to dba.reconsideration@dol.gov or by mail to:
Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210
The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:
Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.
==========
END OF GENERAL DECISION
"

“END OF GENERAL DECISION”

Appendix D

City of Pawtucket Standard Form of Agreement (Sample)

CONTRACT AGREEMENT
FOR:

PROJECT_TITLE

SAMPLE

PAWTUCKET, RHODE ISLAND

PURCHASING DIVISION
137 ROOSEVELT AVE.
PAWTUCKET, RHODE ISLAND

MM/DD/YYYY

CONTRACT AGREEMENT

PROJECT_TITLE
Pawtucket, Rhode Island

1. AGREEMENT FOR SERVICES

This Agreement for Services (hereinafter the "Agreement" or "Contract") made this ##th day of #####, 2015 between the City of Pawtucket, a municipal corporation of the State of Rhode Island, with a business address of 137 Roosevelt Avenue, Pawtucket, Rhode Island (hereinafter the "City") and VENDOR, a company authorized to do business in the State of Rhode Island, with a business address of ########### (hereinafter the "Consultant").

2. SCOPE OF CONSULTANT SERVICES

This is a contract to provide the City with consulting services as specified herein and as set forth in the following Exhibits, all of which are attached hereto and incorporated into this Agreement by reference herein:

- Exhibit 1 – RFP #####;
- Exhibit 2 – Rhode Island Department of Labor and Training Municipal Contract Addendum;

and all addenda issued and any resulting negotiations, and the RFP response received by the City from the Consultant.

SAMPLE

3. COMPENSATION FOR SERVICES

The City shall pay the Consultant in the following sums for work performed under this Agreement after the effective date as set out below:

$,######

The payment and performance of any obligations under this contract for years beyond the first fiscal year are subject to the availability of funds. Payment will not be made until services have been fully performed and accepted, and upon a properly submitted invoice. All invoices must clearly display the purchase order number.

4. RHODE ISLAND LAW AND FORUM

(a) This Agreement shall be construed according to the law of the State of Rhode Island.

(b) Any litigation between the City and the Consultant arising under this Agreement or out of work performed under this Agreement shall occur, if in the state courts, in the Providence County Superior Court, and in the federal courts, in the United States District Court for the District of Rhode Island.

5. NOTICE

Any notice provided for under this Agreement shall be sufficient if in writing and delivered personally to the following addressee or deposited in the United States mail, postage prepaid, certified mail, return receipt requested, addressed as follows, or to such other address as the receiving party hereafter shall specify in writing:

If to the City:

Andrew Silvia, PE, Chief of Project Development
250 Armistice Boulevard
Pawtucket, RI 02860

If to the Consultant:

#######

6. COMPLIANCE WITH LAWS

Consultant shall materially comply with any and all Federal, state and local laws and regulations now in force and which may hereafter during the term of this contract, be enacted and become effected which are applicable, as well as obtaining any and all required permits and licenses.

7. TIMEFRAME TO COMPLETE

The Consultant shall complete the consulting services located in the City of Pawtucket, Rhode Island no later than #########.

8. WAIVERS

No waiver of any breach or any one or more of the conditions or covenants of this Contract by City or Consultant shall be deemed to imply or to constitute a waiver of any prior or succeeding breach; and the failure of City or Consultant to insist upon the strict performance of the terms, covenants, agreements and conditions herein contained or any one of them shall not constitute or be construed as a waiver or relinquishment of City's or Consultant's right to thereafter enforce any such default, or any term, covenants, agreement or condition.

CONSULTANT (VENDOR)

_____ _____

WITNESS

Subscribed and sworn to before me in the _____

on this _____ day of _____, 2015.

_____

NOTARY PUBLIC

My Commission Expires:

CITY OF PAWTUCKET

_____ _____

WITNESS

Subscribed and sworn to before me in the _____

on this _____ day of _____, 2015.

_____

NOTARY PUBLIC

My Commission Expires:

SAMPLE

EXHIBIT 1:

RFP ########

SAMPLE

EXHIBIT 2:

RHODE ISLAND DLT MUNICIPAL CONTRACT ADDENDUM

SAMPLE

MUNICIPAL CONTRACT ADDENDUM

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING

PREVAILING WAGE REQUIREMENTS
(37-13-1 ET SEQ.)

The prevailing wage requirements are generally set forth in RIGL 37-13-1 et seq. These requirements refer to the prevailing rate of pay for regular, holiday, and overtime wages to be paid to each craftsmen, mechanic, teamster, laborer, or other type of worker performing work on public works projects when state or municipal funds exceed one thousand dollars ($1,000).

All Prevailing Wage Contractors and Subcontractors are required to:

1. Submit to the Awarding Authority a list of the contractor's subcontractors for any part or all of the prevailing wage work in accordance with RIGL § 37-13-4;

2. Pay all prevailing wage employees at least once per week and in accordance with RIGL §37-13-7 (see Appendix B attached);

3. Post the prevailing wage rate scale and the Department of Labor and Training's prevailing wage poster in a prominent and easily accessible place on the work site in accordance with RIGL §37-13-11; posters may be downloaded at www.dlt.ri.gov/pw/Posters.htm.poster/htm or obtained from the Department of Labor and Training, Center General Complex, 1511 Pontiac Avenue, Cranston, Rhode Island;

4. Access the Department of Labor and Training website, at www.dlt.ri.gov on or before July 1st of each year, until such time as the contract is completed, to ascertain the current prevailing wage rates and the amount of payment or contributions for each covered prevailing wage employee and make any necessary adjustments to the covered employee's prevailing wage rates effective July 1st of each year in compliance with RIGL §37-13-8;

5. Attach a copy of this CONTRACT ADDENDUM and its attachments as a binding obligation to any and all contracts between the contractor and any subcontractors and their assignees for prevailing wage work performed pursuant to this contract;

6. Provide for the payment of overtime for prevailing wage employees who work in excess of eight (8) hours in any one day or forty (40) hours in any one week as provided by RIGL §37-13-10;

SAMPLE

7. Maintain accurate prevailing wage employee payroll records on a Rhode Island Certified Weekly Payroll form available for download at www.dlt.ri.gov/pw.forms/htm, as required by RIGL §37-13-13, and make those records available to the Department of Labor and Training upon request;

8. Furnish the fully executed RI Certified Weekly Payroll Form to the awarding authority on a monthly basis for all work completed in the preceding month.

9. For general or primary contracts one million dollars ($1,000,000) or more, shall maintain on the work site a fully executed RI Certified Prevailing Wage Daily Log listing the contractor's employees employed each day on the public works site; the RI Certified Prevailing Wage Daily Log shall be available for inspection on the public works site at all times; this rule shall not apply to road, highway, or bridge public works projects. Where applicable, furnish both the Rhode Island Certified Prevailing Wage Daily Log together with the Rhode Island Weekly Certified Payroll to the awarding authority.

10. Assure that all covered prevailing wage employees on construction projects with a total project cost of one hundred thousand dollars ($100,000) or more has a OSHA ten (10) hour construction safety certification in compliance with RIGL § 37-23-1;

11. Assure that all prevailing wage employees who perform work which requires a Rhode Island trade license possess the appropriate Rhode Island trade license in compliance with Rhode Island law; and

12. Comply with all applicable provisions of RIGL §37-13-1, et. seq;

SAMPLE

Any questions or concerns regarding this CONTRACT ADDENDUM should be addressed to the contractor or subcontractor's attorney. Additional Prevailing Wage information may be obtained from the Department of Labor and Training at www.dlt.ri.gov/pw.

CERTIFICATION

I hereby certify that I have reviewed this CONTRACT ADDENUM and understand my obligations as stated above.

By: _____

Title: _____

Subscribed and sworn before me this ____ day of _____, 20__.

_____
Notary Public
My commission expires: _____

SAMPLE

Appendix E

Rhode Island General Laws

Title 37
Public Property and Works

Chapter 13
Labor and Payment of Debts by Contractors
R.I. Gen. Laws § 37-13-5

§ 37-13-5. Payment for trucking or materials furnished — Withholding of sums due.

A contractor or subcontractor on public works authorized by a proper authority shall pay any obligation or charge for trucking and material which have been furnished for the use of the contractor or subcontractor, in connection with the public works being performed by him or her, within ninety (90) days after the obligation or charge is incurred or the trucking service has been performed or the material has been delivered to the site of the work, whichever is later. When it is brought to the notice of the proper authority in a city or town, or the proper authority in the state having supervision of the contract, that the obligation or charge has not been paid by the contractor or subcontractor, the proper authority may deduct and hold for a period not exceeding sixty (60) days, from sums of money due to the contractor or subcontractor, the equivalent amount of such sums certified by a trucker or materialman creditor as due him or her, as provided in this section, and which the proper authority determines is reasonable for trucking performed or materials furnished for the public works.

History of Section.
P.L. 1936, ch. 2361, §§ 2, 3; G.L. 1938, ch. 290, §§ 2, 3; G.L. 1938, ch. 290, § 4; P.L. 1955, ch. 3580, § 1; G.L. 1956, § 37-13-5; P.L. 1965, ch. 77, § 1.

Title 37
Public Property and Works

Chapter 13
Labor and Payment of Debts by Contractors
R.I. Gen. Laws § 37-13-7

§ 37-13-7. Specification in contract of amount and frequency of payment of wages.

(a) Every call for bids for every contract in excess of one thousand dollars ($1,000), to which the state of Rhode Island or any political subdivision thereof or any public agency or quasi-public agency is a party, for the transportation of public and private school pupils pursuant to §§ 16-21-1 and 16-21.1-8, or for construction, alteration, and/or repair, including painting and decorating, of public buildings or public works of the state of Rhode Island or any political subdivision thereof, or any public agency or quasi-public agency and that requires or involves the employment of employees, shall contain a provision stating the minimum wages to be paid various types of employees which shall be based upon the wages that will be determined by the director of labor and training to be prevailing for the corresponding types of employees employed on projects of a character similar to the contract work in the city, town, village, or other appropriate political subdivision of the state of Rhode Island in which the work is to be performed. Every contract shall contain a stipulation that the contractor or his or her subcontractor shall pay all the employees employed directly upon the site of the work, unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment computed at wage rates not less than those stated in the call for bids, regardless of any contractual relationships that may be alleged to exist between the contractor or subcontractor and the employees, and that the scale of wages to be paid shall be posted by the contractor in a prominent and easily accessible place at the site of the work; and the further stipulation that there may be withheld from the contractor so much of the accrued payments as may be considered necessary to pay to the employees employed by the contractor, or any subcontractor on the work, the difference between the rates of wages required by the contract to be paid the employees on the work and the rates of wages received by the employees and not refunded to the contractor, subcontractors, or their agents.

(b) The terms "wages," "scale of wages," "wage rates," "minimum wages," and "prevailing wages" shall include:

(1) The basic hourly rate of pay; and

(2) The amount of:

(i) The rate of contribution made by a contractor or subcontractor to a trustee or to a third person pursuant to a fund, plan, or program; and

(ii) The rate of costs to the contractor, subcontractor, vendor, or provider that may be reasonably anticipated in providing benefits to employees pursuant to an enforceable commitment to carry out a financially responsible plan or program that was communicated in writing to the employees affected, for medical or hospital care, pensions on retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, for unemployment benefits, life insurance, disability and sickness insurance, or accident insurance, for vacation and holiday pay, for defraying costs of apprenticeship or other similar programs, or for other bona fide fringe benefits, but only where the contractor or subcontractor is not required by other federal, state, or local law to provide any of the benefits; provided, that the obligation of a

contractor or subcontractor to make payment in accordance with the prevailing wage determinations of the director of labor and training insofar as this chapter of this title and other acts incorporating this chapter of this title by reference are concerned may be discharged by the making of payments in cash, by the making of contributions of a type referred to in subsection (b)(2), or by the assumption of an enforceable commitment to bear the costs of a plan or program of a type referred to in this subdivision, or any combination thereof, where the aggregate of any payments, contributions, and costs is not less than the rate of pay described in subsection (b)(1) plus the amount referred to in subsection (b)(2).

(c) The term "employees," as used in this section, shall include:

(1) Employees of contractors or subcontractors performing jobs on various types of public works including mechanics, apprentices, teamsters, chauffeurs, and laborers engaged in the transportation of gravel or fill to the site of public works, the removal and/or delivery of gravel or fill or ready-mix concrete, sand, bituminous stone, or asphalt flowable fill from the site of public works, or the transportation or removal of gravel or fill from one location to another on the site of public works, and the employment of the employees shall be subject to the provisions of subsections (a) and (b); and

(2) Persons employed by a provider contracted for the purpose of transporting public and private school pupils pursuant to §§ 16-21-1 and 16-21.1-8 shall be subject to the provisions of subsections (a) and (b) of this section. For the purposes of this subsection the term employee includes school bus drivers, aides, and monitors who are directly providing transportation services; the term employee does not include mechanics, dispatchers, or other personnel employed by the vendor whose duties are normally performed at a fixed location.

(d) The terms "public agency" and "quasi-public agency" shall include, but not be limited to: the Rhode Island industrial recreational building authority, the Rhode Island commerce corporation, the Rhode Island airport corporation, the Rhode Island industrial facilities corporation, the Rhode Island refunding bond authority, the Rhode Island housing and mortgage finance corporation, the Rhode Island resource recovery corporation, the Rhode Island public transit authority, the Rhode Island student loan authority, the water resources board corporate, the Rhode Island health and education building corporation, the Rhode Island turnpike and bridge authority, the Narragansett Bay water quality management district commission, the Rhode Island telecommunications authority, the convention center authority, the council on postsecondary education, the council on elementary and secondary education, the capital center commission, the housing resources commission, the Quonset Point-Davisville management corporation, the Rhode Island children's crusade for higher education, the Rhode Island depositors economic protection corporation, the Rhode Island lottery commission, the Rhode Island partnership for science and technology, the Rhode Island public building authority, and the Rhode Island underground storage tank board.

History of Section.
P.L. 1974, ch. 237, § 3; P.L. 1976, ch. 193, § 1; P.L. 1999, ch. 75, § 1; P.L. 2001, ch. 321, § 1; P.L. 2015, ch. 141, art. 7, § 16; P.L. 2021, ch. 292, § 3, effective July 9, 2021; P.L. 2021, ch. 293, § 3, effective July 9, 2021.

Appendix F

Specifications Issued for Bid

APPENDIX F

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DIVISION 01

SECTION 01010

SUMMARY OF WORK AND CONTRACT MILESTONES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work covered by the Contract, listing of Owner, Project location, Engineer. Sequence requirements, the Contractor's use of the premises Owner's occupancy requirements, State Sales and Use Tax, Non Discrimination in Employment, and Wetland and Waterways.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Parkside Pump Station Improvements consists of the following work:
   - Parkside Wastewater Pumping Station
     - Full pumping station rehabilitation/replacement including but not limited to structural, mechanical and electrical modifications to convert station from modified ejector station to new submersible station with valve vault and new submersible pumps, piping, electrical and instrumentation associated improvements.
   - Startup of new equipment and demonstration of control strategies, and activation of pumping station improvements
   - Electrical work as shown in the contract documents - Electrical drawings and Specifications Division 16
   - Furnish and install instrumentation and control panels furnished under Division 13 and Division 11

B. Pinecrest Pump Station Improvements consists of the following work:
   - Pinecrest Wastewater Pumping Station
     - Full pumping station rehabilitation/replacement including but not limited to structural, mechanical and electrical modifications to convert station from non-standard submersible station to new submersible station with valve vault and new submersible pumps, piping, electrical and instrumentation associated improvements.
   - Startup of new equipment and demonstration of control strategies, and activation of pumping station improvements
   - Electrical work as shown in the contract documents - Electrical drawings and Specifications Division 16
   - Furnish and install instrumentation and control panels furnished under Division 13 and Division 11

   All as more particularly indicated, shown or described in the Drawings, Specifications, and other Contract Documents.

1.03 OWNER

A. City of Pawtucket, Department of Public Works

   250 Armistice Boulevard
   Pawtucket, RI 02860
   Telephone: 401-728-0500
   Contact: Emily Morse

1.04 PROJECT LOCATION

A. Parkside Pump Station,
Stafford Street
Pawtucket, RI 02861

B. Pinecrest Pump Station,
Crest Drive
Pawtucket, RI 02861

1.05 ENGINEER

A. BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865
Telephone: 401-333-2382
Contact: Christopher Cronin, P.E.
Email: ccronin@beta-inc.com

1.06 CONTRACT MILESTONES

A. Shop Drawings and Procurement

1. Shop drawings shall be submitted and approved within 90 days of Notice to Proceed.
2. Documentation of mechanical and electrical equipment procurement and delivery dates shall be submitted within 100 days of Notice to Proceed.

B. FINAL COMPLETION

1. Final Completion, as defined in the Contract Agreement 4.2.1 Project Schedule.

1.07 WORK SEQUENCE

A. In order that Work may be conducted with minimum inconvenience to the public and, work under this Contract may be coordinated with other work which may be under construction or contemplated, and that work under the Contract may conform to conditions which it has been undertaken or conditions attached to a right-of-way or particular location for this work, the Engineer may determine the point or points and time or times when portions of work will commence or be carried on and may issue orders pertaining to the work sequence, relative to the rate of progress on several portions of the work.

1.08 CONTRACTOR USE OF PREMISES

A. The Contractor's use of premises shall be within the limits shown on the Drawings and as defined in 13 Supplementary Conditions 106.0 Use of Premises, for the performance of the Work.

B. The Contractor shall maintain access and utilities to the existing pumping station facilities at all times.

C. The Contractor shall assume full responsibility for security of all materials and equipment on the site, including those of his subcontractor's.

D. If directed by the Owner, the Contractor shall move any stored items that interfere with operations of the Owner.

E. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.09 OWNER OCCUPANCY REQUIREMENTS

A. The existing collection systems and force mains servicing the existing station must remain in full service at all times, throughout the duration of the project.

B. The Owner requires safe and unhindered access to wastewater pumping stations for the purpose of operating and maintaining the stations, throughout the duration of the Contract.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Measurement and payment criteria applicable to the Work performed under a unit price and/or lump sum payment method of Items listed in the BID.

B. Related Sections
   1. Section 00300 - Bid
   2. Section 00500 - Agreement

1.02 LUMP SUM PRICES

A. Payment will be computed on the basis of the percentage of work completed on each Item in the contract BID as determined by the Engineer. Lump sum prices are to include the cost of all necessary materials, labor, equipment, overhead, profit and other applicable costs. (See Par. 1.03, this Section.)

1.03 PRICES INCLUDE

A. The prices stated in the Proposal include full compensation not only for furnishing all the labor, equipment and material needed for, and for performing the work and building the structures contemplated by, the Contract, but also for assuming all risks of any kind for expenses arising by reason of the nature of the soil, ground water, or the action of the elements; for all excavation and backfilling; for the removal of and delay or damage occasioned by trees, stumps, tracks, pipes, ducts, timber, masonry or other obstacles; for removing, protecting, repairing, or restoring, without cost to the Owner, all pipes, ducts, drains, sewers, culverts, conduits, curbs, gutters, walks, fences, tracks, or other obstacles, road pavements and other ground surfacing whether shown on plans or not for draining, damming, pumping or otherwise handling and removing, without damage to the work or to other parties, and without needless nuisance, all water or sewage from whatever source which might affect the work or its progress, or be encountered in excavations made for the work; for maintaining existing plant flows, for providing temporary equipment, systems and facilities as specified and as necessary so that the pumping station may continue operation during construction; for furnishing, inserting and removing as directed, all shoring staging, cofferdams etc.; for all signs, fencing, lighting, watching, guarding, temporary surfacing, bridging, snow removal, etc., necessary to maintain and protect travel on streets, walks and private ways; for making all provisions necessary to maintain and protect buildings, fences, poles, trees, structures, pipes, ducts and other public or private property affected or endangered by

the work; for the repair or replacement of such things if injured by neglect of such provisions for removing all surplus or rejected materials as may be directed; for replacing, repairing and maintaining the surfaces of streets, highways, public and private lands if and where disturbed by work performed under the Contract or by negligence in the performance of work under the Contract; for furnishing the requisite filling materials in case of any deficiency or lack of suitable materials; for obtaining all permits and licenses and complying with the requirements thereof, including the cost of furnishing any security needed in connection therewith; for any and all expense on account of the use of any patented device or process; for protection against inclement or cold weather; for all expenses incurred by or on account of the suspension; interruption or discontinuance of work; for the cost of the surety bond and adequate insurance; for all taxes, fees, union dues, etc., for which the Contractor may be or become liable, arising out of his operations incidental to the Contract; for providing equipment on the site and off site; for providing a field office and its appurtenances and for all general and incidental expenses; for tools, implements and equipment required to build and put into good working order all work contemplated by the Contract; for maintaining and guaranteeing the same as provided; and for fulfilling all obligations assumed by the Contractor under the Contract and its related documents.

B. The Owner shall pay and the Contractor shall receive the prices stipulated in the BID made a part hereof as full compensation for everything performed and for all risks and obligations undertaken by the Contractor under and as required by the Contract.

C. The prices shall also include the removal and disposal of the existing pipe being replaced or repaired, unless otherwise specified in the Contract.

1.04 GENERAL BID, PART I

PARKSIDE PUMP STATION & PINECREST PUMP STATION IMPROVEMENTS

BID ITEM NO. 1 PARKSIDE PUMPING STATION REHABILITATION

A. Payment of the lump-sum price bid in the Bid Form for Item No. 1 shall constitute full compensation for all labor, material, tools, equipment and incidentals necessary for rehabilitating the existing pumping stations as indicated on the Drawings and as specified, including but not limited to mobilization and demobilization; coordination with Owner and Engineer; all required demolition; constructing improvements; design and installation of bypass pumping system; phasing work to maintain existing flows; protection of all existing structures and utilities; the removal and disposal of existing equipment; concrete work; startup; provision of a portable generator; and testing complete as shown on the Drawings and specified herein.
B. Items shall also constitute compensation for all civil site, structural, mechanical, electrical, instrumentation, and all associated appurtenant work, as indicated on the Drawings and as specified in the Bidding and Contract Requirements and Divisions 1 through 17 except for the requirements of other Bid Items.

C. For all equipment and systems provided in Division 11, Division 13, Division 15, Division 16, and Division 17:

- Five (5) percent of the equipment/system cost will be withheld until the operations and maintenance manual has been approved and all copies have been turned over to the Owner.

- Five (5) percent of the equipment/system cost will be withheld until the spare parts and lubricants have been turned over to the Owner.

- Five (5) percent of the equipment/system cost will be withheld until the manufacturer's representative has certified the equipment, assisted with the start-up and completed the training.

- Five (5) percent of the equipment/system cost will be withheld until the testing has been completed and the test results have been submitted and approved.

BID ITEM NO. 2 PINECREST PUMPING STATION REHABILITATION

A. Payment of the lump-sum price bid in the Bid Form for Item No. 1 shall constitute full compensation for all labor, material, tools, equipment and incidentals necessary for rehabilitating the existing pumping station as indicated on the Drawings and as specified, including but not limited to mobilization and demobilization; coordination with Owner and Engineer; all required demolition; constructing improvements; design and installation of bypass pumping system; phasing work to maintain existing flows; protection of all existing structures and utilities; the removal and disposal of existing equipment; concrete work; startup; and testing complete as shown on the Drawings and specified herein.
B. Items shall also constitute compensation for all civil site, structural, mechanical, electrical, instrumentation, and all associated appurtenant work, as indicated on the Drawings and as specified in the Bidding and Contract Requirements and Divisions 1 through 17 except for the requirements of other Bid Items.
C. For all equipment and systems provided in Division 11, Division 13, Division 15, Division 16, and Division 17:

- Five (5) percent of the equipment/system cost will be withheld until the operations and maintenance manual has been approved and all copies have been turned over to the Owner.

- Five (5) percent of the equipment/system cost will be withheld until the spare parts and lubricants have been turned over to the Owner.

- Five (5) percent of the equipment/system cost will be withheld until the manufacturer's representative has certified the equipment, assisted with the start-up and completed the training.

- Five (5) percent of the equipment/system cost will be withheld until the testing has been completed and the test results have been submitted and approved.

BID ITEM NO. 3 MANAGEMENT OF EXCESS SOIL

1. Under this Item, the Contractor shall be paid for Management of Excess Soil at the lump sum price stated in the Bid Schedule.
2. Due to space limitations at the Parkside pump station site the Owner will provide space on a city owned parcel on Freight Street for Management of Excess Soil.
3. The price for this item shall constitute full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for handling and managing of Excess Soil, as defined in Specification Section 02080, including; segregating, handling, staging, and characterization (testing) of all excess soil and fill material prior to final transport and disposal as well as the costs associated with characterizing the destination site as required to assess background conditions; all controls necessary to maintain compliance with regulatory requirements relative to handling contaminated soils and materials; submittal and approval of all required and specified Plans; characterization of all excess excavated soil and fill material handled; health and safety equipment; securing a staging area for stockpiling soil pending analytical testing, reuse, or disposal; and all costs associated with transporting soils to and from the staging areas.
4. The price for this item shall also include payment for placing the soil on and covering the soil stockpile area with 6-mil polyethene sheeting, maintaining coverings, placing straw wattles around the stockpile area, and management of the stockpile area.
5. The price for this item shall also include air monitoring; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; and any other work not covered by other Bid Items.
6. Excavated soil that is geotechnical suitable for backfill shall be used to the extent possible.
7. Payment for disposal of excess materials shall not to be included under this Item and shall be paid under the respective Bid Items.

BID ITEM NO. 4 DISPOSAL OF EXCESS SOIL – CATEGORY I

1. Under this Item, Disposal of Excess Soil – Category I, will be measured by the number of tons of contaminated soils, as recorded on certified weight slips, categorized as Category I soil actually managed and disposed of in accordance with the Contract Documents and/or as directed by the Engineer. In the event that Category I material is disposed at an approved disposal facility not having the ability to provide certified weight slips, tonnage shall be determined by volumetric measurement (in cubic yards) by the Engineer and converted to tonnage based on a conversion of 1.50 tons per cubic yard of material. The quantity of excess Category I material disposed of shall be limited to the trench width payment limits indicated on the Drawings, or limits of actual excavation, whichever is smaller. Excess Category I material removed and disposed of outside the trench width payment limits will be determined by volumetric measurement (in cubic yards) by the Engineer and

converted to tonnage based on a conversion of 1.50 tons per cubic yard of material and subtracted from total tonnage for payment. The quantity identified in the Bid is an indeterminate quantity to be utilized for comparison of bids.

2. The unit price shall include all costs associated with the disposal of Category I material including but not limited to labor, equipment, disposal fees, transportation, and completing and furnishing the Owner with the appropriate bill of lading forms to the satisfaction of the Engineer. Under the unit bid price for this Item, the Contractor shall dispose of excess Category I material generated during site work activities.
3. The Contractor will be eligible for up to 75% of the bid price when material is transported to the disposal facility. The remaining 25% of the bid price will be paid upon the Owner's receipt of all satisfactorily filled and signed transportation and disposal documents.

BID ITEM NO. 5 DISPOSAL OF EXESS SOIL – CATEGORY II

1. Under this Item, Disposal of Excess Soil – Category II, will be measured by the number of tons of hazardous materials, as recorded on certified weight slips, categorized as Category II soil actually managed and disposed of in accordance with the Contract Documents and/or as directed by the Engineer. In the event that Category II material is disposed at an approved disposal facility not having the ability to provide certified weight slips, tonnage shall be determined by volumetric measurement (in cubic yards) by the Engineer and converted to tonnage based on a conversion of 1.50 tons per cubic yard of material. The quantity of excess Category II material disposed of shall be limited to the trench width payment limits indicated on the Drawings, or limits of actual excavation, whichever is smaller. Excess Category II material removed and disposed of outside the trench width payment limits will be determined by volumetric measurement (in cubic yards) by the Engineer and converted to tonnage based on a conversion of 1.50 tons per cubic yard of material and subtracted from total tonnage for payment.
2. The Contractor will be paid on a time and materials basis for labor, equipment, and materials provided by the Contractor, as approved by the Engineer. If the total cost for such charges is greater or less than the allowance amount stated under this item of the BID, a debit or credit of the difference in cost shall be to the Owner.
3. The Contractor will be eligible for up to 75% of the bid price when material is transported to the disposal facility. The remaining 25% of the bid price will be paid upon the Owner's receipt of all satisfactorily filled and signed transportation and disposal documents.

1.05 PAYMENTS

A. Payment of the total price bid in the General Bid shall fully compensate the Contractor for furnishing all labor, materials, equipment and incidentals required to complete the work as outlined above and under Section 01010. Payment shall also include compensation for all other work required to complete the Project as described in the Contract Documents and not specifically mentioned.

1.06 EXTRA WORK

A. Extra work, if any, will be performed and paid for in accordance with the Owner Contractor Agreement, General Conditions and Supplementary Conditions.

END OF SECTION

SECTION 01026

SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for breakdown of lump sum bid.

B. Related Sections

1. Section 01300 - Submittals

1.02 BREAKDOWN OF LUMP SUM BID

A. Within 20 business days of the date of the executed Contract, a list detailing the breakdown of the lump sums bid by the appropriate Divisions of these Specifications or as otherwise directed by the Engineer, shall be submitted for review and concurrence by the Engineer. This list will be used by the Engineer as a guide in preparing estimates for payment. The list shall be an accurate representation of costs required to complete the Work in accordance with the Contract Documents.

B. A schedule of the monthly value of work done based on the Progress Schedule submitted under Section 01300 - Submittals shall be submitted within 20 business days of the date of the executed Contract. The schedule shall show the total sum of work done for each month of the projected construction period and shall be updated monthly to reflect the actual amount requisitioned for payment.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01035

MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Procedures for making modifications to the Contract by change orders or other means.

B. Related Sections

1. Document 00500 - Agreement

1.02 CHANGE ORDERS

A. In general Change Orders will be issued for modification of Contract documents which will incorporate changes in the Contract requirements, including additions or deletions in the Work; for unforeseen field conditions which will necessitate changes in the Work; changes in code provisions or other requirements of federal, state or local authority requiring changes in the Work; changes in the availability of products or for incorporating new products into the work and for changes directed by the Engineer for the benefit of the Owner.

B. Authority to execute Change Orders shall be that of the Engineer and not of the Contractor. Changes Orders will, in general, originate by a “Change Order Proposal Request” or by issuance of a “Construction Change Authorization”.

C. Unless authorized by the Engineer, no work shall be performed that is involved in the change until a formal Change Order is issued.

D. To initiate a Change Order, the Engineer will forward a Change Order proposal request describing the proposed changes and if required, include additional or revised drawings and specifications soliciting a formal quotation of cost and time to complete the proposed Change Order work. Upon reaching mutual agreement on the cost and time, the Engineer will sign his approval of the Change Order and submit it to the Contractor for his full signature of acceptance.

1.03 FIELD ORDERS

A. The Engineer may, to avoid costly removal of, or alterations to, present on-going work, issue a Work Directive Change authorizing the Contractor to proceed, subject to later negotiation of the price of the change.

1.04 PRICE AGREEMENTS

A. Prices agreed upon to cover the Change Orders may be either by mutual acceptance of a lump sum or by unit prices as stated in the Contract bid proposal or actual direct cost plus a percentage for overhead, profit and other expenses consistent with Section 00500 – Contract Agreement.

B. Work done by a subcontractor entitles the General Contractor a percentage of the sum of the actual direct cost, not including the subcontractor's overhead and profit, consistent with Section 00500 – Contract Agreement.

C. Method for computing the cost of the change shall be based on the net additional increase. No overhead and profit shall be deducted from prices for changes deleting work.

D. The Change Order form document shall indicate the net adjustment (+/-) to the total Contract price as a result thereof including extension or reduction of time when applicable.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01040

COORDINATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for coordinating the various parts of Work under this Contract.

1.02 REQUIREMENTS

A. Coordinate scheduling, submittals, and Work of the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical, instrumentation and electrical work, which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.

F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

G. Coordinate work with all utility companies necessary for completion of work under this contract.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

SECTION 01045

CUTTING, CORING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements and limitations for cutting, coring and patching of Work.

B. Related Sections

1. Section 01300-Submittals

1.02 SUBMITTALS

A. In accordance with Section 01300 submit written request in advance of cutting or alteration which affects the following:

1. Structural integrity of any element of Project.
2. Integrity of weather-exposed or moisture-resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected work.
3. Necessity for cutting or alteration.
4. Description of proposed work, and products to be used.
5. Alternatives to cutting and patching.
6. Effect on work of Owner or separate contractor.
7. Written permission of affected separate contractor.
8. Date and time work will be executed.

C. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Engineer and secure his written permission and the required Change Order prior to proceeding.

1.03 RELATED SECTIONS

A. Section 15050 – Pipe Penetrations

PART 2 PRODUCTS

2.01 MATERIALS

A. For replacement of items removed, use materials complying with pertinent sections of these specifications.

B. Sealing materials to be used to seal annular space between cored hole in walls and related pipes to be in accordance with Section 15050.

C. Sealing cored holes in sewer manholes to be with a resilient seal similar to Kor-N-Seal made by National Pollution Control Systems, Inc., Nashua, NH or similar product, as indicated on the Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.
2. After uncovering the work, inspect conditions affecting installation of new work.
3. If uncovered conditions are not as anticipated, immediately notify the Engineer.
4. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Protection

1. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.
2. Perform cutting and demolition by methods which will prevent damage to portions of the Work.

B. Surface Preparation

1. Provide proper surfaces to receive installation of repair and new work.

3.03 INSTALLATION

A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the Work.

B. Execute cutting, fitting, and patching (including excavation and fill) to complete work.

C. Installation of materials shall be in accordance with manufacturer’s instructions.

D. Installations, repair or replacement of items provided under this Contract shall be in accordance with the Contract Documents.

3.04 FIELD QUALITY CONTROL

A. In addition to other requirements specified, upon the Engineer's request uncover work to provide for inspection by the Engineer of covered work, and remove samples of installed materials for testing.

B. Do not cut or alter work performed under separate contracts without the Engineer's written permission.

3.05 ADJUSTING

A. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Survey work and other field engineering responsibilities of the Contractor.

1.02 REQUIREMENTS

A. The Contractor shall be responsible for layout of the work and the establishing of lines and grades.

B. Establish elevations, lines, levels, reference marks, batter boards, etc., required during the progress of the Work. Verify such marks by instrument to confirm accuracy.

C. Locate and protect survey control and reference points.

D. Make, check, and be responsible for all measurements and dimensions necessary for the proper construction of the Work.

E. The Engineer will be permitted to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors found in lines, elevations, reference marks, batter boards, etc.. Such a check shall not be construed as approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate construction and completion of the Work.

F. Control datum for survey as shown on Drawings.

1.03 QUALITY ASSURANCE

A. Qualifications

1. Employ a Civil Engineer or Land Surveyor registered within the Commonwealth of Massachusetts, acceptable to the Engineer.

B. Certifications

1. Submit certificate signed by the Contractor’s Engineer or Land Surveyor stating elevations and locations of the Work are in conformance with the Contract Documents.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01060

PERMITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building codes, Mechanical codes, and Electrical codes, Regulations, Permits and Fees applicable to the project.

1.02 PERMITS BY CONTRACTOR

A. The Contractor shall secure all necessary permits from the state, city or town authorities having jurisdiction, for digging of trenches in the streets or highways and all other building and construction operations requiring permits.

B. As a minimum the following permits are required:

1. Electrical Permit
2. Roadway Excavation Permit
3. Physical Alteration Permit.

1.03 PERMITS BY OWNER

A. The Owner has obtained or will obtain and pay all fees for the permits listed here:

1. Freshwater Wetlands Permit (Pinecrest Pump Station)

a. Contractor shall comply with all applicable permit requirements and conditions, including the installation and maintenance of the required RIDEM permit sign displaying the permit application number. Refer to **Appendix A** for the permit issuance documentation and all additional permit requirements.

1.04 CODES

A. The Contractor shall conform to the requirements of and pay all fees imposed by local and State Building Authorities having jurisdiction over the Work. The Contractor is responsible to conform to all building, mechanical, electrical and plumbing code requirements.

B. The Contractor shall conform to the latest requirements of the following codes:

1. Federal, State and Municipal Laws
2. Rhode Island State Building Codes, National Building Code Regulation SBC-1
3. Rhode Island State Building Codes, Plumbing Code Regulation SBC-3
4. Rhode Island State Building Codes, Mechanical Code Regulation SBC-4
5. Rhode Island State Building Codes, Electrical Code Regulation SBC-5
6. Any prevailing rules and regulations pertaining to adequate protection and/or guarding of any moving parts or otherwise hazardous locations.

1.04 FEES

A. The cost of all permits secured by the Contractor shall be borne by him and shall be considered as having been included in the price or prices stated in the Bid. Copies of all required permits shall be filed with the Engineer prior to starting work for which a permit is required.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01067

STATE OF RHODE ISLAND AND FEDERAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. RHODE ISLAND SALES AND USE TAX
B. HISTORICAL ARTICLES
C. PREVAILING MINIMUM WAGE RATES
D. EXCERPTS FROM RHODE ISLAND LAWS
E. REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION
F. ATTACHMENTS

1.02 RHODE ISLAND SALES AND USE TAX

A. Materials and equipment purchased for installation under this Contract are exempt from the Rhode Island Sales Tax. The Contractor shall file for exemption on behalf of the Owner, with the State of Rhode Island Department of Taxation as required by law. The exemption from the Sales Tax shall be taken into account by the Contractor during bidding.

1.03 HISTORICAL ARTICLES

A. During the life of this Contract, the Contractor is herewith required to immediately notify the following organizations in the event that any articles such as "charcoal," "bone," "shell," "cultural objects - fire cracked stones or stone flaking material" or any other such related items of historical significance are discovered.

1. Owner
2. Local Historical Society
3. Rhode Island Historical Commissioner
4. Engineer

1.04 PREVAILING MINIMUM WAGE RATES

A. Local prevailing minimum wage rates apply to this project. It is the responsibility of the Contractor before bid openings to request, if necessary, any additional information on local prevailing Wage Rates for those tradespeople who are not covered by the applicable local Wage Decision, but who may be employed for the proposed work under this Contract.

1.05 EXCERPTS FROM RHODE ISLAND LAWS

A. The Contractor and each of his subcontractors shall especially note his obligations to comply with the following statues or excerpts therefrom and any current revisions thereof contained in the General Laws of Rhode Island.

B. These laws reflect changes made through the end of the 1992 legislative session. While every attempt at accuracy has been made, these are not certifide true copies of these laws. The responsibility for compliance with all applicable provisions of Rhode Island laws relating to bidding, award, and performance of public works contracts is the Contractor's. Certified true and complete copies of any Rhode Island laws and regulations may be obtained from the Office of the Rhode Island Secretary of State.

R.I.G.L.
Title, Chapter, Section EXCERPT

5-6-2 WORK FOR WHICH LICENSE REQUIRED

"No person, firm, or corporation shall enter into, engage in, or work at the business of installing wire, conduits, apparatus, fixtures and other appliances for carrying or using electricity for light, heat or other purpose, unless such person, firm or corporation shall have received a license and a certificate therefore, issued by the State Board of Examiners of Electricians."

28-26-6 LICENSE REQUIRED FOR OPERATION OF HOISTING MACHINERY - PUBLIC CONTRACTS

"No persons shall operate or be in direct charge of a hoisting or excavation gasoline, steam, diesel, electric or compressed air hoist, shovel, crane, excavator, of five horsepower or more without obtaining a license to do so as provided in this chapter. No user or agent of use of any such described steam, gasoline, diesel, electric or compressed air hoisting machinery shall permit it to be operated unless it is operated by a duly licensed person as hereinafter provided by this chapter.

Every contract in the construction of public works by the State, or by any City or Town, or by persons contracting therewith for such construction, shall contain a clause embodying the provisions of this section."

Chapter 116

From Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State by foreign corporations:

"The certificate and power of attorney mentioned in the General Corporation Law, properly filled out, subscribed and sworn to, and accompanied by a certified copy of the Charter, articles of association or other similar organization papers, together with all amendments thereto, must be filed in the office of the Secretary of State by all foreign corporations intending to carry on business within this State, or for a foreign corporation to enforce in the courts of this State any contract made within the State."

Detailed information regarding Chapter 116 of the General Laws of Rhode Island, 1938, relative to the conditions precedent, etc., to carrying on business within this State for foreign corporations may be obtained from the Secretary of State, State House, Smith Street, Providence, Rhode Island.

Title 37 (chapters as provided at the end of this Specification Section.)

1.06 REQUIREMENTS FOR MINORITY BUSINESS ENTERPRISE, EQUAL OPPORTUNITY AND NONDISCRIMINATION

A. Contracts for work under the bid (proposal) will obligate the contractors and subcontractors not to discriminate in employment practices.

B. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, age, handicap, or national origin. The Contractor shall take affirmative action to ensure that applicants are employed and the employees are treated during employment without regard to their race, color, religion, sex, age, handicap, or national origin. Such actions shall include, but not be limited to, the following: employment, upgrading, demotions, or transfers; recruitment or recruitment advertising, selection for training including apprenticeship; and participation in recreational and educational activities. The Contractor agrees to post in conspicuous places available to employees and applicants for employment, notice to be provided, setting forth the provisions of this non-discrimination clause. The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Contract so that such provisions will be binding upon each subcontractor and upon subcontractors for standard commercial supplies or raw materials.

C. The Contractor shall keep such records and submit such reports concerning the racial and ethnic origin of applicants for employment and employees as the Owner may require as consistent with Federal and State law.

D. The Contractor agrees to comply with such rules, regulations, or guidelines as the State of Rhode Island may issue to implement these requirements. The Contractor further warrants, that it will comply with, Title VI of the Civil rights Act of 1964, 42 U.S.C. 200d to d4.

E. Contractors shall comply with the provisions of the General Laws of Rhode Island and attention is called to Title 37, Chapter 13, Section 1-16, relative to the payment of wages, obligations and charges by Contractors on public works projects. Non-resident Contractors are subject to Section 44-1-6 of the RI General Laws, as amended, regarding OUT-OF-STATE CONTRACTORS.

F. The Contractor will be required to comply with Equal Opportunity Requirements and to abide by the prevailing wage rates for Public Works Projects for all employees on the job. It is the responsibility of contractors to inform themselves as to the local labor conditions, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustment of wage rates. Information is available at the Department of Labor.

G. The attention of the Contractor is directed to the fact that this Contract is subject to both Federal and State requirements regarding Minority Business Enterprises (MBE) and Woman's Business Enterprisees (WBE) participation. The Contractor hereby agrees to ensure compliance with all Federal and State MBE/WBE requirements to provide maximum opportunity for such participation.

H. The Contractor's attention is directed to the following Federal and State requirements contained herein under "ATTACHMENT A" provided at the end of this Specification Section.

I. The Contractor further agrees to ensure that minority business enterprises as defined in RIGL Section 37-14.1-3, shall have the maximum opportunity to participate in the performance of subcontracts performed under this Contract. The Contractor will take reasonable steps in accordance with regulations promulgated under Chapter 37-14.1 of the RIGL to ensure that minority business enterprises have the maximum opportunity to compete for and perform subcontracts under this Contract. DEPARTMENT OF ADMINISTRATION RI STATE EQUAL OPPORTUNITY OFFICE GENERAL CONTRACT COMPLIANCE CERTIFICATE AND AGREEMENT, Pages 1 through 6, are provided at the end of this Specification.

1.07 ATTACHMENTS

A. Attachments referenced by this Specification follow this Section.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01069

HEALTH & SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for providing a Health and Safety Plan (HASP) and maintenance of health and safety while performing the Work.

1.02 REQUIREMENTS

A. Monitor working conditions at all times during construction and provide appropriate protective clothing, equipment and facilities for personnel, and establish workplace procedures to ensure personnel safety.

B. Implement a Health and Safety protection program. The procedures for such implementation shall be submitted to the Engineer and Owner for approval. The procedures shall include provisions for stations allowing workers to wash and to put on and remove protective clothing, and stations for vehicles to be cleaned, if necessary, before leaving the site, air monitoring, and evaluation of areas where unsafe levels of gas has accumulated.

C. Comply with all Federal, State, and local safety requirements related to the hazards anticipated to be encountered during the course of this project.

D. In addition to the above requirements, comply with the following:

1. All construction equipment on the site shall be equipped with vertical exhaust pipes or a spark proof exhaust.
2. Smoking shall not be permitted in any area where gases can accumulate, or in areas where contaminated soil is present.
3. Welding or open flames shall not be permitted in enclosed areas.
4. Toxic gas indicators, an organic vapor analyzer, a combustible gas indicator, an oxygen indicator, and fire extinguishers shall be available at all times during operations. Periodic monitoring with portable monitoring devices shall be employed as dictated by the Health and Safety Plan.
5. During operations, whenever unsafe levels of toxic gases are detected, all work will cease in that area until acceptable levels are reached.

1.03 SHOP DRAWINGS

A. Submit site specific Health and Safety Plan (HASP) that complies with all applicable OSHA requirements to the Engineer for review and acceptance within fifteen (15) working days of the Contractor’s Notice to Proceed. Certified Industrial Hygienist must certify the Contractor’s plan prior to submittal to and review by the Engineer. The Contractor is not to proceed with any subsurface or site work without review and acceptance of the submitted Health and Safety Plan by the Engineer.

1.04 QUALITY ASSURANCE

A. Engage an independent, qualified Health and Safety expert having experience in similar construction conditions, to monitor site conditions and recommend all necessary Health and

Safety protection. This person shall be a Certified Industrial Hygienist (CIH). The Contractor shall follow such recommendations and shall provide such protection to his personnel, and personnel of the Owner and Engineer, as may be affected.

1.05 REGULATORY REQUIREMENTS

A. Establish work place procedures, enforce the use of these procedures, and the associated equipment and facilities in accordance with the following guidelines:

1. Safety and Health Regulations Promulgated by the U.S. Department of Labor OSHA, 29 CFR 1910 - Occupational Safety and Health Standards, and 29 CFR 1920 - Safety and Health Regulations for Construction.
2. Occupational Safety and Health Standards, 29 CFR 1926 - Safety and Health Regulations for Construction.
3. U.S. Environmental Protection Agency Medical Monitoring Program Guidelines.

1.06 SITE CONDITIONS

A. The Contractor's attention is directed to the fact that the work includes connecting new pipe lines to the existing sewer system. In addition to confined space issues, hazardous gasses and oxygen depletion may be encountered in the existing sewer system where proposed work is to take place.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PROTECTION

A. If, at any time, the Owner or the Engineer is apprised of a safety hazard which demands immediate attention because of its high potential for harm to the public travel, persons on or about the Work, or public or private property, the Owner or the Engineer shall have the right to order such safeguards to be erected and such precautions to be taken as necessary and the Contractor shall comply with such orders. If, under such circumstances, the Contractor does not or cannot immediately put the Work into proper and approved condition, or if the Contractor or his representative is not upon the site so that he can be notified immediately of the insufficiency of safety precautions, then the Owner may put the Work into such a condition that is, in his opinion, in all respects safe, and the Contractor shall pay all expenses of such labor and materials as may have been used for this purpose by him or by the Owner. The fact that the Owner or the Engineer does not observe a safety hazard or does not order the Contractor to take remedial measures shall in no way relieve the Contractor of the entire responsibility for any costs, loss or damage by any party sustained on account of the insufficiency of the safety precautions taken by him or by the Owner acting under authority of this Section.

B. If the Contractor is alerted to the fact that conditions of high hazard are present or can be present at the site during the performance of the Work, it is the responsibility of the Contractor to take appropriate safety precautions to meet whatever conditions of hazard may be present during the performance of the Work, whether reasonably foreseeable or not. The

safety conditions enumerated in the Specifications are the minimum permissible and neither the Owner not the Engineer makes any representation that the safety standards provided herein will be adequate to meet all eventualities. The Contractor is therefore alerted to the fact that it shall be his responsibility to anticipate and provide such additional safety precautions, facilities, personnel and equipment as shall be necessary to protect life and property from whatsoever conditions of hazard are present or may be present.

C. The Contractor shall supply and erect highly visible safety fencing a minimum of three feet in height around all construction areas that pose a threat to safety and post proper signage as required by Local, State and Federal requirements. The Contractor shall erect safety fencing as documented in the Contact Drawings or as directed by the Engineer and shall maintain such fencing and signage until such a time that the potential safety hazard has been rectified. Upon final completion of construction all safety fencing shall be removed off-site by the Contractor. Safety fencing requirements of OSHA shall be enforced by the Contractor.

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reference material, abbreviations, and terms used in the Construction Documents and establishes edition dates and complete titles for standards referenced elsewhere in the Specifications.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Obtain copies of standards when required by Contract Documents.

C. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.

D. Should specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

E. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.03 SCHEDULE OF REFERENCES

AA	Aluminum Association 1400 Crystal Dr. Suite 430 Arlington, VA 22202
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439
AFBMA	Anti-Friction Bearing Manufacturers Association 2025 M. Street, NW Washington, DC 20036-3309
AGC	Associated General Contractors of America 2300 Wilson Blvd. Arlington, VA 22201

AGM	American Gear Manufacturers Association 1001 N. Fairfax Street Alexandria, VA 22314-1587
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480
AISC	American Institute of Steel Construction One East Wacker Drive Chicago, IL 60601-1802
AISI	American Iron and Steel Institute 25 Massachusetts Drive Washington, DC 20001
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANS	American National Standard
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC 20036
API	American Petroleum Institute 1220 L Street, NW Washington, DC 20005
ARI	Air-Conditioning and Refrigeration Institute 2111 Wilson Boulevard Arlington, VA 22201
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990
ASPA	American Sod Producers Association 1855 A Hicks Road Rolling Meadows. IL 60008

ASTM	American Society for Testing and Materials 100 Bar Harbor Drive PO Box C700 West Conshohocken, PA 19428-2959
AWG	American or Brown and Sharpe Wire Gage
AWPA	American Wood-Preservers' Association 100 Chase Park South Birmingham, AL 35244-1851
AWS	American Welding Society
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BIA	Brick Institute of America 1850 Centennial Park Drive Reston, VA 20191
CS	Commercial Standard
EJCDC	Engineers' Joint Contract Document Committee American Consulting Engineers Council 1015 15th Street, N.W. Washington, DC 20005
FM	Factory Mutual System 1151 Boston-Providence Turnpike PO Box 688 Norwood, Massachusetts 02062
Fed Spec.	Federal Specification General Services Administration Specification and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
HMA	Hot Mix Asphalt
IBR	Institute of Boiler and Radiator Manufacturers
ICBO	International Conference of Building Officials 900 Montclair Road Birmingham, AL 35213-2298
IPS	Iron Pipe Size
JIC	Joint Industry Conference Standards

MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
NASSCO	National Association of Sewer Service Companies 2470 Longstone Lane Marriottsville, MD 21104
NBS	National Bureau of Standards
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171
NCPWB	National Certified Pipe Welding Bureau
NEMA	National Electrical Manufacturers' Association 1300 North 17th Street Arlington, VA 22209
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
NPT	National Pipe Thread
OS&Y	Outside screw and yoke
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
SMACNA	Sheet Metal and Air Conditioning Contractors' National Assoc. 4201 Lafayette Center Drive Chantilly, VA 20151-1219
Stl. WG	U.S. Steel Wire Washburn and Moen, American Steel and Wire or Roebling Gage
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062
USS Gage	United States Standard Gage
125-lb. ANS 250-lb. ANS	American National Standard for Cast-Iron Pipe Flanges and Flange Fittings, Designation B16.1-1975, for the appropriate class

1.04 EDITION DATES

A. Reference to publications and reference material shall be understood to mean the latest edition, unless stated otherwise.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for project meetings.

1.02 PRECONSTRUCTION CONFERENCE

A. The Engineer will schedule and administer a pre-construction conference.

B. The pre-construction conference will be scheduled and administered within fourteen (14) calendar days after the dated "Notice to Proceed". The Contractor shall be prepared to address such topics as projected construction schedules, major personnel, critical work areas, construction facilities and shop drawing submittals.

1.03 PROGRESS MEETINGS

A. The Engineer will schedule and administer progress meetings and specially called meetings throughout the duration of the Work at minimum monthly intervals.

B. The time and location of such meetings shall be designated by the Engineer and shall be convenient for all parties involved.

C. The Engineer will, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to participants, and those affected by decisions made.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for submission of schedules and shop drawings.

1.02 PROGRESS SCHEDULE

A. Refer to Section 01310 Construction Progress Schedule for Critical Path Method (CPM) construction scheduling requirements.

B. Special attention is directed to the requirement that the Contractor shall start the Work, as specified under this Contract, no later than thirty (30) calendar days after the execution of the Contract Documents, unless otherwise directed by the Owner. The Contractor shall comply with all pre-construction requirements as specified. The Owner reserves the right to delay the commencement of the Work or any part thereof if the specified requirements as determined by the Engineer have not been satisfied. The Owner further reserves the right to limit or, delay construction, or certain activities thereof, in certain areas of the Contract should the Owner deem it to be in the public's best interest and/or safety to do so.

C. The Contractor shall contact the appropriate town or city authorities concerning any public or semi-public events that may occur during the construction period that may affect construction. The Contractor alone shall be responsible for arranging his construction sequence to conform to any restrictions these events may impose. No claims for extras will be allowed because of any delay, extra materials handling, extra excavation, etc. caused by the imposed restrictions. However, additional time may be granted for completion of the work to compensate for delays caused by said restrictions.

1.03 SHOP DRAWINGS

A. Submit all shop and working drawings through agreed upon electronic Shop Drawing Submittal and tracking program. Shop Drawings shall be provided for materials and equipment to be permanently incorporated into the work and shall include items such as concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.

B. A maximum of two (2) submittals of each shop drawing will be reviewed by the Engineer. If more submittals are required due to the Contractor’s neglect or failure to fulfill the requirements of the Contract plans and specifications, or to make corrections or modifications required by the Engineer in the review of the first two submittals, the Engineer will review the submittal and the Contractor will be responsible for the cost of the review, as determined by the Owner based on the Engineer’s documentation of time and rates for additional services established in the Engineering Agreement between the Owner and the Engineer.

C. Such drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc.,

depending on the subject of the drawing. When the dimensions are of particular importance, or when specified, the drawings shall be certified by the manufacturer or fabricator as correct for the Contract.

D. When so specified or if considered by the Engineer to be acceptable, manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted in place of shop and working drawings.

E. The Contractor shall be responsible for the prompt and timely submittal of all shop and working drawings to eliminate delay to the Work due to the absence of such drawings. All shop and working drawings must be submitted to the Engineer within thirty (30) calendar days prior to incorporation into the Work, unless otherwise permitted by the Engineer. **Prior to the submittal of any shop drawings, the Contractor shall submit a schedule of proposed shop drawing transmittals.** The schedule shall identify the subject matter of each transmittal, the corresponding specification section number and the proposed date of submission. Prior to and during the progress of the Work the schedule shall be revised and resubmitted as requested by the Engineer.

F. No material or equipment shall be purchased or fabricated for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

G. Until the necessary review has been made, the Contractor shall not proceed with any portion of the Work (such as the construction of foundations) for which review is required.

H. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24 inch by 36 inch sheets, except those which are made by changing existing standard shop and working drawings. All drawings shall be clearly marked with the names of the Owner, Contractor, and building, equipment, or structure to which the drawing applies, and shall be suitable numbered. Submitted shop drawings shall be accompanied by a letter of transmittal, completed by the Contractor as provided by the Engineer.

I. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Contractor's approval, and then shall be submitted to the Engineer; other drawings shall be returned for correction.

J. If a shop drawing shows any deviation from the Contract requirements, the Contractor shall make specific mention of the deviations in his letter of transmittal.

K. The review of shop and working drawings by the Engineer will be general only, and nothing contained in this Section shall relieve, diminish or alter in any respect the responsibilities of the Contractor under the Contract Documents and in particular, the specific responsibility of the Contractor for details of design and dimensions necessary for proper fitting and construction of the work as required by the Contract and for achieving the result and

performance as specified. The Contractor shall be responsible for errors and omissions in shop drawings.

L. Should the Contractor submit equipment that requires modifications to the structures, piping, electrical conduit, wires, appurtenances, or layouts etc., either existing or as detailed on the Drawings, he shall also submit details of the proposed modifications. If such equipment and modifications are accepted, the Contractor, at no additional cost to the Owner, shall do the work necessary to make such modifications.

M. The Contractor shall furnish additional copies of shop drawings or catalog cuts when so requested.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01310

CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for computer generated Critical Path Method (CPM) construction scheduling and Narrative progress report.

B. No portion of this specification shall take precedent over SECTION 00500-Contract Agreement.

1.02 SUBMITTALS

A. Submit in accordance with SECTION 01300-Submittals

1. Quality Assurance/Control Submittal
   a. Name and version of CPM software proposed for use.
   b. List of construction projects completed on which progress of work was controlled with CPM software.
2. Schedule
   a. Within **14 days** following the receipt of the Notice to Proceed, the Contractor shall submit **two** color copies of a computer generated schedule and a list of activities to the Engineer. Following review by the Engineer and Owner the Contractor shall meet with the Engineer and Owner to discuss the review. The Contractor shall incorporate the Engineer's comments into the schedule and submit eight color copies of the revised schedule within 14 days following receipt of the Engineer's comments.

PART 2 PRODUCTS

2.01 SOFTWARE

A. Computer based scheduling software used by the Contractor shall be the product of a recognized commercial computer software producer and shall be capable of meeting the requirements specified herein.

PART 3 EXECUTION

3.01 PREPARATION

A. General

1. The Contractor shall prepare his proposed CPM schedule based on a breakdown of work tasks that he has developed.
2. The construction schedule and updates shall be prepared by the Contractor or the Contractor's qualified consultant.

B. Schedule

1. Each schedule shall be prefaced with the following summary data:
   a. Contract name and number
   b. Contractor's Name
   c. Contract duration
   d. The effective or starting date of the schedule
   e. Revision date of the latest schedule.
2. The CPM schedule shall be sequenced by early start date and shall include the following minimum items:
   a. Activity Name
   b. Estimated duration
   c. Activity description
   d. Early start date (calendar date)
   e. Early finish date (calendar date)
   f. Latest allowable start date (calendar date)
   g. Latest allowable finish date (calendar date)
   h. Status (whether critical)
   i. Estimated cost of the activity
   j. Float (total and free)
   k. Major milestones
3. Separate milestones shall be included for Notice-to-Proceed and Project Completion Date.
4. Activities shall include major components of the work including submittals that might impact the critical path, subcontractor work, major and critical equipment design, fabrication, testing, delivery and installation times, system/subsystem/component testing, process and facility startup, training, demobilization, project cleanup and closeout. Critical portions of process instrumentation and control system work, shall be defined in detail in a sub schedule.
5. The sum of the costs assigned to the activities shall be equal to the Contract price. Activity costs shall not be assigned to submittals or submittal reviews. Comply with SECTION 01026-Schedule of Values. Provide a table showing the anticipated monthly percentage of completion, based on the total contract price.
6. Critical activities, predecessors, free float and total float shall be clearly displayed on the schedule in graphical form. Schedules that contain activities showing negative float or that extend beyond the contract completion date will not be approved.
7. Each schedule submittal shall also include a list of activities in the order in which the activities will be performed, along with activity durations, activity predecessors, type of predecessor (finish-start, finish-finish, start-start, lead/lag), and any dependency or required date.
8. The schedule shall be based on a standard 5-day work week with allowance for holidays and adverse weather.
9. Engineer’s approval of the CPM schedule is advisory only and shall not relieve the Contractor of responsibility for accomplishing the work prior to the contract completion date. Omissions and errors in the approved CPM schedule shall not excuse performance less than that required by the Contract. Approval by the Engineer in no way makes the Engineer an insurer of the CPM schedule's success or liable for time or cost overruns flowing from its shortcomings. The Owner hereby disclaims any obligation or liability by reason of approval by its agent, the Engineer, of the CPM schedule.

C. Narrative Progress Report

1. Include as a minimum:
   a. Summary of work completed during the previous period (since submission of last narrative progress report).
   b. Explanation for variations between actual work completed in previous period and planned work as reported in last period.
   c. Summary of work planned during the next period.
   d. Current and anticipated delaying factors and their estimated impacts on other activities and milestones, both critical and non-critical.
   e. Corrective actions taken or proposed.
2. A Narrative Progress Report shall be submitted monthly to the Engineer, at least 5 working days prior to the progress meeting.
3. At the discretion of the Engineer, the Contractor may be required to submit a revised CPM schedule showing completion to date and any changes to the previous schedule.

3.02 MONITORING SCHEDULE

A. The CPM approved construction schedule shall be used by the Contractor throughout the duration of the project for planning, organizing, and directing the Work, and for reporting progress of the Work

B. The Contractor is solely responsible for monitoring schedule compliance. When a delay to the critical path occurs, the Contractor shall immediately notify the Engineer in writing. Within one week of the notification, the Contractor shall submit for the Engineer's approval, a description of proposed actions to return the project to schedule.

3.03 MODIFYING SCHEDULE

A. If the Contractor desires to make changes in his method of operating which affect the approved CPM schedule, he shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor shall revise and submit for approval, without additional cost to the Owner, all of the affected portions of the CPM schedule.

B. It may be necessary for the contract schedule or completion time to be adjusted by the Owner to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the Owner or its representatives and other unforeseeable conditions which may indicate schedule adjustments or completion time extensions. Under such conditions, the Engineer will direct the Contractor to reschedule the work or contract completion time to reflect the changed conditions and the Contractor shall revise his schedule accordingly.

C. Float time is a project resource available to both the Contractor and the Owner to meet contract milestones and completion dates. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to proportionate benefit of OWNER and CONTRACTOR.

D. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the Time of Completion to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Contractor’s quality control of products, suppliers, manufacturers, services, site conditions, and workmanship, to produce Work of specified quality.

1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Comply fully with manufacturers' instructions, including each step in sequence.

B. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.03 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications sections for review.

B. Acceptable samples represent a quality level for the Work.

C. Where field sample is specified to be removed, clear area only after field sample has been accepted by the Engineer.

1.04 CERTIFIED WELDERS

A. Structural welds shall be made only by operators who have been qualified by tests, as prescribed in the "Standard Qualification Procedure" of the American Welders Society, to perform the type of work required.

B. Pipe welds shall be made only by operators who have been qualified by the National Certified Pipe Welding Bureau and each operator's qualification record shall be submitted to the Engineer before any work is performed.

C. Shop welding shall be in accordance with the "Code for Welding in Building Construction".

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Qualification, duties and responsibilities of testing laboratories.
2. Coordination and scheduling responsibilities of the Contractor.

B. Related Sections

1. Section 01600 - Materials and Equipment

1.02 RESPONSIBILITY

A. Contractor is responsible for hiring an Independent Laboratory to conduct sampling and analyses. The Contractor has full responsibility for the scheduling, coordination and payment.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. E329, Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.04 REQUIREMENTS

A. Work included:

1. Cooperate with the Owner's selected testing agency and all others responsible or testing and inspecting the Work.
2. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in the Contract Documents.
3. Where no testing requirements are described, but the Owner directs testing, the Contractor shall provide testing under the requirements of this Specification.

B. Work not included:

1. Selection of testing laboratory: The Owner will select a qualified independent testing laboratory.

1.05 QUALITY ASSURANCE

A. Qualifications

1. The testing laboratory will be qualified to the Owner's approval in accordance with ASTM E329.

B. Regulatory requirements

1. Testing, when required, will be in accordance with all pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

2. Regulatory Requirements Inspections and tests required by codes or ordinances, or by a plan approved authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600 - Materials and Equipment.

B. Promptly process and distribute, to the Engineer, required copies of test reports and instructions to assure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

1.07 SCHEDULING

A. Establishing schedule

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.
2. Provide all required time within the construction schedule.
3. Coordinate testing activity with the appropriate testing laboratory.

B. Revising schedule

1. When changes of construction schedule are necessary during construction, coordinate all such changes with the testing laboratory as required.

C. Adherence to schedule

1. When the testing laboratory is ready to test according to the established schedule, but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back-charged to the Contractor and shall not be borne by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Site Tests

1. Representatives of the testing laboratory shall have access to the Work at all times and at all locations where the Work is in progress. Provide facilities for such access to enable the laboratory to perform its functions properly.
2. All specimens and samples for testing, unless otherwise provided in the Contract Documents, shall be taken by the testing personnel. All sampling equipment and personnel will be provided by the testing laboratory. All deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for temporary utilities required during construction.

1.02 GENERAL REQUIREMENTS

A. The Contractor is responsible for payment of all costs associated with the installation and operation of all temporary utilities necessary for the completion of the work. The General Contractor shall arrange with the Engineer and Owner methods of determining monthly utility costs for Temporary Utilities prior to connection of any temporary systems. The Contractor shall pay the Owner on a monthly basis for all temporary utility costs. The Temporary Utilities to be paid by the Contractor include but are not limited to the following: Electricity, Water, Sanitary, Heating, Ventilation, Plumbing and other services required to complete the work.

1.03 TEMPORARY WATER

A. Temporary pipe lines and connections from the permanent service lines, necessary for the use of the General Contractor and his Subcontractors shall be installed, protected, and maintained at the expense of the General Contractor.

B. Provide an adequate supply of drinking water from an approved source of acceptable quality, satisfactorily cooled, for his employees and those of his Subcontractors.

1.04 TEMPORARY ELECTRICITY

A. Provide electrical energy required for temporary lighting and power.

B. Temporary wiring of a special nature shall be paid for by the Contractor including but not limited to special circuits required by electric welders, elevators, lifts, pumps or other special equipment requiring high-amperage and/or special voltage service and exterior lighting circuits for protection against vandalism, public warning lights and lights for advertising, etc.

C. The General Contractor and all Subcontractors, individually, shall furnish all extension cords, sockets, motors, and accessories required for their work. They shall also pay for all temporary wiring of construction offices and buildings used by them.

D. Temporary wiring installed by the Electrical Subcontractor shall be removed after it has served its purpose.

E. Electrical work to be done in accordance with applicable codes.

F. Refer to special requirements for Myles Standish Pump Station in Section 01015.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide adequate sanitary facilities for the use of those employed on the Work. Sanitary facilities shall be made available when the first employees arrive on the site of the Work, be properly secluded from public observation, and be maintained during the progress of the Work in suitable numbers.

B. Maintain sanitary facilities in an orderly and sanitary condition at all times and enforce their use. Rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the Owner, or any adjacent property.

1.06 TEMPORARY HEATING

A. Within 30 calendar days after the execution of this Contract, submit in writing to the Engineer for approval, three copies of method and time schedule for heating during construction which shall concur with his progress schedule submitted under Specification Section 01300.

B. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices which may cause damage to finish surfaces shall not be used.

C. After the permanent heating system has been installed, tested, and made ready for operation, the Contractor may, at his own risk and expense, use it for providing heat for protection of the Work. He shall provide and pay for all fuel and care necessary, and, when the Work is ready for acceptance, he shall, at his own expense, put the system into first-class condition, even to the extent of replacing worn or damaged parts as directed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01525

TEMPORARY ENCLOSURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for protecting portions of the Work which are affected by inclement weather conditions.

B. Provide “Weather Protection” and heat to permit construction work to be carried on during the months of November through March. These Specifications are not to be construed as requiring enclosures or heat for operations that are not economically feasible to protect in the judgment of the Engineer. Included in the preceding category, without limitation, are such items as site work, excavation, pile driving, steel erection, erection of certain "exterior" wall panels, roofing, and similar operation.

1.02 SUBMITTALS

A. Within 30 calendar days after execution of this contract, submit in accordance with Specification Section 01300, proposed methods for "Weather Protection".

1.03 WEATHER PROTECTION

A. Weather Protection shall be provided for protection of that work adversely affected by moisture, wind and cold, by covering, enclosing and/or heating. This protection shall provide adequate working areas during dates consistent with the approved Progress Schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations.

B. Furnish and install all enclosures and be responsible for all costs, including heating required to maintain a minimum temperature of 40 degrees F., at the working surface. This provision does not supersede any specific requirements for methods of construction, curing of materials or the applicable general conditions set forth in the Contract Documents with added regard to performance obligations of the Contractor.

C. Installation of weather protection and heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection devices. Heating devices which may cause damage to finish surfaces shall not be used.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for cleaning, maintenance of the site, barriers and fences required during construction.

1.02 CLEANING DURING CONSTRUCTION

A. Unless otherwise specified under the various trade Sections of the Specifications, the General Contractor shall perform clean-up operations during construction as herein specified.

1. Control accumulation of waste materials and rubbish; periodically dispose of off-site. Bear all costs, including fees resulting from disposal.
2. Clean interior areas prior to start finish work and maintain areas free of dust and other contaminants during finishing operations.
3. Maintain project in accordance with all local, State and Federal Regulatory Requirements.
4. Store volatile wastes in covered metal containers, and remove from premises.
5. Prevent accumulation of wastes that create hazardous conditions.
6. Provide adequate ventilation during use of volatile or noxious substances

B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.
2. Do not dispose or volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
3. Do not dispose of wastes into streams or waterways.
4. Use only those materials which will not create hazards to health or property and which will not damage surfaces.
5. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
6. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and wind blown debris, resulting from construction operations.
7. Provide on-site containers for collection of waste materials, debris, and rubbish.
8. Remove waste materials, debris, and rubbish from the site periodically and dispose of at legal disposal areas off the construction site.
9. Handle material in a controlled manner with as little handling as possible. Do not drop or throw materials from heights.
10. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.
11. During its progress, the work and the adjacent areas affected thereby shall be kept cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
12. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes, structures, work done under this contract, or

elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc. shall, upon completion of the work, be left in a clean and neat condition.

1.03 DUST CONTROL

A. Provide adequate means for the purpose of preventing dust caused by construction operations throughout the period of the construction contract.

B. This provision does not supersede any specific requirements for methods of construction or applicable general conditions or performance obligations of the General Contractor.

1.04 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize amount of bare soil exposed at one time.

C. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts for clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

F. Construct sediment control devices for discharge from dewatering trenches.

G. Construct all sedimentation control devices shown on the plans.

1.05 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with Silencers, and power equipment with mufflers.
2. Manage vehicular traffic and scheduling to reduce noise.

1.06 POLLUTION CONTROL

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

1.07 SURFACE WATER CONTROL

A. Take all precautions to prevent damage to the work or equipment by high waters or by storms. The Engineer with the approval of 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.

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 Engineer may require, at no additional expense to the Owner.

1.08 BARRIERS AND ENCLOSURES

A. Fences and Barricades

1. Provide and maintain temporary fences, barriers, lights, guardrails, and barricades as indicated in the Contract Documents, or as necessary to secure the Work and adjacent property, and protect persons and property.
2. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate tasks requiring items mentioned herein.

B. Protection of Trees

1. The Contractor shall take care not to harm trees along the sides of roads or with in the existing facility in which the construction work is to be done or trees on adjacent lands except as indicated on the drawings or with the written permission of the Owner and any other owner of the trees involved. Care shall be taken not to cut tree roots so as to harm the growth of trees to remain.
2. If, in the opinion of the Engineer, any trees damaged during construction can be repaired, the Contractor shall satisfactorily repair same at no further cost to the Owner.
3. If, in the opinion of the Engineer, any tree damaged during construction cannot be repaired and should be removed, the Contractor shall satisfactorily remove and replace, in kind, same at no further cost to the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for delivery, storage, handling and installation of systems, materials, manufactured units, equipment, components, and accessories used in the work.

B. Related Sections

1. Section 01300 - Submittals

1.02 DELIVERY

A. Refer to Specifications' Sections for requirements pertaining to delivery and handling of materials and equipment.

B. Transport products by methods to avoid product damage; deliver in undamaged condition in manufacturers' unopened containers or packaging, dry.

C. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

D. Promptly inspect shipments to assure that products comply with requirements, that quantities are correct, and products are undamaged.

1.03 STORAGE AND PROTECTION

A. Refer to Specifications' Sections for requirements pertaining to storage and protection of materials and equipment.

B. Store products in accordance with manufacturers' instruction, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by manufacturers' instructions.

C. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.

D. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage to provide access for inspection. Periodically inspect to assure that products are undamaged, and are maintained under required conditions.

1.04 INSTALLATION STANDARDS

A. Comply with Specifications and referenced standards as minimum requirements.

B. Components required to be supplied in quantity within a Specification Section shall be the same, and shall be interchangeable.

C. Do not use materials and equipment removed from existing structures, except as specifically required, or allowed, by the Contract Documents.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

F. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300 - Submittals, distribute copies to persons involved, and maintain one set in field office.

G. Perform work in accordance with details of instructions and specified requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01631

USE OF OTHER THAN FIRST NAMED MANUFACTURER

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section includes requirements related to the Contractor's responsibilities when using a named manufacturer or product other than the first named.

1.02 EQUIVALENT MATERIALS AND EQUIPMENT

A. Whenever a material, article, or method is specified or described by using the name of a proprietary product or the name of a particular manufacturer(s) or vendor(s), followed by the phrase "or equal," the specific item mentioned shall be understood as establishing the type, function, dimension, appearance, and quality desired and is to be the basis upon which bids are to be prepared, subject to the provisions of this Section.

B. In every instance, the design was completed using criteria required to accommodate the first named manufacturer. When practical, other named manufacturers were included in the Technical Specifications based upon performance and design criteria comparable to the first named. However, in some instances, the size, shape, loadings, configuration, and/or other design criteria for other named manufacturers may require redesign of the Work. Other named manufacturers may be used subject to the requirements of this Section.

C. When the Contractor uses any manufacturer or product other than the first named in the specifications, which use requires modification to the Work, the Contractor shall, to the satisfaction of the Program Manager, review and revise the design of the Work, including coordination with other Technical Specification sections to ensure that all component units fit and function as a whole, to properly accommodate the use of that product.

D. The Contractor shall bear the costs and liability for all redesigned elements of the Work necessary to properly accommodate the proposed item.

1.03 SUBMITTALS

A. In addition to the requirements of Section 01300, the Contractor shall submit complete data and engineering documents that provide a complete analysis of the proposed item and the extent of the redesign of the Work necessary to properly incorporate the proposed item into the Work. The Contractor shall:

B. Identify each and every element of the design of the Work that must be modified to:

1. Accommodate the proposed item.
2. Coordinate the proposed item with the overall design, inclusive of all related disciplines.
3. Ensure the proper functioning of the entire system in which the item is to be incorporated.

C. Include complete engineering drawings, bearing the seal of a Professional Engineer registered in the State of Rhode Island, addressing all requirements in 1.02 above.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF USE OF OTHER THAN FIRST NAMED MANUFACTURERS

SECTION 01665

SERVICES OF MANUFACTURER'S REPRESENTATIVES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for services provided by manufacturer's representatives.

1.02 SERVICES OF MANUFACTURER'S REPRESENTATIVES

A. General

1. Arrange for a qualified factory trained service representative from each company manufacturing or supplying certain equipment and systems, as listed in the Table at the end of this section and as specified in Division 11 through Division 16, to perform the duties described herein.
2. Qualified factory trained service representatives shall be approved by the Engineer
3. All 8-hour days specified herein and in other sections of the specifications are exclusive of travel time
4. Services of Manufacturer's Representative shall not commence until an Operation and Maintenance Manual has been submitted and approved for each piece of equipment and system.

B. Supervision of Installation

1. Provide on-site supervision and advice to the Contractor to insure that proper procedures are followed during equipment installation.

C. Equipment Checkout

1. Inspect, align, operate, test and adjust the equipment after equipment installation has been completed and equipment is presumably ready for operation, but before it is operated by others.
2. The inspection shall include, but shall not be limited to, the following points as applicable:
   a. Soundness (without cracked or otherwise damaged parts)
   b. Completeness in all details as specified
   c. Correctness of setting, alignment, and relative arrangement of various parts
   d. Adequacy and correctness of packing, sealing and lubricants.
3. Operate, test and adjust the equipment, as required, to prove that the equipment is left in proper condition for satisfactory operation under the conditions specified.
4. Upon completion of the work, submit a complete signed report of the result of the inspection, operation, adjustments and tests to the Engineer via the Contractor. The report shall include:
   a. Detailed descriptions of the points inspected and work completed
   b. Deficiencies noted and/or corrected
   c. Tests and adjustments made
   d. Quantitative results obtained if such are specified
   e. Suggestions for precautions to be taken to ensure proper maintenance

f. A certificate that specifically states that "… the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacture's warrantee null and void".

D. Field Acceptance Test

1. Tests shall be conducted by the Contractor, with assistance from the manufacturer's representative, after the Engineer has reviewed completed and equipment checkout report
2. Manufacturer's representative shall be present during field acceptance tests

E. Pre-Startup Operator Training

1. General
   a. Provision for classroom and hands on training to plant personnel in the operation and maintenance of the equipment prior to placing the equipment in full operation.
   b. Provide the Owner's personnel and their consultants with sufficient information and skills training on the theory, design, site specific operation and maintenance practices (including items such as routine monitoring with normal and abnormal parameters, troubleshooting techniques, and preventive and corrective maintenance requirements) to insure that equipment and systems can be efficiently and effectively operated and maintained by the trainees upon completion of the training.
   c. Training shall be a combination of classroom, field observance and hands-on applications.
   d. Provide the following as specified herein:
      1) Lesson Plans
      2) Trainee Manuals
      3) Catalog of training materials.
   e. The Contractor shall provide a credit to the Owner for any unused instructor hours.
   f. Training classes shall be based on the approved Contractor Operation and Maintenance Manual.
   g. Conduct the training at scheduled times in accordance with the Contractor's approved comprehensive training schedule for all equipment, system and components. All training shall be coordinated and scheduled with the Owner a minimum of 7 days in advance. All training sessions will be conducted during the day shift. Currently the day shift is approximately 7:00 AM to 3:00 PM. For scheduling and training effectiveness, no one class will be longer than 4 hours.
2. Operations Sessions
   a. Overview of the equipment and its' auxiliary support/systems covering nomenclature, function and theory of operation.
   b. General safety requirements for operation of the equipment and its' auxiliary/support systems, including suggested safety equipment.
   c. Pre-start-up safety and equipment check.
   d. Equipment and auxiliary/support systems start-up procedures covering manual and automatic modes, if available.
   e. Routine operation and monitoring requirements; including specifics on normally expected ranges for items such as oil, water pressure and temperatures, discharge pressures, sensory observations, etc., procedures to change operating parameters (such as air or flow rates).
   f. Equipment/systems shut down procedures covering manual and automatic modes (if applicable).
   g. Operational troubleshooting of equipment and auxiliary/support systems.
   h. Procedures for handling non-routine operational problems such as response to alarms, power failures, emergency shutdown, auxiliary/support system failures, etc.
3. Maintenance Sessions

a. If session is specific to a discipline; (e.g., electrical, mechanical, I&C), include only appropriate maintenance items for the discipline. If session is to include multiple disciplines, include all items for those disciplines and indicate in submittal outline which discipline the material refers to.
b. For All Disciplines provide:
    1) An overview of the equipment and its' auxiliary/support systems covering nomenclature, function and theory of operation.
    2) General safety requirements for maintenance of the equipment and its' auxiliary/support systems appropriate to each discipline including suggested safety equipment and practices. Cover local/remote lockout procedures, safe procedures for handling alarms and built in safety devices during preventive and corrective maintenance.
    3) Overview of pre-start-up, routine operation monitoring, and shutdown procedures covering automatic and manual modes (if applicable).
c. For Each Specific Discipline provide:
    1) Preventive maintenance procedures to be followed; include parts' lube quantities, types, frequencies, application points, time requirements to perform procedures, etc.

       Note: Information should be provided to trainees from the O&M manuals which cross references manufacturer's lube requirements.
    2) Specific procedures to cover adjustment requirements for alignment, wear, calibration, etc. for all preventive maintenance and corrective maintenance procedures, including time required to perform.
    3) Special tools, techniques or procedures required for either preventive or corrective maintenance of equipment or its' auxiliary support systems.
    4) Assembly/disassembly procedures required for preventive or corrective maintenance, including time required to perform.
    5) Maintenance troubleshooting of equipment and auxiliary/support systems.

F. Post-Startup Services

1. Provision for assistance to the Owner in the calibration, tuning and troubleshooting, plus any additional training which may be required during the one-year guarantee period.

1.03 SUBMITTALS

1. Submit instructor qualifications, training outline, and lesson plans 90 calendar days prior to pre-startup operator training. Qualifications of the factory trained service representative, as defined below.

2. Submit trainee manuals at least 30 calendar days prior to scheduled training.

3. Training Outline/ Lesson Plans:

    a. 4 copies
    b. Training outline/lesson plans to cover each major trainee group (i.e.: operations, electrical maintenance, instrumentation, etc). If the same session outline is to be used for more than one type of trainee group, such as one which would cover equipment identification and principals of operation, this information should be so indicated on the outline. The outline should be detailed and include length of session for each major topic and type of session; i.e., field or classroom.
    c. The lesson plan shall be cross referenced to the trainee manuals provided and include instructor references for the use of training aids, training strategies, etc. They should contain sufficient technical material to guide the instructor in the delivery of the training material session. Lesson plans are to be provided for each separate technical discipline to be trained. Generic "informational" lesson plans may be used for

multiple trainee discipline target groups. The specific number of lesson plans for each session will be determined by the complexity, content and objectives of the subject equipment covered.

d. The purpose of the manual is to provide specific guidance for the instructor and the trainees on what is to be taught and how, as well as to insure consistency and completeness of the sessions when they are presented to different groups of the same target trainee group.

4. Trainee Manuals

   a. **4** final copies.
   b. Key trainee manuals to the training outline. Copies should be available to pass out to each trainee at the session, they are to be retained by the trainee for future use. This trainee manual is not the O&M manual required in the specification, however, similar materials may be included as appropriate.
   c. The purpose of the manual is to provide an organized package of information for the trainee, which will be used during the training sessions as well as for future reference material.
   d. The organization of the manual should correspond to the training outline. Material in the manual should include information on the training topics, the training outline, and other relative reference material. Specifically, all manuals should be geared toward an eighth grade level of reading.
   e. Manuals for Operations training sessions should include a description of the equipment, pre-start-up checks, start-up and shutdown procedure, specific monitoring checks including expected parameters, troubleshooting and safety procedures, etc. as described previously.
   f. Manuals for Maintenance training sessions should include a description of the equipment, pre-start-up checks, start-up and shutdown procedure, specific monitoring checks including expected parameters, troubleshooting and safety procedures, etc. as described previously.

5. 2 copies of a catalog of all training materials including training outline, lesson plans and trainee manuals.

1.04 QUALITY ASSURANCE

A. Qualifications

1. Factory trained service representative shall have the training and experience to provide technical and/or process related advice, and/or assistance, relating to the installation, operation, maintenance and utilization of the products that he represents. Additional qualifications may be specified elsewhere.
2. Representative is subject to acceptance by Engineer. No Substitute representatives will be allowed unless prior written approval by Engineer has been given.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

A. Equipment and Components Requiring Services is listed in the Table at the end of this section.

B. Provide a credit to the Owner for unused service manhours as specified below, at the manufacturer's published field service rate plus travel costs.

SERVICES OF MANUFACTURER'S REPRESENTATIVE
Manhour Requirements Table

Specification Section	Section Number	Supervision of Installation	Equipment Checkout	Field Acceptance Tests	Pre-Startup Operator Training	Post-Startup Services
Submersible Sewage Pumps	11305	4	4	4	4	4
Hoisting Equipment	14600	4	4	4	4	4
Instrumentation & Control System	13300	N/A	16	16	4	16
Permanent Generator	16612	N/A	4	4	4	4
Portable Generator	16613	N/A	4	4	4	4
VFD and motor starter equipment	13300	N/A	4	4	4	4
Automatic Transfer Switch	16085	N/A	4	4	4	4
Manual Transfer Switch	16085	N/A	4	4	4	4

Hours presented are representative of those required **for each pump station** where applicable improvements are made.

EQUIPMENT CERTIFICATION

Owner: _____ Date: _____

Project : _____

_____

Contractor: _____

_____

Equipment Manufacturer: _____

_____

Equipment: _____

Specification Section: _____

As an authorized representative of the Equipment Manufacturer, the undersigned certifies that the equipment listed above conforms to the requirements of the construction contract between the Contract and the Owner. The undersigned further certifies that the equipment has been installed in accordance with the Manufacturer's written instructions, that the equipment is ready for permanent operation and that nothing in the installation will render the Equipment Manufacturer's warranty null and void.

_____ Date: _____
(Authorized Manufacturer's Representative)

_____ Date: _____
(Witness)

Remarks:_____
_____
_____
_____
_____

EQUIPMENT TRAINING CERTIFICATION

Owner: _____ Date: _____

Project: _____

_____

Contractor: _____

_____

Equipment Manufacturer: _____

_____

Equipment: _____

Specification Section: _____

As an authorized representative of the Equipment Manufacturer, I certify that I have trained the Owner's personnel in the proper operation and maintenance of the above equipment.

_____ Date: _____
(Authorized Manufacturer's Representative)

The following personnel listed below attended the training session(s):

_____
_____
_____
_____

_____ Date: _____
(Owner's Representative)

_____ Date: _____
(Beta Group, Inc. Witness)

END OF SECTION

SECTION 01680

EQUIPMENT AND SYSTEM CHECKOUT, CERTIFICATIONS AND TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements and procedures for physical checkout certification, and testing of equipment.

1.02 DEFINITIONS

A. Shop Testing is defined as testing that is done by the manufacturer either at the place of manufacture, the place of assembly, or at another location where the required testing apparatus is located, for the purpose of proving that the equipment meets the requirements of the pertinent technical specification(s).

B. Equipment Checkout, Inspection and Certification is defined as the process of physically inspecting products after they have been installed in the work, and then certifying that the products have been properly and completely installed, and are ready for field and/or functional testing.

C. Field Testing is defined as testing that is performed by the Contractor with supplier assistance on products they have been installed in the work and after the performance of physical checkout, for the purpose of proving that the tested products meet the requirements of the pertinent technical specifications. While field testing can be described as "shop testing in the field", it may be required regardless of whether or not shop testing was performed on the same piece of equipment or material.

D. System Testing is defined as testing performed on a "system" normally comprised of two or more pieces of equipment, after the equipment has been installed in the work, and after physical checkout and field testing has been completed, for the purpose of providing that the system meets requirements as specified and as indicated.

E. Manufacturer's Representative, sometimes referred to as the Factory-Trained Service Technician, is defined as a person or persons provided by the manufacturer, who is qualified by having the training and experience to provide technical and/or process related advice, and/or assistance, relating to the installation or utilization of the products provided by that same manufacturer, for installation and utilization in the work. Such training and experience shall include a minimum of three years participation in similar work including no less than three similar projects during this three year period. The qualifications of each representative must be submitted to the Engineer for approval at least 30 days prior to their first site visit.

F. The Testing Checkout Coordinator is defined as the person provided by the contractor to coordinate and oversee the total spectrum of testing and inspection activities required by the contract documents. The testing and checkout coordinator shall have been in responsible charge of at least two similar projects in the last four years.

1.03 ROLES AND RESPONSIBILITIES

A. The Contractor shall provide all outside services, materials, labor, supplies, test equipment and other items necessary to perform the testing specified herein. In addition, arrange for and provide the participation or assistance of survey crews, engineers, quality control technicians, manufacturers' representative(s), and required governmental agency representatives.

1.04 CHECKOUT PLAN

A. The Contractor shall submit a checkout plan based upon the requirements defined herein to the Engineer. Six copies of checkout plan (preliminary) shall be submitted for review within 90 calendar days prior to the proposed date of the first test, whichever occurs first. The plan shall define:

1. The logical and systematic performance of physical inspections, shop, field, and system tests.
2. A list of all shop tests, and supplier certifications, including those required by the applicable technical specifications. Provisions shall also be included for retesting in the event it is required.
3. Participants in the testing.
4. Special test equipment.
5. Sources of the test media (water, power, air) and the proposed method of delivery of the media to the equipment to be tested.
6. Ultimate disposal of the test media.

B. The plan shall be reviewed by the Engineer, modified or revised as necessary by the Contractor, then approved by the Engineer. The Contractor shall continue to update the checkout plan, working in conjunction with the Engineer prior to the start of the scheduled equipment checkout and functional testing activities.

C. The Contractor shall designate, in the checkout plan, a testing and checkout coordinator to coordinate and manage the activities defined in the checkout plan, as approved by the Engineer.

1.05 EQUIPMENT AND SYSTEM CHECKOUT AND CERTIFICATIONS

A. Checkout is defined as inspection by the Contractor, Engineer and Owner to verify conformance to the contract drawings and specifications. Checkout procedures will be conducted by the Contractor in the presence of the Engineer and Owner to verify the presence, appropriateness, and proper construction or installation of each being “checked out". Typical elements of the checkout include the following:

1. Verify exterior areas for backfill, grading, surfacing, drainage, landscaping, roadways, fencing, and gates.
2. Verify buildings for structure, masonry, architectural, mechanical systems, electrical/lighting, communications, and HVAC.
3. Verify concrete structures for structural integrity, finish tolerance, durability, appearance, embedded and inserted items, painting and surface applications.
4. Verify steel structures for member alignment, connection bolts torque, connection welds integrity, painting, fire proofing and surface applications.
5. Verify mechanical systems and items for setting, alignment and securing, check and adjust packing and seals, lubrication, drying out, drive connection and alignment

including rotation and belt/chain tension, painting or surface applications, and tagging for project system.

6. Verify piping systems for material, size, components, direction, alignment of joints and bolts/welding, packing and seals, screens and filters and strainers, leak and pressure hydro tests, painting and color coding, hangers and anchors and expansion provision and supports, clean out of foreign matter and tagging for project system.
7. Verify electrical and control/instrumentation systems for conduit and tray installation, wire/cable material and size, circuit continuity and identification, voltage testing, ground continuity and testing, terminal installation and identification, jar switches and circuit breakers and transformers tested, substation operation tested, and tagging for project system.
8. Verify communication system including telephone, fire/smoke alarm, security, page/part, closed circuit TV similar to electrical above.
9. Verify computer systems by station, function, and network interface.

B. Each piece of equipment and system must be certified by the manufacturer's representative as specified in Section 01665 Services of Manufacturer’s Representatives.

C. Certifications shall not be completed until an Operation and Maintenance Manual has been submitted and approved.

1.06 FIELD TESTING OF EQUIPMENT

A. When required by the technical specifications, perform field testing on installed equipment. Field testing shall be in addition to and not in lieu of, any shop testing either required or otherwise performed. Perform field testing as a part of the overall equipment and system testing process defined herein and in accordance with the approved checkout plan.

B. Provide ninety days written notice indicating the date and time for testing one piece of equipment, or a series of equipment pieces. Submit with this notice the following for approval by the Engineer:

1. Description of the tests, specifically outlining how the test will prove conformance with the requirements in the technical specifications.
2. Testing devices that will be used in the tests. Description shall state what portion of the tests that the devices will perform or measure, and device accuracy.
3. Personnel used to perform the tests. Submit resumes, qualifications, and experience. As a minimum, personnel must have three years experience with the manufacturer and operation of the equipment to be tested and will have participated in five similar tests during this period of experience.
4. Schedule of testing. Schedule shall include frequency of measurements, personnel present, and contingency plans for equipment and/or test failure.
5. Test forms. Provide test forms for recording reporting on the field test data, prior to the test.
6. Material and equipment required for the test. This material and equipment shall be supplied at no additional cost to the Owner.
7. Water and Power Requirements. Water and power requirements shall be identified in the plan by the Contractor and will be supplied by the Contractor for field testing purposes. The Contractor shall provide all temporary piping and wiring required for field testing; and equipment and labor for the reuse of the test water. When testing is performed with water during freezing conditions, the Contractor shall take measures to prevent damage to the work caused by freezing of the water.

8. Operational Requirements. Include valve positions, set-ups, gate positions, including temporary arrangements that are required to run the tests so that the Owner can anticipate and plan for the testing situation.
9. Provide seven days written notice to the Engineer prior to the actual start of any testing. This will include a statement by the Contractor that the equipment and facilities to be tested have been thoroughly inspected and cleaned of construction debris or other extraneous materials and all lubrication, materials, and preparations are completed.

C. Field test procedures will be reviewed and returned by the Engineer within 30 days of receipt. Incorporate minor comments on the procedures, equipment, or personnel prior to testing. Major comments by the Engineer will require a resubmission of the field test procedure and proposed test date. The Contractor will be notified, in writing, by the Engineer if a formal resubmission is required with the transmittal of the review comments.

D. Submit within one week after completion of the tests, the following to the Engineer for approval:

1. Completed test forms for each device tested.
2. Completed certification documentation.
3. A written summary of testing, reporting on the results and summarizing the entire procedure.
4. A schedule for retesting, if necessary. Perform any retesting required to fulfill the intent of the technical specification test requirements at no additional cost to the Owner.

1.07 SYSTEM TESTING

A. Specific system tests shall be performed by the general contractor in addition to the requirement for shop, field, and other tests called for in the technical specifications. System tests will be performed with fluid or gaseous substances that are generally non-septic, non-corrosive, non-toxic, and non-inflammable.

B. Provide 30 days written notice indicating the date and time during which the specific functional test is proposed. Submit with this notice, the following to the Engineer for approval:

1. Testing devices that will be used in the tests. Description shall state what portion of the tests that the devices will perform or measure, and device accuracy.
2. Personnel used to perform the tests. Submit resumes, qualifications, and experience. As a minimum, personnel must have three years experience with the manufacturer and operation of the equipment to be tested and will have participated in five similar tests during this period of experience.
3. Schedule for Testing: Schedule shall include frequency of measurements, personnel present, and contingency plans for equipment and/or system test failure.
4. Test forms. Provide test forms for recording reporting on the field test data, prior to the test.
5. Material and equipment required for the test. This material and equipment shall be supplied at no additional cost to the Owner.
6. Water and Power Requirements. Water and power requirements shall be identified in the plan by the Contractor and will be supplied by the Contractor for system testing purposes. The Contractor shall provide all temporary piping and wiring required for field testing; and equipment and labor for the reuse of the test water. When testing is performed with water during freezing conditions, the Contractor shall take measures to prevent damage to the work caused by freezing of the water.

7. Operational Requirements. Include valve positions, set-ups, and gate positions that are required to run the tests in the written request so that the Engineer can anticipate and plan for the testing.
8. Provide seven days written notice to the Engineer prior to the actual start of any testing. This will include a statement by the Contractor that the equipment and facilities to be tested have been thoroughly inspected and cleaned of construction debris or other extraneous materials and all lubrication, materials, and preparations are completed.

C. The Engineer, and the Owner may witness the performance of these tests, at their option.

D. A review of the system test package by the Engineer will be made within two weeks of receiving the package. The Contractor shall incorporate minor comments on the procedures, equipment, and personnel prior to testing. Major comments by the Engineer will require a resubmission of the system test package and test date.

E. Submit within one week after completion of the tests, the following to the Engineer for approval.

1. Completed test forms, for each device.
2. Completed certification.
3. A written summary of testing, reporting on the results and summarizing the entire procedure.
4. A schedule for retesting, if necessary, including changes to procedures, testing devices, or personnel. Any retesting required to fulfill the intent of the test requirements due to negligence, poor workmanship, or products that fail to meet the contract requirements, shall be at no additional cost to the Owner.

1.08 CORRECTIONS TO THE WORK

A. Correct any items of work failing to meet the specified requirements, at no additional cost to the Owner. Correct the nonconforming items by re-work, modification, or replacement, to the option of the Engineer. This includes the provision of all required labor, materials, and requirements for retesting as specified herein, to verify that the items conform with contract documents.

1.09 SAFETY

A. Conduct all specified test procedures in compliance with all applicable safety standards and regulations.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01700

CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for specific administrative procedures, record keeping, close-out submittals, and forms used at substantial and final completion of the Work.

B. Contractor shall satisfy all administrative requirements within the Contract Documents and the Requirements listed in this section prior to Contract Close-out.

1.02 FINAL CLEANING

A. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

B. The Contractor shall restore or replace, when and as directed, any public or private property damage by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required, all necessary highway or driveway, walk and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

C. Unless otherwise specified under the various Sections of the Specifications, the Contract or shall perform final cleaning operations as herein specified prior to final inspection.

D. At completion of work, remove waste materials, rubbish tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

E. Cleaning shall include all surfaces, interior and exterior in which the Contractor and all Subcontractors have had access whether existing or new.

F. Refer to Sections of the Specifications for cleaning of specific products or work.

G. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

H. Use only those cleaning materials and methods that are recommended by the manufacturer of surfaces material to be cleaned.

I. Employ experienced workmen, or professional cleaners, for final cleaning operations.

1.03 PROJECT RECORD DOCUMENTS

A. Project Record Documents also referred here as Record Drawings shall consist of all the contract drawings.

B. The Contractor and all Subcontractors shall be required to maintain one set of Record Drawings, as the work relates to their Sections of the Specifications, at the site.

C. Record Drawings shall be stored and maintained in the General Contractor's field office apart from other documents used for construction. The Record Drawings shall be maintained in a clean, dry, and legible condition and shall not be used for construction purposes.

D. Record Drawings shall be available at all time for inspection by the Engineer. All deficiencies noted shall be promptly corrected.

E. The following information shall be indicated on the Record Drawings for building construction:

1. Record all changes, including change orders, in the location, size, number, and type both horizontally and vertically of all elements of the projects which deviate from those indicated on all the contract drawings.
2. The tolerance for the actual location of utilities and appurtenances within the building to be marked on the Record Drawings shall be plus or minus two (2) inches.
3. The location of all underground utilities and appurtenances referenced to permanent surface improvements, both horizontally and vertically at ten (10) ft. intervals and at all changes of direction.
4. The location of all internal utilities and appurtenances, concealed by finish materials, including but not limited to valves, coils, dampers, vents, clean outs, strainers, pipes, junction boxes, turning vanes, variable and constant volume boxes, ducts, traps and maintenance devices. The location of these internal utilities, appurtenances and devices shall be shown by offsets to the column grid lines on the drawings.
5. Each of the utilities and appurtenances shall be referenced by showing a tag number, area served and function on the Record Drawings.
6. Prior to the installation of all finish materials, a review of the Record Drawings shall be made to confirm that all changes have been recorded. All costs to investigate such conditions shall be borne by the applicable party as demonstrated by the Engineer.

F. The following information shall be indicated on the Record Drawings for sewer construction:

1. Location of manholes with 3 swing ties.
2. Linear distance of sewer from manhole to manhole, including size and type of pipe.
3. Manhole rim elevation and invert elevations of all pipes within manholes, including drops.
4. Recalculated pipe slopes based on record elevations.
5. Location in feet from downstream manhole of wyes and chimneys and vertical height of chimneys.
6. Length of service connections.
7. Location of service connection terminus (at property line) with 3 swing ties and depth from existing surface grade.
8. Pumping station information as detailed in 1.03, E.

G. The following information shall be indicated on the Record Drawings for water main construction:

1. Linear distance along watermain from appurtenance (i.e. vault to tee, tee to bends, bends to valves, blow offs and service corporations, including size and type of pipe.
2. Depths of pipe and fittings.
3. Location of vaults, valves, hydrants, bends, blow offs and service curb boxes with 3 swing ties.
4. Rim elevation on vaults (meter, air release etc.).

H. The following information shall be indicated on the Record Drawings for storm drain construction:

1. Rim elevations on inlets, catch basins, manholes and other structures.
2. Invert elevations of all pipes within inlets, catch basins, manholes, end sections, headwalls, culverts and other structures.
3. Linear distance along drain from structure to structure, and branch connections, including size and type of pipe.
4. Recalculated pipe slopes based on record elevations.
5. Location of manholes, inlets, catch basins, outlets, headwalls, other structures and service line connections with 3 swing ties.

I. At the end of each month and before payment for materials installed, the Contractor, and his Subcontractors, shall review Record Drawings for purpose of payment. If the changes in location of all installed elements are not shown on the Record Drawings and verified in the field, then the material shall not be considered as installed and payment will be withheld.

J. At the completion of the contract, each Subcontractor shall submit to the Contractor a complete set of his respective Record Drawings indicating all changes. After checking the above drawings, the Contractor shall certify in writing on the title sheet of the drawings that they are complete and correct and shall submit the Record Drawings to the Engineer.

1.04 EQUIPMENT AND SYSTEM CHECKOUT, CERTIFICATIONS AND TESTING

A. Comply with requirements of Section 01680 Equipment and System Checkout, Certifications and Testing.

1.05 OPERATING AND MAINTENANCE MANUALS

A. Comply with requirements of Section 01730 Operation and Maintenance Manuals.

1.06 SPARE PARTS

A. Comply with requirements of Section 01750 Spare Parts.

1.07 LUBRICANTS

A. Comply with requirements of Section 01751 Lubricants.

1.08 WARRANTIES

A. Comply with requirements of Section 01740 Warranties.

1.09 FINAL INSPECTION

A. The Contractor shall submit written certification that:

1. Project has been inspected for compliance with Contract Documents.
2. Equipment and systems have been tested in the presence of the manufacturer's representative and are operational and satisfactory.
3. Project is completed, and ready for final inspection.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01710

STARTUP

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Startup requirements for processes, equipment and components, and the roles and responsibilities of the Contractor and the Owner.

1.02 DEFINITIONS

A. Startup: The initial operation of a sufficiently completed facility and/or plant by the Owner, utilizing wastewater and related substances (sludge, wastewater, scum), or other media, which the facility has been designed to process.

1.03 DESCRIPTION OF WORK

A. The primary responsibility for startup rests with the Contractor with assistance from the Owner as specified herein.

B. The Contractor shall not operate any of the existing facilities at any time. This shall include the starting and stopping of equipment or opening and closing of valves. Whenever the Contractor believe his work will effect or be effected by the existing facilities operation he shall so notify the Engineer in writing three (3) working days prior to the intended start of the work. This notification shall clearly detail the work to be completed, the method by which the existing facilities operation may be effected and the assistance requested of the Owner.

C. At the discretion of the Engineer, individual startups may be required for various phases of the work. If this occurs, the phase startups will be ordered by the Engineer when the following has been completed for all equipment and systems within each Phase. The Engineer may order the startups prior to the completion of non-essential items of work.
   1. Compliance with Section 01665 Services of Manufacturer's Representatives, including:
      a. Supervision of Installation
      b. Equipment Checkout
      c. Field Testing of Equipment
      d. Pre-Startup Operator Training
   2. Compliance with requirements of Section 01680 Equipment and System Checkout, Certifications and Testing
   3. Compliance with requirements of Section 01730 Operation and Maintenance Manuals
   4. Compliance with requirements of Section 01750 Spare Parts
   5. Compliance with requirements of Section 01751 Lubricants

D. The Contractor shall be responsible for maintaining all equipment until the dates of substantial completion.

E. The Contractor shall assist the Owner during startup in any way deemed appropriate by the Engineer.

F. There will be a date of substantial completion certified by the Engineer for each Phase of construction. These dates will not be certified until the following requirements have been satisfied by the Contractor:

1. All Contract requirements are coordinated into a fully operational system. All individual units of equipment and treatment processes are fully operative and performing at specified efficiencies. Where efficiencies are not specified, performance must meet acceptable standards for the particular unit.
2. All field tests have been completed and satisfactorily reports forwarded to the Engineer.
3. All pre-startup training has been completed by the manufacturer's representatives.
4. All spare parts and lubricants have been satisfactorily delivered to the Owner.

1.04 ROLES AND RESPONSIBILITIES

A. Contractor’s Responsibilities

1. Startup
   a. Develop specific startup plans and schedule.
   b. Provide specific startup material and operating supplies until substantial completion or until acceptance of a specific system. Supplies include lubricants, chemicals, gases, specialized fluids, electric power, water (City and non-potable process water) and all other required appurtenances.
   c. Provide the necessary craft or labor assistance, in the event of an emergency equipment failure requiring immediate attention, (emergency is defined as a failure of function which precludes the further operation of a critical segment of; or the whole of the work) with a response time of not less than four hours from the time of notification. The time of notification is defined as the time of contact between the Engineer's representative and the Contractor's representative.
   d. Clarify submittals, testing requirements, schedules, or other items related to the startup of the equipment and facilities specified and indicated in the Contract Documents.
   e. Correct all failures or equipment problems identified during startup when notified by the Engineer.
   f. Attend meetings related to the review of startup plan(s).

2. Performance Testing (where specified in individual technical specifications Sections 11 through 16).
   a. Review procedures for performance testing.
   b. Provide manufacturer's representative to provide guidance during performance testing.
   c. Provide manufacturer's representatives and operating supplies for retesting of systems that fail to pass the initial performance tests due to deficiencies in products or workmanship at no additional cost to the Owner.
   d. Resolve and correct all equipment or system failures during the performance testing.

3. Provide to the Engineer a list of 24 hour, "on call" representative supervisory persons who will monitor the startup and performance testing.

B. Owner’s Responsibilities

1. Assist in the startup testing activities. The Owner will endeavor to be cooperative with the Contractor when required. However, it is emphasized that the existing facilities operations and treatment take precedence and only requests that do not adversely affect the flow or treatment will be considered. Additionally, any assistance given to the Contractor must be completed when the Owner's schedule and manpower permit. There

may be instances when the Owner cannot provide assistance at the time of the Contractor's request and this shall not be the basis for a claim by the Contractor.

2. Provide staff to operate and maintain equipment, systems, and facilities requiring startup.

1.05 SUBMITTALS

A. Specific Startup Plans and schedule for all phases of startup.

B. List of 24-hour "on call" representative supervisory persons.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for compiling and submitting operation and maintenance manuals.

1.02 OPERATION AND MAINTENANCE MANUALS

A. General

1. Include all elements and components of the system including instrumentation. Provide a description of how the equipment or complete system works. Additionally, where a number of components are furnished to provide a complete system, describe the operation of components as they relate to the complete system.
2. Include all necessary instruction for the maintenance and operation of the equipment or system in accordance with the manufacturer's recommendations, and as herein specified.
3. Customize the manual so that only data pertaining to the specific equipment or system to be furnished is included. If a standard type manual is utilized, it shall be neatly annotated to highlight the data pertaining to, and deleting the data not pertaining to, the specific equipment or equipment being furnished.
4. Bind each manual for each type of equipment or system separately as specified below

B. Content of Manuals

1. Table of Contents and index. Provide title of Contract and schedule of products and systems, indexed to content of the volume.
2. Brief description of each system and components. Identify function, normal operating characteristics and limiting conditions. Include performance curves, with engineering data and tests. Include equipment Nameplate Data (Serial No., Model No., rating, voltage, etc.).
3. Names, addresses, and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
4. One copy of each approved shop drawing and each Contractor's coordination and layout drawing
5. Record drawings of wiring diagrams and control schematics including external connection diagrams.
6. Test and balancing reports, calibration data, alignment records, and other information.
7. Copy of any applicable warranties, guarantees and bonds
8. Operating Procedures:
   a. Include start-up, break-in, and routine normal operating instructions and sequence. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
   b. Manufacturer's printed operating instructions.
9. Maintenance Procedures:
   a. Complete maintenance instructions (include routine, preventive and corrective maintenance).
   b. Manufacturer's printed maintenance instructions, parts list, illustrations, and diagrams.

c. Include maintenance schedule and types of lubricants. Cross-reference lubricants to products offered by at least three major lubricant suppliers.

10. Spare Parts:
    a. List of recommended spare parts, manufacturer's current price, and recommended quantity
    b. Parts lists to include the specific part or identification number used by the manufacturer of the parts. Arbitrary sequential numbers or letters keyed to a sectional diagram are not satisfactory.
11. Additional Requirements: As specified in individual product specification sections.

C. Format

1. PDF
    a. PDF file for each piece of equipment or system shall be provided
    b. File shall have complete Table of Contents with each section book marked
    c. Each section shall have a cover sheet

2. Binder
    a. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; two inch maximum ring size. When multiple binders are used, correlate data into related, consistent groupings. Provide a table of contents in each binder.
    b. All binders to be of similar design and color, but sized to sized to suit the individual manuals with a minimum allowable edge of width of 1 inch.
    c. Identify each manual with a permanent label affixed to the outside binding of the binder and include the following information:
        1) Name of Contract, Contract Number
        2) Location of equipment or system (i.e. Primary Settling Tanks)
        3) Common name of equipment or system (i.e. Chain and Flight Sludge Collectors)
    d. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
3. Material for Content
    a. Loose leaf on 60 pound, punched paper
    b. Holes reinforced with plastic cloth or metal
    c. Page size, 8 1/2 by 11 inches
    d. Diagrams, illustrations, and attached foldouts as required, of original quality, reproduced by dry copy method
    e. Drawings: Provide with reinforced punched, binder tab. Bind in with text; fold larger drawings to size of text pages

1.03 SUBMITTALS

A. Sample of typical binder, cover and tabbed fly leaf.

B. Provide one (1) electronic copy of the O&M manual for review. Once the O&M manual has been approved then provide three (3) hard copies and one (1) electronic copy of O&M manuals for the Owners' use.

C. All manuals pertaining to equipment or a system within each specific components of construction must be completely approved prior to the Field Acceptance Tests of that component.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01740

WARRANTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1.02 SUBMITTAL

A. Submit written warranties to the Owner prior to the date fixed by the Engineer for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than a date of Substantial Completion for the Work, or a designed portion of the Work, submit written warranties upon request of the Owner.

B. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner prior to acceptance of this portion of the Work.

C. Refer to individual Sections of Division 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.03 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.

F. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.04 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01750

SPARE PARTS

PART 1 GENERAL

1.01 DESCRIPTION

A. Spare parts which are identical and interchangeable with original parts shall be provided with equipment as specified in each Section of the Specifications. Spare parts shall be individually packaged in boxes bearing the equipment reference, tag number, and part identification (Example: Sewage Pump No. 1).

B. Subsequent to the approval of the appropriate operation and maintenance manuals but prior to the delivery of the spare parts, the Contractor shall prepare and submit an itemized tabulation of all spare parts to be provided. The tabulation shall include the name of the equipment for which the spare part is intended, type of spare part, manufacturer of spare part, manufacturer model or manufacturer identification number of spare part, quantity of spare part, and page in the appropriate operation and maintenance manual detailing the parts list.

C. Spare parts shall be stored by the Contractor in a location approved by the Engineer. Unless otherwise directed by the Engineer, the Contractor shall deliver the spare parts to the Owner at the time of "Substantial Completion." Spare parts shall be stored in accordance with the manufacturer's written recommendations, and shall be protected against theft, vandalism, weather, and all other adverse conditions. Spare parts delivered to the Owner shall be in new, undamaged condition. Upon delivery to the Owner, spare parts shall be logged in against the above noted tabulation and inspected by the Contractor in the presence of the Engineer. Any missing or damaged spare parts shall be replaced by the Contractor at no expense to the Owner.

1.02 SPECIAL TOOLS

A. Provide special tools required for operation, service, or maintenance of the products as specified or as needed, as determined by the manufacturer’s representative.

B. Pack items to protect them during storage. Tag items and containers to clearly identify them.

1.03 CONTRACT SPECIFIC REQUIREMENTS

A. Specific requirements for spare parts for this contract are included in the technical specifications.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01751

LUBRICANTS

PART 1 GENERAL

1.01 REQUIREMENTS

A. The Contractor shall furnish and deliver to the Owner such oil, grease and any special lubricants that are necessary for proper operation of all equipment furnished under this contract. The quantity furnished shall be sufficient for one year's operation after the date of substantial completion. The grade of lubricants furnished shall be in accordance with the recommendations of the equipment manufacturers.

B. Subsequent to the approval of the appropriate operation and maintenance manuals but prior to the delivery of the lubricants, the contractor shall prepare and submit an itemized tabulation of all lubricants to be provided. The tabulation shall include the name of the equipment for which the lubricant is intended, its tag number, type of lubricant, manufacturer of lubricant, frequency of lubrication, quantity of lubricant required for one year, and page in the appropriate operation and maintenance manual referencing the lubricant.

C. All lubricants shall be delivered to the Owner prior to the start-up of the equipment. They shall be delivered in the manufacturer's unopened containers and shall be labeled with the equipment name for which it is to be used. At the time of delivery they shall be logged in against the above noted tabulation and inspected by the Contractor in the presence of the Engineer.

D. The Contractor shall also furnish and deliver to the Engineer such grease guns and auxiliary lubricating devices as are required to conveniently maintain all equipment furnished. As a minimum, one grease gun and accessories will be furnished for each individual item of equipment requiring lubrication.

E. Prior to substantial completion, the Contractor shall submit an "Equivalent Lubrication Table" which shall list equivalent products from at least four major oil companies for all lubricants that will be required for all the equipment provided under this Contract.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01800

MAINTENANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for maintaining work completed under this Contract.

1.02 MAINTENANCE PERIOD

A. The general maintenance period for all construction or materials under this Contract shall be one (1) year subsequent to the date of the acceptance of the work by the Owner, or as provided by other sections of this Specification.

B. If the Owner puts any structure or equipment to use prior to acceptance of all work under the Contract, the maintenance period for such structures or equipment shall be calculated from the time use begins.

C. Contractor agrees to replace the material which does not conform to the Contract requirements, and to repair any damage of material or work without cost to the Owner, to satisfaction of Engineer, in conformance with Contract Documents provided orders for replacement and/or repairs are received in writing by the Contractor within the one year period.

D. This Section shall in no way limit the duration of the Contractor's responsibility for the correction of any defect due to workmanship or materials provided by the Contractor which are not in compliance with the Contract Documents.

1.03 ABUSE OF WORK

A. Contractor is not obligated to perform work of replacement or repair that he may prove is required because of abuse by parties other than the Contractor, after the date the Owner puts to continuous use the work requiring replacements or repair, or after date the Owner has approved the Certificate of Completion.

1.04 EMERGENCY REPAIRS

A. If the Owner deems necessary, the Owner shall order replacement or repairs be undertaken within 24 hours.

B. If the Contractor delays or fails to make the ordered replacement or repairs within the time specified, the Owner shall have the right to make such replacements or repairs and the expense shall be deducted from moneys due the Contractor, or moneys of the Contractor retained by the Owner.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

DIVISION 02

SECTION 02050

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section includes requirements for demolition of existing facilities and removal of equipment and materials for reuse or salvage.

B. Items scheduled for demolition are shown on the Contract Drawings.

C. Items or areas scheduled for partial or selective demolition are shown on the Contract Drawings.

1.02 SUBMITTALS

A. Shop Drawings

1. In accordance with Specification Section 01300.

B. Quality Assurance/Control Submittals

1. Methods of demolition and equipment proposed for use in demolition.
2. Copies of Permits required for demolition. See Section 01060.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Utilities

1. Notify Owner to turn off affected services prior to demolition.
2. Remove utilities to be abandoned as a result of demolition.
3. Seal water, sewer, drainage and gas utilities and services as shown on Contract Drawings using plugs, caps or seals as needed.
4. Temporary Sewer Bypass system shall be installed, started up and tested prior to any demolition work.

B. Equipment Salvage and Reuse

1. Do not remove equipment or materials without approval of Engineer.
2. Properly store and maintain equipment and materials to be reused in the Work.

3.02 SAFETY

A. Protect persons and property throughout progress of work.

B. Have acceptable fire extinguishers available at all times where demolition by burning torches is being conducted.

C. Burning of demolition debris not permitted on or near site.

D. Explosives not to be used or brought to site without prior written permission by Engineer.

E. Maintain circulation of traffic within area of demolition operations.

F. Provide and maintain lights, barriers and temporary passageways for safe access within area of demolition operation.

G. Take precautions to minimize spread of dust and flying particles. Keep work area wet down to prevent dust from rising.

H. Provide maximum practical protection from inclement weather to materials, equipment and personnel in partially dismantled structures.

3.03 DEMOLITION

A. Dismantle and remove existing piping, pumps, motors, equipment and other appurtenances indicated without damaging existing structures, equipment and appurtenances to remain.

B. Confine demolition work, new construction and operations to areas that will not interfere with continued use and operation & flows.

C. Floors and/or roofs shall not be overloaded. Complete demolition on upper levels before disturbing supporting members on lower levels. Provide storing and bracing where necessary to prevent settlement or displacement of existing or new structures.

D. All existing instrumentation not scheduled for demolition or alterations to remain where located and in operation, including instruments which relate to new monitoring or control loops unless otherwise indicated or specified.

E. Electrical equipment, conduit, wiring, etc. to be removed as indicated, as specified under appropriate sections of Division 16 - ELECTRICAL.

F. On exposed surfaces, where there will be in the finish work a joint between old and new concrete, the existing concrete at the face shall be removed to a straight rather than a rough line.

G. Piping

1. Remove piping to be abandoned as indicated, specified and directed by Engineer or if it interferes with new work.
2. Remove to nearest solid support, cap and leave in place piping not indicated to be removed or interfering with new work.
3. Piping to be removed which passes through an existing wall shall be cut off and properly capped on each side of the wall.
4. Underground piping to be abandoned and remain shall be properly capped unless it interferes with new structures or as indicated, specified and directed by Engineer.

3.04 REPAIR/RESTORATION

A. Repair or remove and replace items not scheduled for demolition damaged by Contractors operations to original condition as directed by Engineer.

B. The Contractor shall exercise extreme caution when removing sections of concrete from slabs or walls that are to be utilized as part of the new construction. Demolition shall be to the exact limits indicated on the Drawings. Over-excavated concrete shall be replaced at the Contractor's expense and to the satisfaction of the Engineer. Any damage to the remaining structure caused by the Contractor's operations shall be satisfactorily repaired at the Contractor's expense.

3.05 DISPOSAL

A. The contractor shall provide a disposal plan for approval by the Owner and Engineer. Contractor shall provide all receipts, bills of lading, manifests and other applicable documentation for any offsite disposal.

B. All mechanical equipment, including interior piping, valves and other appurtenances indicated on the drawings or specified and directed by Engineer to be demolished or removed will be removed from the property of the Owner immediately after disassembly and will become the property of the Contractor. The Owner reserves the right to remove any equipment or piping prior to signing of the agreement.

C. Debris from structures, including concrete, masonry, steel or other rubble shall become the property of the Contractor, unless otherwise directed by the Engineer, and shall be promptly removed from site at the Contractor's expense.

3.06 CLEANING

A. Leave affected areas of demolition in a clean, safe and orderly condition, ready to accept new work if proposed.

END OF SECTION

SECTION 02080

MANAGEMENT AND DISPOSAL OF CONTAMINATED SOIL

PART 1 GENERAL

1.01 SUMMARY

A. Due to space limitations at the Parkside & Pinecrest pump station sites, the Owner will provide space at a city owned property located on Freight Street. All excess soil from the project will be temporarily stored and classified at this location.

B. This Section includes requirements for furnishing all labor, equipment, and materials, and performing all operations in connection with the excavation, handling, stockpiling, and disposal and/or project in-situ soil and waste material resulting from the construction operations as specified and as directed by the ENGINEER. In-situ soil shall be defined as material that is reused within the project area, such as replacement of soil back into an excavated trench after installation of new utilities.

C. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 – General Requirements, apply to this Section.

D. The soil management practices specified herein apply to all soil excavated during the course of this contract, including potentially contaminated soil and re-use material as defined below. The objective of soil management practices detailed herein is to manage all soil excavated at the site during the course of this contract in compliance with applicable Federal, state and local laws and regulations and in a cost-effective manner.

E. Three categories of soil disposal have been identified for disposal of Excess Soil:

1. Re-use – Defined as soil or materials containing concentrations of contaminants below Rhode Island's Method 1 Residential Direct Exposure Criteria identified in Table 1 of RIDEM's Remediation Regulations and less than the acceptance criteria at a soil re-use facility based on the Contractor's laboratory analytical results.
2. Category I - Defined as non-hazardous and further defined as those containing concentrations of contaminants above Rhode Island's Method 1 Residential Direct Exposure Criteria identified in Table 1 of RIDEM's Remediation Regulations based on the Contractor's laboratory analytical results.
3. Category II – Defined as hazardous and further defined in the Code of Federal Regulations (CFR) Title 40 CFR 261.3.

F. "Contaminated" soil shall be defined as soil categorized as Category I or Category II, as defined above, based on the Contractor's laboratory analytical results.

G. "Suspect" soils are those believed by the Engineer (but not yet confirmed by laboratory testing) to be categorized as Category II soil, as defined above. The designation of "Suspect" will be made by the Engineer based on field screening, visual observation and or olfactory indications.

H. Payment for the management of in-situ soil and the removal and disposal of excess and contaminated soil shall be is accordance with Sections 01025 – Measurement and Payment.

I. The Contractor shall be required to submit a Health and Safety Plan (HASP) for review and approval, as specified in this Section and the Contract Documents.

J. Related Sections include the following:

1. Section 01300 – Submittals
2. Section 01025 – Measurement and Payment
3. Section 01069 – Health and Safety Requirements
4. Section 02140 – Dewatering
5. Section 02200 – Earth Excavation, Backfill, Fill and Grading

1.02 PERFORMANCE REQUIREMENTS OF THE CONTRACTOR

A. Secure all permits and licenses, as necessary, including notification of local emergency personnel and notification/reporting requirements, with respect to unforeseen conditions;

B. Mobilization and demobilization of all personnel, equipment, materials and supplies required to perform the Work;

C. In the event that soil conditions are encountered with characteristics that deviate from the typical fill that is known to be present on the Site, the CONTRACTOR's work in the impacted area shall stop until the soil can be fully characterized. The CONTRACTOR shall obtaining environmental samples, as requested. The CONTRACTOR will have the soil analyzed and provide analytical to the ENGINEER within fourteen (14) days. No claim shall be made for reasonable delays associated with such sampling, analytical services and decision making. The ENGINEER will provide direction to the CONTRACTOR with regard to handling and disposal practices for this soil upon review of the soil analytical characterization. The CONTRACTOR shall amend his HASP based on this new data.

D. Develop, implement, maintain, supervise, and be responsible for all soil management practices during the course of this contract;

E. Coordinate all off-site disposal of excess Contaminated Soil at an appropriate disposal facility, based upon soil analytical characterization results and/or supplemental sampling/analytical data requested by the disposal facility. All soil testing will be completed by the Contractor.

F. Segregate boulders and other large rocks for off-site management, as directed by the ENGINEER;

G. To the extent practical, remove and segregate asphalt, brick and concrete from the soil;

H. General site cleanup.

1.03 SAMPLING

A. The CONTRACTOR shall be responsible for **all costs** associated with sampling and analyses as may be required by the receiving disposal facility(ies) for off-site disposal of soil. Any such sampling services shall be completed by the Contractor after stockpiling and as quickly as possible. Contractor shall schedule his/her activities to allow for sampling to be performed, analytical results to be compiled, and management decisions to be made.

B. The Contractor will provide the Engineer with 48 hours notice of sampling activities. Engineer will be present during all sampling activities.

C. Sample collected and/or tested by the Contractor without coordinating with the Engineer shall be for his own convenience only, and shall not be the basis for classification, determination of limits, or payment.

1.04 QUALIFIED ENVIRONMENTAL PROFESSIONAL SERVICES

A. If required, RIDEM environmental response actions will be provided by the Owner's representative. The owner's representative will be responsible for preparing all RIDEM related filings including but not limited to Remedial Action Progress Reports, Material Shipping Records, Bills of Lading and a Remedial Action Closure Report.

1.05 APPLICABLE LAWS AND REGULATIONS

A. Work under this Section shall be performed in strict compliance with all applicable Federal, State and local laws, rules, regulations including Rhode Island's Remediation Regulations, related to the handling and off-site management of contaminated wastes and regulated soil.

B. Pertinent Federal and State Authorities having jurisdiction over this project include:

1. Occupational Safety and Health Administration (OSHA)
2. Rhode Island Department of Environmental Management (RIDEM)

C. The following OSHA regulations will apply:

1. Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response - 29 CFR 1910.120.
2. Safety and Health Regulations for Construction - 29 CFR 1926.

1.06 SUBMITTALS

A. Submittals shall be made in compliance with the requirements of Section 01300 except as provided for herein.

B. No work will be permitted to proceed until the required submittals have been received and approved by the ENGINEER. In the event the ENGINEER requests additional information,

it shall be the CONTRACTOR's responsibility to provide such additional information in a complete and timely manner, so that construction can proceed by the date stipulated in the Notice to Proceed.

C. Contaminated Soil will be encountered during the work. Prior to the commencement of work, the CONTRACTOR shall submit the following to the ENGINEER for approval:

1. Required certifications demonstrating that personnel are properly trained and qualified to perform the work in accordance with applicable OSHA regulations and all laws governing the work.
2. Names, qualifications and the identification of tasks to be performed by each SUBCNTRACTOR.
3. The CONTRACTOR's Site-Specific Health & Safety Plan pursuant to OSHA 1910.120 requirements.

D. Approval of submittals by the ENGINEER shall not impose any liability upon the ENGINEER, nor shall any such approval relieve the CONTRACTOR of his/her responsibilities to meet all of the requirements and comply with all applicable laws, regulations and other applicable requirements under this Contract.

1.07 EXISTING ENVIRONMENTAL CONDITIONS

A. The CONTRACTOR shall satisfy himself/herself as to the conditions existing at the Site, the type of equipment required to perform this Work, and the quality and quantity of the materials to be removed.

B. Failure of the CONTRACTOR to become fully acquainted with the available information will not relieve him/her of the responsibility to completely and properly perform the work in full compliance with the Contract Documents. The ENGINEER assumes no responsibility for any conclusion or interpretation made by the CONTRACTOR on the basis of information made available by the Owner or ENGINEER

PART 2 PRODUCTS [NOT USED]

PART 3 EXECUTION

3.01 GENERAL

A. The primary concern of the CONTRACTOR in the excavation, handling, sampling, bulking, and on-site storage of soil/solid waste and/or drummed material (if encountered) will be to protect the health and safety of the site workers, the public, and the environment.

B. The CONTRACTOR will provide adequate barriers and demarcation of excavations and exclusion zones to warn site visitors and the public of potential hazards.

C. The CONTRACTOR will take appropriate means to prevent a release or the spread of hazardous materials or Contaminated Soil as a result of the CONTRACTOR's operations.

D. The CONTRACTOR will notify the ENGINEER 48 hours prior to the collection of soil and/or groundwater samples for laboratory analyses. The ENGINEER or his representative shall be present during all sampling.

3.02 SITE HEALTH & SAFETY

A. The CONTRACTOR is solely responsible for controlling Site health and safety, including the provision of a Site Health and Safety Officer. In the performance of its work, the CONTRACTOR shall provide for the safety of all CONTRACTOR personnel, regulatory agency personnel who may inspect the Site, and the public for the duration of the Contract.

B. The CONTRACTOR is solely responsible for his/her construction means and methods.

C. The ENGINEER will be responsible for the health and safety of its personnel only.

D. The CONTRACTOR shall provide a Health and Safety Plan (HASP) that addresses identified contaminants of concern for the Work under this Contract. Such plan shall conform to the requirements of OSHA 1910.120 and all other applicable federal, state, and local laws, regulations, ordinances, and procedures. The HASP shall be developed and implemented by the CONTRACTOR's Safety Officer experienced with the health and safety requirements of OSHA 1910.120. The HASP shall be revised, as needed, whenever new information about site hazards is obtained.

E. All personnel performing Work in contaminated or hazardous areas shall be fully trained in accordance with the OSHA 1910.120 and the HASP and shall be thoroughly briefed on anticipated hazards, safety equipment to be employed, safety practices to be followed, and emergency procedures and communications. The CONTRACTOR shall have a medical monitoring surveillance program in place for all personnel in accordance with all applicable laws and regulations.

3.03 MISCELLANEOUS PROVISIONS

A. CONTRACTOR or its SUBCONTRACTORS must have a valid EPA identification number and any other permits or licenses required by federal, state, and local laws, regulations, ordinances, and procedures for the transportation of Contaminated Soil or hazardous wastes, as required.

B. The CONTRACTOR shall be responsible for securing all necessary and applicable permits, certificates, licenses, and approvals required for the performance of this Work and shall be responsible for the payment of all associated fees.

C. The CONTRACTOR shall comply with all required reporting and record keeping requirements in accordance with the provisions of this Contract and all applicable federal, state, and local laws, regulations, ordinances, and procedures.

D. The CONTRACTOR shall be responsible for all notifications required by federal, state, and local laws, regulations, ordinances, and procedures. All notifications shall be coordinated with the ENGINEER.

E. Material Shipping Records and/or Bills of Lading, as appropriate, will be provided to and coordinated by the ENGINEER. The Owner will be responsible for signing all waste manifests and bills of lading. In order for CONTRACTOR's operations to proceed without interruption, complete and accurate information shall be provided by the CONTRACTOR during the Submittals process. CONTRACTOR shall be responsible for preparing applications to disposal facilities.

3.04 DUST MONITORING & CONTROL MEASURES

A. The CONTRACTOR is responsible for monitoring the Work for evidence of airborne particulates (dusts) emanating from the Work area. It shall be the CONTRACTOR's responsibility to continuously monitor the work area for dust levels.

B. The CONTRACTOR shall take appropriate measures to substantially eliminate the generation of dusts within the Work Area, including use of water provided by the CONTRACTOR and covering all stockpiled wastes and/or soil, except in the immediate vicinity of the excavation, where water may be required to control dust emissions.

C. The ENGINEER will also be monitoring the site for elevated levels of dusts. In the event that visible emissions are observed, the ENGINEER may direct the contractor to take appropriate measures to mitigate the condition. Failure of the CONTRACTOR to implement measures that reduce dust levels may be cause for suspension of the Work, until otherwise directed by the ENGINEER.

3.05 EXCAVATON OF SOIL

A. Excess soil generated from excavation activities associated with the Work shall fall in one of the three soil categories identified. Activities involving excess soil performed by the CONTRACTOR or SUBCONTRACTORS within the Project Limits shall be performed in a manner which considers the health and safety of all CONTRACTOR and SUBCONTRACTOR personnel, support personnel, the ENGINEER and his representatives, and the surrounding environment.

B. The CONTRACTOR shall minimize the spread and loss of Soil during excavation activities as follows:

1. The Contractor shall segregate boulders, asphalt, construction debris and other deleterious materials from excavated soil to the extent practicable and as directed by the ENGINEER. This segregation shall occur at the point of excavation, prior to the transport of soil.

C. Excavated Soil will be re-used on site as backfill to the maximum extent possible to limit the volume of excess soil.

3.06 TEMPORARY SOIL STOCKPILING

A. All excavated soil shall be temporarily stockpiled in accordance with local, State, and Federal requirements and as detailed below:

1. As directed by the ENGINEER, Contaminated Soil shall be stockpiled out of the immediate work area and in a location designated by Owner on 6-mil polyethylene sheeting. All stockpiled Contaminated Soil shall be covered with 6-mil polyethylene sheeting at the end of every working day. Sheeting shall be properly secured such that it remains fully intact during inclement weather. No individual stockpile may exceed 500 cubic yards. In no event shall the total volume of stockpiled soil exceed 1,500 cubic yards, without the specific approval of ENGINEER.

2. All stockpiled soil shall be reused to the maximum extent possible. All excess excavated soil shall be tested by the Engineer to confirm disposal characteristics. The Contractor shall be required to arrange for and dispose of all surplus soil as detailed below. In no case shall excavated soil remain stockpiled for more than 60 days from its excavation.

3.07 TEMPORARY SUSPECT SOIL STOCKPILING

A. The ENGINEER does not anticipate the need for temporary stockpiling of Suspect soil. If required, the following provisions shall apply to the stockpiling of Suspect Soil:

1. As directed by the ENGINEER, Suspect soil shall be stockpiled out of the immediate work area and in a location designated by Owner, on 6-mil polyethylene sheeting. All stockpiled Suspect soil shall be covered with 6-mil polyethylene sheeting at the end of every working day. Sheeting shall be properly secured such that it remains fully intact during inclement weather conditions.

2. As directed by the ENGINEER, the CONTRACTOR shall segregate the Suspect soil into separate stockpile areas (physically separated by excavation site and labeled) to facilitate separate characterization by ENGINEER, and subsequent off-site management. No individual stockpile may exceed 250 cubic yards.

3.08 ALL STOCKPILED SUSPECT SOIL SHALL BE TRANSPORTED AS SOON AS POSSIBLE. IN NO CASE SHALL EXCAVATED SOIL REMAIN STOCKPILED FOR MORE THAN 120 DAYS FROM ITS EXCAVATION. IN NO EVENT SHALL THE TOTAL VOLUME OF STOCK PILED SOIL EXCEED 1,500 CUBIC YARDS, WITHOUT THE SPECIFIC APPROVAL OF ENGINEER.OFF-SITE MANAGEMENT OF EXCESS SOIL

A. The CONTRACTOR shall be responsible for the off-site transportation and disposal of Excess Soil to an approved disposal facility.

B. The CONTRACTOR shall be responsible for coordination of all transporter and receiving facility activities. Transporter vehicles used for the transportation of Contaminated Soil shall be covered, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local laws, regulations, ordinances, and procedures.

C. Vehicles departing the site shall be properly logged to show the vehicle identification, driver’s name, time of departure, destination, and approximate volume and content of material carried.

D. Excess soil shall not leave the site or stockpile area until the designated receiving facility has agreed in writing to accept the type and quantity of waste/soil to be shipped.

E. The CONTRACTOR shall complete required facility applications and other pertinent forms for proper transportation and disposal. The ENGINEER shall review, and the Owner will sign the applications. Signatures from the receiving location of materials transported off-site are required. The CONTRACTOR shall be held accountable for ensuring that requirements of the transporter and receiving disposal facility(ies) and federal, state, and local laws, regulations, ordinances, and procedures are complied with and properly documented.

F. Documentation shall be maintained indicating that applicable laws have been satisfied and that Excess Soil has been successfully transported and received at the disposal facility(ies).

G. Actual quantities and measurements in the field shall be tabulated by the CONTRACTOR on a daily basis. The CONTRACTOR will not be reimbursed for unit rate work performed without the prior approval.

3.09 SITE CLEANUP

A. During the course of the Work, the CONTRACTOR shall keep the Site and his operations clean and neat at all times. The CONTRACTOR shall dispose of all residue resulting from the site operations; and at the conclusion for the day's Work, he shall remove and haul away surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site operations and shall leave the site in a neat and orderly condition.

3.12 DOCUMENTATION

A. Within forty-five (45) days after soil disposal , the CONTRACTOR shall submit to the ENGINEER one (1) original copy of all manifests, certified weigh slips (tons), bills-of-lading, and records of final waste disposition from the accepting disposal facility(ies), and all other pertinent documentation.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for removal of vegetation and topsoil at the site.

1.02 DEFINITIONS

A. Clearing: Removal of trash, vegetation, or organic matter alive or dead.

B. Grubbing: Removal of vegetation including stumps, buried logs and roots.

C. Scalping: Removal of grass turf to a depth of 3 inches.

D. Stripping: Removal of top soil after scalping operation is complete.

1.03 QUALITY ASSURANCE

A. Obtain Engineer's approval of staked work limits prior to starting the clearing, grubbing, and stripping.

1.04 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Install erosion and sediment controls prior to starting the Work.

B. Existing Conditions

1. Temporarily remove property improvements, to the minimum extent necessary, to complete the work and restore improvements to condition which existed prior to construction.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Chips from cleared trees and brush.

PART 3 EXECUTION

3.01 PROTECTION

A. Do not cut or injure any trees or other vegetation outside the limits of disturbance and/or permanent easement, as indicated on the drawings.

B. Trees, shrubbery, or planting, along the traveled highways or roads, shall not be removed except with the written approval of the Engineer.

C. Preserve certain vegetation such as trees, shrubs, hedges and plants within the construction area, as indicated on the drawings to be protected.

D. Easement Clearing

1. The Engineer shall designate trees to be removed within easement lines.

E. Work In Improved Property

1. Protect trees, cultivated hedges, lawns, shrubs, and plants that might be damaged by the Contractor's operations.

2. Temporarily replant and care for trees less than 4 inches in diameter that would be damaged by the construction operation. After the construction operations have been substantially completed, replant in their original positions and care for until growth is reestablished. If trees, cultivated hedges, lawns, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced at the Contractor's expense by items of kind and quality existing at the start of the work.

3. Do such handwork as may be required to prevent damage to buildings and improvements.

4. Protect fences and stone walls and if needed to be removed to facilitate construction or if damaged, upon completion of the work, properly restore or repair to at least as good condition as existed prior to start of the work.

3.02 CLEARING

A. Cut or remove all trees, saplings, brush, and vines, windfalls, logs, and trees lying on the ground, dead trees and stubs more than 1 foot high above the ground surface.

B. Except where clearing is done by uprooting with machinery or where stumps are left longer to facilitate subsequent grubbing operations, trees, stumps, and the stubs to be cleared shall be cut as close to the ground surface as practicable, but no more than 6-inches above the ground surface in the case of small trees, and 12-inches in the case of larger trees. Saplings, brush, and vines shall be cut off close to the ground.

C. Selective Trimming

1. Cut back limbs and branches of trees to be preserved only to the extent necessary for construction.

2. Trim neatly, and cleanly so that the remaining tree will not be damaged and healing will be facilitated. Where limbs and branches over 1 inch in diameter have been cut, the

newly cut area of the tree shall be given a thorough application of approved tree-healing paint.

D. Salvaged Wood

1. Logs, timber and other wood removed in the course of clearing found to be acceptable, as determined solely by the Engineer, shall remain the property of the applicable private property owner or the Owner, unless otherwise directed by the Engineer.
2. Cut logs, timber and other wood in 4 foot lengths and stack, as directed by the Engineer.
3. Prior to the final completion of the contract, all unclaimed logs, timber and other wood previously cut and stacked shall be removed from the site and properly disposed of by the Contractor at no additional cost to the Owner.

E. Chips from Cleared Wood and Brush

1. Stockpile for future use on cleared easements as indicated on the Drawings.
2. Spread at locations shown on the drawings once work is substantially complete.
3. If the wood chips from the cleared wood are not of sufficient amount, the Contractor at his own expense shall furnish the required amount to provide a minimum thickness as shown on the Contract Drawings.
4. Elm wood and elm bark shall not be used as chips for ground cover.

3.03 GRUBBING

A. Remove completely all stumps.

B. Remove to a depth of 12-inches all roots larger than 3-inches in diameter.

C. Remove to a depth of 6-inches all roots larger than 1/2-inches in diameter.

D. Measure depths from the existing ground surface or the proposed finished grade, whichever is the lower.

3.04 STRIPPING

A. Strip topsoil, loam and unsuitable earth from the ground surface in areas cleared and grubbed.

B. Utilize topsoil and loam, where possible, for finished surfacing.

C. All loam to remain on site.

D. Dispose of unsuitable materials off site at authorized disposal location.

3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIALS

A. Dispose of cleared and grubbed materials off site at authorized disposal location.

B. Such disposal shall be carried on as promptly as possible after removal of material in the clearing and grubbing operations and shall not be left until the final period of cleaning up.

C. Elm bark whether stripped from the wood or intact with the wood shall be either buried at least 1 ft. below grade in approved dumping areas or burned in a suitable incinerator off-site with satisfactory anti pollution and fire prevention controls to prevent the spread of Dutch Elm Disease.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for designing, furnishing, installing, maintaining, operating and removal of temporary dewatering systems required to lower and control water levels and hydrostatic pressures during construction.
2. Requirements for disposing of pumped water.

1.02 DEFINITIONS

A. Dewatering: Lowering the zone of saturation and intercepting groundwater seepage which would otherwise emerge from the slopes or bottom of the excavations. The purposes of dewatering are to increase the stability of excavated slopes; prevent loss of material from beneath the slopes or bottom of the excavation; improve the excavating and hauling characteristics of on site soil; prevent rupture or heaving of the bottom of an excavation; and dispose of pumped water. In addition, dewatering is required to place and compact structural fill.

1.03 DESIGN REQUIREMENTS

A. The Contractor is responsible for the adequacy of the dewatering system.

B. Design dewatering systems to:

1. Effectively reduce the hydrostatic pressure and lower the groundwater levels to a minimum of 2 feet below excavation in soil;
2. Develop a substantially dry and stable subgrade for the protection of subsequent operations;
3. Result in no damage to adjacent buildings, structures, utilities and other work, included in this contract.
4. Depressurize stratified layers of sand that may be confined by silt layers so that a stable excavation bottom is maintained.

C. Methods may include sump pumping, single or multiple stage well point or jet eductor well point systems, deep wells, or combinations thereof.

D. Locate dewatering facilities where they will not interfere with existing utilities, facilities and/or construction work to be done under this Contract.

E. Contractor is responsible to obtain all necessary permits from state and local authorities regarding the operation and discharge of the dewatering system, and to conduct all necessary sampling and testing that may be required by those authorities.

1.04 SUBMITTALS

A. Shop Drawings

1. In accordance with Section 01300 submit the following prior to dewatering system installation:

a. Proposed system components.
b. Operational plan to include locations and depth of components.
c. Method of disposal of pumped water, including method of insuring proper sediment removal should upset in dewatering system occur.

B. Quality Assurance/Control Submittals

1. In accordance with Section 01300 submit the following:

a. Dewatering systems to be designed under the direct supervision of a professional Civil Engineer registered in the state which the work is to be done.
b. Complete Certificate of Design at the end of this section.
c. Provide documentation demonstrating ability and experience of installing contractor for the type of conditions under this contract.
d. Names, addresses and telephone numbers of supervisory personnel actively involved in at least five successful projects requiring dewatering.

1.05 PROJECT/SITE CONDITIONS

C. Environmental Requirements

1. Dispose of all pumped water in accordance with local agencies having jurisdiction.

D. Existing Conditions

1. Groundwater was not observed during the subsurface boring investigation.

2. Groundwater surface is subject to fluctuations during periods of heavy precipitation.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Surface Drainage

1. Construct dikes, ditches, pipe lines, sumps or other means to intercept and divert precipitation and surface water away from excavations.

B. Drainage of Excavated Areas

1. Construct dikes, ditches, pipe lines, sumps or other means to collect surface and seepage water which may enter the excavation.

2. Discharge water through settling basins or method approved by Engineer when water is to be deposited into an existing watercourse.

3.02 INSTALLATION

A. Advise Engineer of changes made to Operation Plan as submitted under article 1.05 of this section, made to accommodate field conditions.

3.03 MONITORING

A. Observe and record daily the elevation of the groundwater during the length of the dewatering operation and provide data to Engineer on daily basis.

3.04 OPERATION

A. Operate dewatering systems to lower the groundwater level in excavations allowing all subsequent work to be done on a stable dry subgrade.

B. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, to prevent further damage. Modifications made at no additional expense to the Owner.

C. Maintain the water level a minimum of two (2) feet below subgrade or at lower elevation to eliminate hydrostatic pressure on structures.

D. Prevent disturbance of foundation soils and loss of ground as water is removed.

E. Notify the Engineer of disturbance to the foundation soils caused by an interruption or inadequacy of the dewatering system.

F. Maintain on site, auxiliary equipment to operate the dewatering system continuously while excavations are opened below elevation of final grade.

3.05 DISPOSAL OF WATER

A. Discharge water in a manner that will not cause erosion, flooding, damage to existing facilities, completed Work or adjacent property, improved or otherwise.

3.06 REMOVAL

A. Remove all material and equipment from the site upon completion of dewatering operations.

B. Seal all dewatering wells upon completion of the dewatering by pressure injecting a grout capable of sealing the wells and preventing leakage.

END OF SECTION

CERTIFICATE OF DESIGN

Re: Contract Between

OWNER: _____
(Name)

and

CONTRACTOR: _____
(Name)

on

CONTRACT: _____
(Title)

_____ Dated:_____
(Number)

Contractor hereby certifies that_____
(Designer)

1. Is licensed or registered to perform professional engineering work in the state of

_____
(Location of Project)

2. Is qualified to design the_____
(Item)
specified in Section_____ of the subject contract;

3. Has designed_____before;

4. Has prepared the design in full compliance with the applications and requirements of Section_____ of subject contract including all applicable laws, regulations, rules and codes; and

5. The work has been signed and sealed pursuant to the applicable state law.

FOR: _____
(Contractor)

BY: _____
(Signature)

_____ Dated:_____
(Name and Title)

SECTION 02149

MAINTAINING EXISTING FLOW

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to maintain existing flow and implement and complete all flow diversions and/or bypass pumping required to complete the Work indicated on the Drawings.

1.02 PERFORMANCE REQUIREMENTS

A. It is essential to the operation of the existing sewerage system that there be no interruption of the wastewater flow throughout the duration of this project. An interruption shall be considered, but may not be limited to, any condition that in the sole opinion of the Engineer adversely affects or alters operation of the existing sewage system and/or any other portion or component of the existing collection system including the associated flows; allows the level of sewage flow to increase, rise, collect, surcharge and/or overflow existing facilities in any manner; or results in any operational or permit violations being issued to the Owner.

B. The Contractor shall provide, maintain, and operate temporary facilities such as dams, bulkheads, pumping equipment (both primary and backup units as required) conduits, electrical power, and all other labor and equipment to intercept and maintain the existing sewage flow before it reaches the point where it would interfere with his work, carry it past his work, and return it to the existing facilities beyond his work.

C. The Contractor's attention is directed to the fact that the existing wastewater flow may be affected by high groundwater and rainfall. Increases in normal flow should be expected during periods of wet weather. The Contractor shall therefore take all precautions necessary including monitoring weather forecasts to fully accommodate, control and sufficiently handle the increases in flow during periods of wet weather and/or storms as well as periods of normal flow.

D. The Engineer may prohibit the carrying out of any work at any time when in his sole judgment, increased flow conditions are unfavorable or not suitable, or at any time, regardless of the existing flows, when proper precautions are not being taken to safeguard the existing sewerage system, previously constructed work, work in progress and/or the general public.

E. 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.

F. Reliable flow meter data for the pumping stations are not available. The pumping capacities for the stations are provided below.

Pump Station	Flow Rate (GPM)	Exist. Force Main Diameter (inch)	Exist. Force Main Length (feet)
Parkside Pump Station	115	4	375
Pinecrest Pump Station	115	4	970

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Detailed plans and descriptions outlining all provisions and precautions to be taken regarding the control and handling of existing sewage flows.
2. Include such items as schedules, locations, elevations, capacities of equipment, materials, traffic maintenance plans, and all other incidental items necessary and/or required by the Owner to ensure proper protection of the facilities and compliance with the requirements herein specified.
3. Qualifications as described herein.
4. Detailed proposal for noise prevention measures for review.
5. Shop drawings for all pumping, piping, and appurtenances for type and size of equipment required to perform the flow diversion and/or bypass pumping work as required herein.

B. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall proposal and/or operations without claim from the Contractor should the Engineer deem it to be in the Owner's or publics best interest to do so.

1.04 QUALITY ASSURANCE

A. Qualifications

1. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor who can demonstrate to the Engineer that he specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of similar size and complexity in wastewater applications performed by his firm within the past three years within New England. The bypass system shall meet the requirements of codes and regulatory agencies having jurisdiction.
2. The vendor shall demonstrate the bypass pumping equipment is automated and is capable of functioning without the assistance of an operator.
3. The vendor shall demonstrate the pumping equipment can operate for an extended period of time running dry. After this period of time, the pump shall have the capability of pulling a 25" Hg vacuum without adjustment or repair.
4. The vendor shall demonstrate sufficient service resources and repair parts in stock to fulfill service or repair of rental equipment within one hour of a service call, twenty-four hours per day, seven days per week.
5. Temporary components of the bypass system including pumps, pipe, hose, valves, and fittings shall be provided by one bypass vendor. Hydraulic calculations and drawings required by the submittals shall be provided by the bypass vendor and stamped and certified by a Professional Engineer licensed in the State of the installation.

B. Pre-Installation Meeting

1. Contractor to schedule and attend a pre-installation meeting with the vendor, Owner and Engineer prior to installation of by-pass system.

1.05 SPECIAL BYPASS REQUIREMENTS

A. The contractor shall refer to the Contract Drawings for information regarding the proposed temporary bypass configuration, house services requiring bypass, designated pump staging areas, and the locations of the influent and discharge manholes.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. At a minimum, all equipment shall be supplied in duplicate for emergency situations. Provide adequate on-line backup facilities so that no interruption in service is encountered. Equipment and installation are subject to the approval of the Owner and the Engineer.

B. Pumping System(s)

1. The Contractors attention is directed to the three (3) existing sewer services located downstream of the proposed bypass manhole. Plugging the discharge in the existing wet well and only bypassing at the proposed bypass manhole is **not** considered an acceptable alternative. The Contractor shall provide all pumps (primary and backup), temporary power, ancillary system components, and labor required to bypass flow from the three (3) sewer services separate from the recommended bypass system depicted on the Contract Drawings.
2. All pumping units (primary and secondary) and appurtenances shall be sized properly to handle the flows encountered including increased flows due to wet weather.
3. The bypass pumps depicted on the Contract Drawings shall be centrifugal, end suction, fully automatic self-priming pumps that do not require the use of foot-valves, vacuum pumps, diaphragm pumps, or isolation valves in the priming system. The pumps shall consist of an electric powered duty pump and a diesel-powered standby pump. Pumps must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows and shall immediately develop 25” Hg vacuum without adjustment or repair or employ level control devices to regulate on/off or variable speed of the pump. All pumping units and appurtenances shall be sized in accordance with the design parameters provided. Pumps shall not be connected by a common suction manifold. Solids handling wastewater submersible pumps may also be used where appropriate and as approved by the Engineer.
4. Seals shall be high pressure, mechanical self-adjusting type with silicon carbide faces capable of withstanding suction pressures to 100 psi running. The mechanical seal shall be cooled and lubricated in an oil bath reservoir, requiring no maintenance or adjustment. Pump shall be capable of running dry, with no damage, for extended periods of time. All metal parts shall be of stainless steel. Elastomers shall be Viton.
5. Bypass pumps to be utilized for the three existing sewer services shall be electric submersible grinder pumps or approved equal. A temporary electrical service and backup generator power system shall also be provided. Refer to electrical drawings for available power at the site.

6. The Contractor shall provide the necessary start/stop controls for each pump.
7. The Contractor shall be responsible to meet noise requirements in specified elsewhere in this section. All diesel driven primary and standby pumps shall be sound attenuated. The use of Critical Silenced Canopy pumps or acoustical Whisper Pac enclosures for sound attenuation are required.
8. **Note, the Contractor is required to obtain and pay for a temporary electric service.**

C. Piping System(s)

1. All piping systems (primary and secondary) and appurtenance shall be sized properly to handle the flows encountered including increased flows due to wet weather.

D. Power Generating Facilities

1. Include power generating facilities capable of providing all power necessary to operate any primary and secondary pumping systems. Use of Owner's standby facilities will not be allowed.
2. Maintain facility to be ready for use if required.

E. Noise Prevention

1. Noise prevention measures for all equipment shall be used to insure minimum noise impact or surrounding areas.
2. Measures may include but shall not be limited to enclosures, insulation, electric pumping units, and hospital grade silencers or mufflers.
3. Noise levels shall be maintained such that increase shall not exceed 10 dBA over background at the nearest property line.
4. Should at any time prior to or during the performance of above mentioned work, the Engineer determines the noise prevention measures being used are not adequate, the Contractor shall at no additional cost to the Owner suspend all work until acceptable measures are incorporated.

F. Alarm System Response

1. Pumping system shall be equipped with an alarm system capable of remote notification. Notification shall be automatic to a preprogramed list approved by the Owner/Engineer.

2. At a minimum, the following call-out alarms shall be provided

   a. High Level
   b. High-High Level

3. The Contractor shall respond to any alarm within 1-hour of receiving an alarm notification.

PART 3 EXECUTION

3.01 PUBLIC SAFETY AND CONVENIENCE

A. General

1. The Contractor shall at all times keep the streets, highways, roads, driveways, parking lots, private walks, and public sidewalks open for pedestrian and vehicular traffic unless otherwise authorized by the Owner/Engineer. Sidewalks, crosswalks, and access points

shall be established and maintained in accordance with the requirements of the Americans With Disabilities Act (ADA).

B. Public Travel Ways

1. Any authorized temporary closure of any streets, highways or roads shall be coordinated with the local Fire, Police and/or Department of Public Works as required by the municipality.

C. Municipal, Commercial and Private Property

1. Any authorized, temporary closure of any municipal, commercial or private driveway or access route will require the Contractor provide 48 hour notice to abutters of the temporary restriction of access to their property. The Contractor will make every attempt to schedule his work with as little inconvenience to the property owner as possible

3.02 INSTALLATION

A. Keep the Engineer advised at all times of any changes made to the overall operation(s) to accommodate field conditions.

B. Flow diversions and/or bypass pumping shall be maintained at all times as long as it is necessary to maintain the flow through the limits of the project during construction.

C. Maintain auxiliary and/or emergency equipment at the site to continue flow division and/or by-pass pumping operations in the event of a breakdown and/or loss of normal power.

D. The Contractor shall be responsible for the proper functioning and operation of the backup pumping units. Back-up pump(s) shall be on-line, isolated from the primary system by a valve.

E. No work shall begin until all provisions and requirements of this Section have been reviewed and approved by the Engineer.

F. The Engineer reserves the right to limit and/or otherwise restrict the Contractor's overall activities and/or operations at any time without claim should the Engineer deem it to be in the Owner's or public's best interest to do so.

G. The Contractor shall successfully test bypass pumps in continuous automatic operation for a duration of two (2) days, before taking the existing pumping station offline for replacement of the existing force main and demolition of the pump station equipment.

H. Bypass system shall remain onsite fully functional until new station operates continuously for seven (7) days uninterrupted in automatic mode and after Owner’s and Engineer’s acceptance of all field and functional testing.

END OF SECTION

SECTION 02160

EXCAVATION SUPPORT

PART 1 GENERAL

1.01 DESCRIPTION

A. The Contractor shall properly design and furnish all labor and materials necessary and shall construct complete, all sheeting, bracing supports, and appurtenances required to perform the Work including sheet piling for construction of structures and buildings, trench support and cofferdams, permanent and temporary alike, as indicated on the Drawings and specified or as otherwise directed by the Engineer or required by agencies having jurisdiction over the Work.

B. Wood timber or steel sheeting shall be used except where otherwise indicated, specified or directed by the Engineer and agencies having jurisdiction over the work.

1.02 DESIGN RESPONSIBILITY

A. The Contractor shall be fully responsible for providing complete and adequately designed sheeting as required and/or directed by the Engineer in accordance with the provisions set forth herein. The sheeting shall be designed to resist hydrostatic pressures in accordance with the Contractor’s dewatering design.

B. The Contractor shall engage, at his own expense, the services of a fully competent and qualified Professional Engineer, hereinafter referred to as the "Contractor's Engineer", registered in the State in which the Work is being constructed, for the design of all sheeting requirements to accomplish the Work specified, and for supervising the proper on-site installation associated therewith. The Contractor's Engineer shall be acceptable to the Engineer and demonstrate a minimum of ten (10) years documented experience in the field of sheeting design and implementation. Prior to the actual employment of the Contractor's Engineer, the Contractor shall submit to the Engineer, to the full extent deemed necessary, a detailed resume stating the Contractor's Engineer's professional qualifications, related experience and references, and if requested, examples of work similar to that required for the Work specified, for a general review by the Engineer and a means of documenting the requisite experience hereinbefore specified. Only after a satisfactory review of the Contractor's Engineer's overall qualifications by the Engineer in fulfillment of the requisite experience hereinbefore specified shall the Contractor finalize such employment and begin the design aspects of the Work.

C. The Contractor's attention is directed to the fact the acceptance of the Contractor's Engineer and/or his/her qualifications by the Owner and/or Engineer shall not be an overall approval of the Contractor's Engineer nor the sheeting designs and methods of installation employed during the Work. It being understood that all sheeting requirements necessary to accomplish the Work specified and/or indicated on the Drawings shall be designed by and installed under the direct supervision of the Contractor's Engineer who shall ultimately and fully bear the responsibility for that Work.

1.03 QUALITY ASSURANCE

A. The Contractor's Engineer shall provide and maintain throughout the sheeting installation and/or Work sufficient supervision and technical guidance to the Contractor for proper sheeting materials, equipment, operations and methods to the extent necessary to assure strict compliance with the Contractor's Engineer's design, all safety procedures and standard requirements for such Work, and the successful completion of the Work. Failure to provide and/or maintain such supervision and/or technical guidance during the Work shall in no way relieve the Contractor's Engineer and/or the Contractor from their overall responsibilities and obligations under the Contract, nor shall it be a basis for any claim by either against the Owner and/or Engineer.

B. The Contractor and Contractor's Engineer shall fully indemnify and save harmless the Owner and Engineer and their agents, employees and representatives, from and against any and all claims as stipulated under the Agreement, whether directly or indirectly arising out of, relating to or in connection with the Work.

C. Quality assurances and proper safety procedures must be maintained at all times and be in strict accordance with the Contractor's Engineer's requirements and consistent with all federal, state and local regulatory agencies having jurisdiction over the Work. Should any conflict in requirements, regulations, restrictions or codes exist between that which is specified by the Contractor's Engineer and any federal, state or local agency, the more stringent application shall prevail.

1.04 PRODUCTS AND DESIGN CRITERIA

A. The overall sheeting design, quality of materials and methods of installation for all sheeting applications necessary to accomplish the Work specified shall be consistent with the established standards of the construction industry and must, as a minimum, comply with the requirements for earth support systems for excavations as defined by current US Department of Labor, Occupational Safety and Health Act (OSHA) regulation applicable thereto, and any other federal, state and local agencies having jurisdiction and/or requirements pertaining thereto including Building Code requirements for the State in which the work is being performed. The design and implementation thereof shall be in accordance with sound engineering practice and modern accepted principles of soil mechanics, and shall include the effects of hydrostatic forces and all surcharge loads which may be reasonable anticipated. The methods employed shall be to the extent necessary to permit the proper and satisfactory installation and construction of the Work specified; to withstand all loads and forces encountered; to provide soil restraint and control of water as required; to insure the safety of the workers and all other personnel on or near the site; to prevent injurious caving or erosion, or loss of ground; to maintain at all times proper and safe pedestrian, vehicular traffic on public and private streets, property and rights-of-way; and to stabilize unforeseen areas of work encountered during the execution of the Work as deemed necessary by the Owner and/or Engineer.

B. The Contractor and Contractor's Engineer's attention is directed to the fact that should any additional investigations, subsurface explorations and/or other appurtenant information be required to fulfill the needs of this design, as determined by the Contractor's Engineer above and beyond that which is already provided under these Contract Documents, the Contractor shall obtain all such information and data required at his own expense.

1.05 SHOP DRAWINGS AND/OR DESCRIPTIVE LITERATURE

A. Prior to the installation of any sheeting, the Contractor shall submit to the Engineer for documentation ONLY, complete sheeting layout and detail drawings and sheeting descriptions bearing the Contractor's Engineer's State of **Rhode Island** Professional Seal and signature. Said submission shall be for informational purposes only as a means of documenting the work to be performed and will not be considered an approval or disapproval of the design and/or the implementation thereof. This submission will not relieve the Contractor of the sole responsibility for the adequacy of the system nor shall it be construed as an approval or guarantee that the Contractor's proposed equipment, materials and methods for the sheeting, bracing or appurtenances will be adequate for the work required at the locations of and for the Work required by this Contract.

B. Included as part of this submission, the Contractor's Engineer must provide a complete listing of all references, codes and specifications used by the Contractor's Engineer and required by any federal, state or local agency having jurisdiction, and to which the sheeting design conforms.

C. Specific design calculations are not to be submitted to the Engineer. In the event design calculations are submitted to the Engineer, they shall be returned to the Contractor without review nor checking by the Engineer.

1.06 CERTIFICATE OF DESIGN

A. The Contractor's special attention is directed to the required "Certificate of Design", the form of which is provided at the end of this Section. The Contractor and Contractor's Engineer shall complete this "Certificate" in its entirety for each location of work to be done, and any revisions associated there with, and submit it simultaneously with, as an integral part thereof, the sheeting submission. Any submission made without the completed "Certificate", appropriately signed and sealed, shall be returned to the Contractor. The Owner and/or Engineer hereby reserves the right to delay sheeting work and/or any work associated with, or dependent upon, the proper implementation of sheeting, without cause for claim against the Owner or Engineer, until a complete and appropriate submission is rendered. This Certification shall indicate that the sheeting, bracing and all appurtenances related thereto are designed to withstand the required loads, forces to be encountered, and to provide soil and water control, and are in compliance with these specifications and all federal, state or local agencies having jurisdiction over the Work to be performed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Timber sheeting and bracing:

1. Timber sheeting and bracing may be of any species of wood which will satisfactorily withstand all driving and construction stresses and the loads to which the members will be subjected. Sheeting shall not be less than 3 inches nominal thickness and shall be provided with continuous interlocks. All timber sheeting and bracing shall be free from worm-holes, windshakes, loose knots, decayed or unsound portions or other defects which might impair its strength or tightness.

B. Steel sheeting:

1. The shapes, sizes, and lengths of steel sheeting to be utilized are optional with the Contractor, providing they are satisfactory to withstand all driving and construction stresses and provided with continuous interlocks.

C. Bracing, Hardware and Fastenings:

1. Bracing and other supports whether of steel or of timber, shall be of the strength and dimensions necessary to satisfactorily withstand the loads to which they will be subjected. All bracing and other supports shall be free from any defects which might impair this strength. The Contractor shall provide all necessary hardware and fastenings necessary in connections with satisfactory installation of all sheeting and bracing.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall be fully responsible for ensuring adequate safety measures are provided at all times and shall comply with all safety requirements of federal, state and local agencies having jurisdiction over the Work. Installation of the sheeting including all bracing, supports and appurtenances, shall be adequate to permit the performance of the Work and be in accordance with the requirements of the Contractor's Engineer and the sheeting design associated therewith.

B. Any movements of sheeting and/or appurtenances which prevent the proper completion of the work shall be corrected at the expense of the Contractor.

C. Sheeting shall be installed in a manner which will prevent the disturbance of the surrounding surface, subsurface conditions and/or structures. Any such disturbances shall be corrected at the Contractor's expense and to the satisfaction of the Engineer.

3.02 REMOVAL

A. If used no sheeting shall be removed except with specific written approval by the Engineer.

B. Sheeting shall be cut-off as directed by the Engineer.

C. All sheeting approved for removal by the Engineer shall become the property of the Contractor.

D. All restoration and clean up shall be as indicated and as specified.

CERTIFICATE OF DESIGN

_____(Owner)

Contract Reference: _____

_____, dated _____.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

_____

_____
(Contractor's Name and Address)

hereby certifies that _____

_____
(Contractor's Engineer's Name and Address)

(1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of _____;

(2) Is fully qualified to design and supervise the _____

_____
(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

(3) Has successfully designed and supervised _____

_____
(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

(4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

(5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;

(6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;

(7) Hereby indemnifies and holds harmless the_____

_____and BETA Group, Inc.,
(name of owner)

and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and

(8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:	CONTRACTOR'S ENGINEER:
_____	_____
(Contractor's Name)	(Engineer's Name)
_____	_____
By: _____	By: _____
_____	_____
(Name and Title)	(Name and Title)
Date: _____	Date: _____
(SEAL)	(P.E. STAMP)

(Note: Contractor to fully reference all attachments below)

END OF SECTION

SECTION 02200

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for; excavating in earth for trenches and structures; backfilling excavations; furnishing necessary material; compaction; constructing embankments and fills; miscellaneous earth excavations and miscellaneous grading.

B. Related Sections

1. Section 01410 - Testing Laboratory Services
2. Section 02140 – Dewatering
3. Section 02149 – Maintaining Existing Flow
4. Section 02160 – Excavation Support
5. Section 02215 - Aggregate Materials
6. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 QUALITY ASSURANCE

A. Field Samples

1. Provide samples of materials as requested by the Engineer, to the Quality Control Engineer hired by the Owner, prior to delivery of materials on site, in order to facilitate field testing of compaction operations and material properties.

1.04 PROJECT/SITE CONDITIONS

A. Existing Conditions

1. There are pipes, drains, and other utilities in locations not indicated on drawings, no attempt has been made to show all services, and completeness or accuracy of information given is not guaranteed.

1.05 MAINTENANCE

A. Maintain all work in accordance with SECTION 01800.

PART 2 PRODUCTS

2.01 MATERIALS

A. Suitable Aggregate

1. The nature of materials will govern both acceptability for backfill and methods best suited for placement and compaction.
2. All material whether from excavations or from borrow pits, after being placed and properly compact, will make a dense stable fill and containing no vegetation, masses of roots, individual roots more than 18 inches long, or more than 1/2 inch in diameter, stones over 6 inches in diameter, or porous matter.
3. Organic matter to be well distributed and not to exceed minor quantities.

B. Trench and Excavation Backfill

1. In general, and unless other material is indicated on drawings or specified, material used for backfilling trenches and excavations shall be suitable material which was removed in the course of making the construction excavations. If sufficient suitable material is not available from the excavations, the backfill material shall be crushed stone, gravel borrow or select borrow as directed by the Engineer, in according to respective Specification Sections.
2. See Section 2.01.C for excavation backfill requirements under and adjacent to foundation walls.

C. Structure Backfill

1. Unless otherwise indicated or specified, all fill and backfill under and adjacent to structures, foundations walls, and pavement adjacent to structures shall be gravel borrow that consist of inert material that is hard, durable stone and course sand, free of loam and clay, surface coatings, and deleterious materials. Gradation requirements for backfill gravel shall be in accordance with SECTION 02215.

2. Excavated material shall not be permitted for backfill of structures or foundation walls.

D. Filling and Embankment Backfill

1. Suitable selected materials available from the excavations and not required for backfill around pipes or against structures may be used for filling and building embankments, except as otherwise specified. Material needed in addition to that available from construction operations shall be obtained from suitable gravel banks or other suitable deposits. The Contractor shall furnish, at his own expense, all borrow material needed on the work.

E. Additional materials

1. Concrete: In accordance with SECTION 03300.
2. Crushed stone: In accordance with SECTION 02215.
3. Gravel borrow: In accordance with SECTION 02215.
4. Select borrow: In accordance with SECTION 02215.

2.02 EQUIPMENT

A. Well Points

1. Designed to drain soil and prevent saturated soil from flowing into excavation.

B. Pumping Units

1. Designed for use with the wellpoints, capable of maintaining a high vacuum and, handling large volumes of air and water at the same time.

C. Underdrain Pipe

1. HDPE pipe enclosed in crushed stone encased in filter fabric.
2. Sewer pipe of quality know as "seconds".

2.03 SOURCE QUALITY CONTROL

A. Provide Engineer with access to location of off site sources of materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify all existing utilities and facilities prior to excavation.

3.02 PROTECTION

A. Utilities

1. Support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures, which the Engineer decides must be preserved in place without being temporarily or permanently relocated.
2. Restore items damaged during construction without compensation, to a condition at least equal prior to construction.

B. Trees

1. Enclose the trunks of trees adjacent to work with substantial wooden boxes of height necessary to protect trees from injury from piled material, equipment, operations or otherwise.
2. Employ excavating machinery and cranes of suitable type and size and operate with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
3. When trimming is required, make all cuts smooth and neat without splitting or crushing.
4. Cover cut areas with an application of grafting wax or tree healing paint.
5. Branches, limbs, and roots shall not be cut except by permission of the Engineer.

C. Plantings

1. Protect by suitable means or temporarily replant and maintain cultivated hedges, shrubs, and plants which may be injured by the Contractor's operations
2. Replant in their original positions and care for until growth is re-established, once the construction operations have been substantially completed.

3. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of kind and quality at least equal to which existed prior to the start of the Work.

D. Paved surfaces

1. Do not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels shaped as to cut or injure paved surfaces.
2. All surfaces which have been injured by the Contractor's operations shall be restored to a condition at least equal to which existed prior to start of the Work.
3. Suitable materials and methods shall be used for such restoration.

3.03 PREPARATION

A. Pavement Removal

1. Remove only existing pavement as necessary for the prosecution of the work.
2. Engineer may require that pavement be cut with pneumatic tools or saws without extra compensation to Contractor, where in the opinion of the Engineer it is necessary to prevent damage to the remaining road surface.
3. Dispose large of pieces of broken pavement before proceeding with excavation.

B. Top Soil Removal

1. From areas which excavations are to be made, loam and topsoil shall be carefully removed and separately stored to be used again as directed; or, if the Contractor prefers not to separate surface materials, he shall furnish, as directed, loam and topsoil at least equal in quantity and quality to that excavated.

C. Subgrade

1. Remove loam and topsoil, loose vegetable matter, stumps, large roots, etc., from areas where embankments will be built or material will be placed for grading.
2. Shape as indicated on the drawings and prepare by forking, furrowing, or plowing to bond first layer of the new material placed.

3.04 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

A. The structures to which the provisions of this article apply include pipes, wires, and other structures which meet all of the following:

1. Are not indicated on the drawings or otherwise provided for.
2. Encroach upon or are encountered near and substantially parallel to the edge of the excavation.
3. In the opinion of the Engineer will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

B. In removing existing pipes or other structures, the Contractor should use care to avoid damage to materials, and the Engineer shall include for payment only those new materials which, in his judgment, are necessary to replace those unavoidably damaged.

C. Whenever the Contractor encounters certain existing structures as described above and is so ordered in writing, he shall do the whole or such portions of the work as he may be directed to change the location of, remove and later restore, or replace such structures, or to assist the

Owner thereof in so doing. For all such work, the Contractor shall be paid under such items of work as may be applicable, otherwise as Extra Work.

D. When fences interfere with the Contractor's operations, he shall remove and (unless otherwise specified) later restore them to a condition which existed prior to the start of the Work, all without additional compensation. The restoration of fences shall be done as promptly as possible and not left until the end of the construction period.

3.05 SHEETING AND BRACING

A. Provide in accordance with Specification Section 02160.

3.06 DEWATERING

A. Provide in accordance with Specification Section 02140.

3.07 EXCAVATION

A. Execute operation of dewatering, sheeting and bracing without undermining or disturbing foundations of existing structures or of work previously completed under this contract.

B. Excavate to widths that provide suitable room for:

1. Building structures or laying and jointing piping.
2. Placing all sheeting, bracing, and supports.
3. Cofferdamming, pumping and draining.

C. Render bottom of excavations firm, dry and acceptable in all respects.

D. Do not plow, scrap or dig by machinery, earth at finished subgrade which results in disturbance of material below subgrade, unless indicated or specified, and remove with pick and shovel, last of material to be excavated, just before placing pipe, masonry or other structure.

E. Make all excavations in open, except as otherwise specified or permitted.

F. Excavation Near Existing Facilities

1. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and the excavation shall be done by means of hand tools. Such manual excavation when incidental to normal excavation shall be included in the work to be done under items involving normal excavation.

G. Unauthorized Excavation

1. If the bottom of any excavation is taken out beyond the limits indicated or prescribed, the resulting void shall be backfilled at the Contractor's expense with thoroughly compacted gravel borrow, if the excavation was for a pipeline, or with Class B concrete, if the excavation was for a masonry structure.

H. Unsuitable Material

1. If material unsuitable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the Drawings and/or Specifications, the Contractor shall remove such material to the required width and depth and replace it with thoroughly compacted, crushed stone, gravel borrow, fine aggregate or concrete as directed.

3.08 TRENCHING

A. Trench Excavation

1. Where pipe is to be laid in specified bedding material or concrete cradle, the trench may be excavated by machinery to, or to just below, the designated subgrade, provided that the material remaining at the bottom of the trench is no more than slightly disturbed.
2. Where pipe is to be laid directly on the trench bottom, the lower part of trenches in earth shall not be excavated to subgrade by machinery, but, just before the pipe is to be placed, the last of the material to be excavated shall be removed by means of hand tools to form a flat or shaped bottom, true to grade, so that the pipe will have a uniform and continuous bearing and support on firm and undisturbed material between joints except for limited areas where the use of pipe slings may have disturbed the bottom.

B. Depth Of Trench

1. Excavate trench to depths permitting the pipe to be laid at the elevations, slopes, or depths of cover indicated on the drawings, and at uniform slopes between indicated elevations.

C. Width Of Trench

1. Excavate trench as narrow as practicable and do not widen by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed and consolidated.
2. Excavate trenches with approximately vertical sides between the elevation of the center of the pipe and an elevation 1 ft. above the top of the pipe.

D. Trench Excavation In Fill

1. If pipe is to be laid in embankments or other recently filled material, the material shall first be placed to the top of the fill or to a height of at least 1 ft. above the top of the pipe, whichever is the lesser. Particular care shall be taken to ensure maximum consolidation of material under the pipe location. The pipe trench shall then be excavated as though in undisturbed material.

E. Length of trench open at any one time will be controlled by conditions, subject to any limits that may be prescribed by Engineer.

3.09 BACKFILLING

A. General

1. Frozen material shall not be placed in the backfill nor shall backfill be placed upon frozen material. Previously frozen material shall be removed or shall be otherwise treated as required, before new backfill is placed.

B. Fill And Backfill Under Structures

1. The fill and backfill materials shall be placed in layers not exceeding 6 in. in thickness. Unless otherwise indicated or specified, each layer shall be compacted to 95 percent in accordance with ASTM D1557.

C. Backfilling Around Structures

1. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been done, special leakage tests, if required, shall be made. Promptly after the completion of such tests, the backfilling shall be started and then shall proceed until its completion. Excavated materials shall not be used in backfilling of structures. Unequal soil pressures shall be avoided by depositing the material evenly around the structure.
2. The material shall be placed and compacted to 90 percent in accordance with ASTM D1557 unless otherwise indicated or specified.

D. Backfilling Pipe Trenches

1. As soon as practicable after the pipes have been laid and the joints have acquired a suitable degree of hardness, if applicable, or the structures have been built and are structurally adequate to support the loads, including construction loads to which they will be subjected, the backfilling shall be started and thereafter it shall proceed until its completion.
2. With the exception mentioned below in this paragraph, trenches shall not be backfilled at pipe joints until after that section of the pipeline has successfully passed any specified tests required. Should the Contractor wish to minimize the maintenance of lights and barricades and the obstruction of traffic, he may, at his own risk backfill the entire trench, omitting or including backfill at joints as soon as practicable after the joints have acquired a suitable degree of hardness, if applicable, and the related structures have acquired a suitable degree of strength. He shall, however, be responsible for removing and later replacing such backfill, at his own expense, should he be ordered to do so in order to locate and repair or replace leaking or defective joints or pipe.
3. No stone or rock fragment larger than 12 in. in greatest dimension shall be placed in the backfill nor shall large masses of backfill material be dropped into the trench in such a manner as to endanger the pipeline. If necessary, a timber grillage shall be used to break the fall of material dropped from a height of more than 5 ft. Pieces of bituminous pavement shall be excluded from the backfill unless their use is expressly permitted, in which case they shall be broken up as directed.
4. Zone Around Pipe
   a. Backfilled with the materials and to the limits indicated on the drawings.
   b. Material shall be compacted to 90 percent by tamping.

5. Remainder of Trench
   a. Compact by water-jetting, or tamping, in accordance with the nature of the material to 95 percent in accordance with ASTM D1557. Water-jetting may be used wherever the material does not contain so much clay or loam as to delay or prevent satisfactory drainage. However, tamping shall be used if water-jetting does not compact the material to the density required.

6. Excavated material which is acceptable to the Engineer for surfacing or pavement subbase shall be placed at the top of the backfill to such depths as may be specified

elsewhere or as directed. The surface shall be brought to the required grade and stones raked out and removed.

E. Placing And Compacting Embankment Material

1. After the subgrade has been prepared as hereinbefore specified, the material shall be placed thereon and built up in successive layers until it has reached the required elevation.
2. Layers shall not exceed 12 in. in thickness before compaction. In embankments at structures, the layers shall have a slight downward slope away from the structure; in other embankments the layers shall have a slight downward slope away from the center. In general, the finer and less pervious materials shall be placed against the structures or in the center, and the coarser and more pervious materials, upon the outer parts of embankments.
3. Each layer of material shall be compacted by the use of approved rollers or other approved means so as to secure a dense, stable, and thoroughly compacted mass. At such points as cannot be reached by mobile mechanical equipment, the materials shall be thoroughly compacted by the use of suitable power-driven tampers.
4. Previously placed or new materials shall be moistened by sprinkling, if required, to ensure proper bond and compaction. No compacting shall be done when the material is too wet, from either rain or too great an application of water, to compact it properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compaction, or such other precautions shall be taken as may be necessary to obtain proper compaction.
5. The portion of embankments constructed below proposed structures shall be compacted to 95 percent in accordance with ASTM D1557. The top 2 ft. of an embankment below a pavement base shall be compacted to 95 percent. All other embankments shall be compacted to 90 percent in accordance with ASTM D1557.

3.10 METHODS OF COMPACTION

A. Water-Jetting

1. Saturate backfill material throughout its full depth and at frequent intervals across and along the trench until all slumping ceases.
2. Furnish one or more jet pipes, each of sufficient length to reach the specified depth and of sufficient diameter (not less than 1-1/4 in.) to supply an adequate flow of water to compact the material.
3. Equip jet pipe with a quick-acting valve, supply water through a fire hose from a hydrant or a pump having adequate pressure and capacity to achieve the required results.

B. Tamping and Rolling

1. Deposit backfill material and spread in uniform, parallel layers not exceeding 8 in. thick before compaction. Before the next layer is placed, each layer shall be tamped to obtain a thoroughly compacted mass. Care shall be taken that the material close to the bank, as well as in all other portions of the trench, is thoroughly compacted. When the trench width and the depth to which backfill has been placed are sufficient to make it feasible, and it can be done effectively and without damage to the pipe, backfill may, on approval, be compacted by the use of suitable rollers, tractors, or similar power equipment instead of by tamping. For compaction by tamping (or rolling), the rate at which backfilling material is deposited in the trench shall not exceed that permitted by the facilities for its spreading, leveling, and compacting.

2. If necessary to ensure proper compaction by tamping (or rolling), the backfill material shall first be wet by sprinkling. However, no compaction by tamping (or rolling) shall be done when the material is too wet either from rain or too great an application of water to be compacted properly; at such times the work shall be suspended until the previously placed and new materials have dried out sufficiently to permit proper compacting, or such other precautions shall be taken as may be necessary to obtain proper compaction.

C. Miscellaneous Requirements.

1. Whatever method of compacting backfill is used, care shall be taken that stones and lumps shall not become nested and that all voids between stones shall be completely filled with fine material. Only suitable quantities of stones and rock fragments shall be used in the backfill; the Contractor shall, as part of the work done under the items involving earth excavation and rock excavation as appropriate, furnish and place all other necessary backfill material.
2. All voids left by the removal of sheeting shall be completely backfilled with suitable materials, and thoroughly compacted.

3.11 DISPOSAL OF SURPLUS EXCAVATED MATERIALS

A. No excavated materials shall be removed from the site of the work or disposed of by the Contractor except as directed or permitted by the Engineer.

B. Surplus excavated materials suitable for backfill shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill; shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes within a haul of 1 mile from the point of excavation; all as directed or permitted and without additional compensation.

C. Surplus excavated materials not needed as specified above shall be hauled away and dumped by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him.

3.12 DISPOSAL OF SPECIAL WASTES

A. The Contractor's attention is directed to the requirements set forth by the State of Rhode Island, Department of Environmental Protection, (RIDEM) regarding "Special Wastes" and the proper disposal thereof. All waste materials and debris, as designated by the Owner and/or Engineer, including but not limited to any sewers, storm drains, catchbasins, and combined system pipelines and associated structures, or any portions thereof, including but not limited to sludge, grit, sediment, dirt, sand, rock, grease, roots and other liquid, solid or semi-solid materials contained therein, shall be considered "Special Wastes." In addition, any excavated soils contaminated in any manner, as designated by the Owner and/or Engineer, shall also fall under this category and shall be handled the same. When so encountered, all such materials and debris shall be removed to the extent so ordered by the Engineer and properly disposed of in strict compliance with the requirements of the MA DEP and other regulating authorities to an approved and certified waste disposal site. It shall remain the sole responsibility of the Contractor to apply for and obtain all required permits, bonds and/or insurance relative to such disposal. The Contractor shall also pay all costs associated with the disposal, required permits, bonds and insurance with no additional expense to the Owner. All handling of such "Special Waste" shall be done in strict compliance with the MA DEP requirements and/or any other federal, state or local agency having jurisdiction or authority

over the same. Under no circumstances shall sewage, solids or other "Special Wastes" removed from the sewer lines be dumped or spilled onto the streets or into ditches, catch basins or storm drains. The Contractor must use watertight and State approved vehicles in transporting any wastes as hereinbefore designated.

B. The Contractor shall indemnify and save harmless the Owner and Engineer and all persons acting for or on behalf of the Owner and Engineer from all claims and liability of any nature or kind, and all damages, costs and expenses, including attorney's fees and penalties, arising from the improper handling, transportation or disposal of "Special Wastes" as determined by the MA DEP and/or any other federal, state or local agency having jurisdiction or authority over the same.

3.13 DUST CONTROL

A. During the progress of the Work, maintain the area of activities, by sweeping and sprinkling of streets to minimize the creation and dispersion of dust. If the Engineer decides that it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed.

3.14 BRIDGING TRENCHES

A. Provide suitable and safe bridges and other crossings where required for the accommodation of travel, and to provide access to private property during construction. Remove once bridges and crossings are no longer needed.

3.15 FIELD QUALITY CONTROL

A. Site Tests

1. In accordance with SECTION 01410

3.16 CARE AND RESTORATION OF PROPERTY

A. Restoration of existing property or structures done as promptly as practicable and not left until the end of the construction period.

END OF SECTION

SECTION 02210

ROCK EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for removal and disposal of rock.

B. Related Sections

1. Section 00500-Agreement
2. Section 00800- Supplementary Conditions
3. Section 02200-Earth Excavation, Backfill, Fill and Grading

1.02 DEFINITIONS

A. Rock-as defined in SECTION 00500.

1.03 REQUIREMENTS

A. Excavate rock if encountered, to the lines and grades indicated on the drawings or as directed, dispose of the excavated material, and furnish acceptable material for backfill in place of the excavated rock.

B. Excavate rock in pipe trenches to a limit which provides 6-inches clearance minimum from the pipe after it has been laid. Before the pipe is laid, the trench shall be backfilled to the correct subgrade with thoroughly compacted, suitable material or, when so specified or indicated on the drawings, with the same material as that required for bedding the pipe, furnished and placed at the expense of the Contractor.

C. The use of explosives will not be allowed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXCESS ROCK EXCAVATION

A. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below in this section.

B. In pipe trenches, excess excavation below the elevation of the top of the bedding, cradle, or envelope shall be filled with material of the same type, placed and compacted in the same manner, as specified for the bedding, cradle, or envelope. Excess excavation above said elevation shall be filled with earth as specified in the article titled "Backfilling Pipe Trenches" in SECTION 02200.

C. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with 3000 psi concrete. Other excess excavation shall be filled with earth as specified in the article titled "Backfilling Around Structures" in SECTION 02200.

3.02 SHATTERED ROCK

A. If the rock below normal depth is shattered due to rock removal operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches screened gravel shall be used for backfill. All such removal and backfilling shall be done by and at the expense of the Contractor.

3.03 PREPARATION OF ROCK SURFACES

A. Whenever so directed during the progress of the work, remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly, using steam to melt snow and ice, if necessary. Water in depressions shall then be removed as required so that the whole surface of the designated area can be inspected to determine whether seams or other defects exist.

B. The surfaces of rock foundations shall be left sufficiently rough to bond well with the masonry and embankments to be built thereon, and if required, shall be cut to rough benches or steps.

C. Before any masonry or embankment is built on or against the rock, the rock shall be scrupulously freed from all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means shall be used to accomplish this cleaning. Remove free water left on the surface of the rock.

3.04 REMOVAL OF BOULDERS

A. Remove piles of boulders and loose rock encountered within the limits of earth embankments and dispose in a suitable place.

3.05 DISPOSAL OF EXCAVATED ROCK

A. All excavated rock shall be handled, transported and disposed of by the Contractor, at his expense, at appropriate locations, and in accordance with arrangements made by him without additional cost to the Owner.

B. Excavated rock may be used in backfilling trenches subject to the following limitations:

1. Pieces of rock larger than permitted under the article titled "Backfilling Pipe Trenches" in SECTION 02200 shall not be used for this purpose.
2. The quantity of rock used as backfill in any location shall not be so great as to result in the formation of voids.
3. Rock backfill shall not be placed within 36 in. of the surface of the finish grade.

C. Surplus excavated rock shall be disposed of as specified for surplus excavated material as specified in SECTION 02200.

3.06 BACKFILLING ROCK EXCAVATIONS

A. Where rock has been excavated and the excavation is to be backfilled, the backfilling above normal depth shall be done as specified in SECTION 02200. If material suitable for backfilling is not available in sufficient quantity from other excavations, the Contractor shall, at his own expense, furnish suitable material from outside sources.

END OF SECTION

SECTION 02215

AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and placing materials, which include Crushed Stone, Gravel Borrow and Select Borrow.
2. Location of specified materials as detailed on the Drawings or as directed by the Engineer for excavation below normal depth, utility support, replacement of unsuitable material or elsewhere, as ordered.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading.
2. Section 02500 - Paving

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

1. T11, Amount of Material Finer than 0.075 mm Sieve in Aggregate
2. T27, Sieve Analysis of Fine and Coarse Aggregates.

B. American Society for Testing and Materials (ASTM).

1. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

1.03 DEFINITIONS

A. The term Screened Gravel as used in the Contract Documents shall mean Crushed Stone.

1.04 SUBMITTALS

A. Shop Drawings

1. Provide sieve analysis when gradation requirements are given in the Specification.

B. Samples

1. Furnish representative sample including location of source with Shop Drawing transmittal sheet.

1.05 QUALITY ASSURANCE

A. Field Samples

1. The attention of the Contractor is directed to the fact that under Specification SECTION 00700, 1.03 Materials and Equipment, all materials furnished by the Contractor to be incorporated into the Work shall be subject to the inspection of the Engineer. The

Engineer shall be the sole judge as to the acceptability of proposed materials and said judgement shall be final, conclusive, and binding.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. In accordance with Specification SECTION 00700, 1.03 Materials and Equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Crushed Stone

1. For bedding and pipe zone material for pipe larger than 3 inches diameter. Well graded in size from 3/8 inches to 3/4 inches or such other sizes as may be approved.
2. For bedding and pipe zone material for plastic pipe 3 inches diameter and less, maximum particle size shall be 3/8 inches.
3. Clean, hard, and durable particles or fragments, free from dirt, vegetation, or other objectionable matter, and free from an excess of soft, thin elongated, laminated or disintegrated pieces.
4. Screened Stone of similar size and grading to this specification may be used instead of Crushed Stone.

B. Gravel Borrow

1. Granular material well graded from fine to coarse with a maximum size of 3 inches, obtained from approved natural deposits and unprocessed except for the removal of unacceptable material and stones larger than the maximum size permitted.
2. Gravel shall not contain vegetation, masses of roots, or individual roots more than 18 inches long or more than 1/2 inches in diameter.
3. Gravel shall be substantially free from loam and other organic matter, clay and other fine or harmful substances.
4. Gradation requirements for gravel shall be determined by AASHTO-T11 and T27 and conform to the following:

Sieve	Percent Passing
1/2 inch	60-95
No. 4	50-85
No. 50	8-28
No. 200	0-8

C. Select Borrow

1. Use inorganic natural soils and/or rock, having not more than 8 percent by weight passing the No. 200 sieve and having a maximum stone size no greater than 6-inches.
2. Use only material well-graded throughout entire size range, free of roots, leaves and other organic material, ice or frost and aggregations of frozen soil particles.
3. Moisture content to be within plus minus 3 percent optimum at the borrow source.
4. Material must meet compaction requirements indicated or as specified.

D. Gravel Base Course

1. In accordance with SECTION 02500.

2.02 SOURCE QUALITY CONTROL

A. Test, Inspection

1. Engineer may elect to sample material supplied at the source.
2. Assist the Engineer and/or personnel from the designated testing laboratory in obtaining samples.

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed Stone

1. Spread in layers of uniform thickness not greater than 6 inches.
2. Compact thoroughly by means of a suitable vibrator or mechanical tamper.

B. Gravel Borrow

1. Spread in layers of uniform thickness not exceeding 12 inches before compaction and moistened or allowed to dry as directed.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment.
3. Compaction shall conform to 95% of minimum dry density per ASTM D1557.
4. The percolation rate for the compacted bank-run gravel shall not exceed 5 minutes per inch.

C. Select Borrow

1. Spread in layers of uniform thickness not exceeding 12 in. (loose lift) before compaction and moistened or allowed to dry.
2. Compact thoroughly by means of suitable power-driven tampers or other power-driven equipment unless otherwise directed by the Engineer.

3.02 FIELD QUALITY CONTROL

A. Material and compaction testing

1. In accordance with SECTION 01410.

END OF SECTION

SECTION 02224

CONTROLLED LOW STRENGTH MATERIAL (CLSM)

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for controlled low strength material (CLSM) to be used in place of compacted soil for general backfill of trenches.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading
2. Section 03300 - Cast-In-Place Concrete

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. C33, Standard Specification for Concrete Aggregates.
2. C150, Standard Specification for Portland Cement.
3. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
4. C494, Standard Specification for Chemical Admixtures for Concrete
5. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
6. C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

B. American Concrete Institute (ACI)

1. ACI Committee 229, Standard Specification for Controlled Low Strength Materials (CLSM).

C. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any materials.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, 2004 Edition, including all addenda, issued by the State of Rhode Island Department of Public Works, (referred to as the Standard Specification).

1.03 DEFINITIONS

A. Controlled Low Strength Material, also known as “Flowable Fill”, “Controlled Density Fill” and “Ready-mix Fill.” Self-compacting, self-leveling, cementitious material used for backfills, fills and structural fills.

B. Very Flowable, Exhibits characteristics needed for small or confined areas and required to flow over long distances.

C. Flowable, Where the above flowability characteristics are not required.

D. Excavatable, may be removed in the future if required.

E. Non excavatable, not expected to be removed in the future.

1.04 DESIGN REQUIREMENTS

A. Provide a mixture of Portland cement, aggregates, water and mineral admixtures with a low cement content and high slump to reduce strength development for possible removal and minimize settlement after placement.

B. The proposed mix should maximize the flow characteristics of the material while producing the necessary strength.

C. The design mixes shall have the following strengths at 28 days:

1. Excavatable fill,
   a. Class I (flowable) and II (very flowable), Range: 30 to 100 psi.
   b. Maximum: 100 psi maximum at 28 days, 200 psi at 6 months.
2. Non excavatable fill,
   a. Class III (flowable) and IV (very flowable), Range: 100 to 1200* psi.
   b. Maximum: 1200 at 28 days
      * Specific compressive strength(s) for structural applications are noted on the Contract Drawings

D. Air Content to be minimum 15%

E. Slump, using the modified method consisting of a six inch long by three inch inside diameter straight tube of non porous material.

1. Class I and III: 6” to 8” diameter
2. Class II and IV: 9” to 14” diameter

1.05 PERFORMANCE REQUIREMENTS

A. Provide fill of homogeneous structure which when cured, will have the required strength, water tightness, and durability. To this end, it is essential that careful attention be given to the selection of materials, mixtures, placing and curing of the fill.

1.06 SUBMITTALS

A. In accordance with Section 01300, submit the following,

1. Mix design data not limited to, but including maximum and minimum strengths, air content, setting times, flowability and yield.
2. Certification by the supplier stating compatibility with the project requirements and the Contractor's installation methods.

1.07 QUALITY ASSURANCE

A. Furnish the supplier with information as to the intended use of the CLSM.

PART 2 PRODUCTS

2.01 MATERIALS

A. In general conformance with the Standard Specification and the following:

1. Portland Cement: ASTM C150, Type II American-made. (AASHTO M85)
2. Water: Clean, potable and complying with ASTM C94. (AASHTO M157)
3. Aggregates: ASTM C33 or a non-reactive aggregate source free of contaminants which exhibits high flow properties for controlled density fill. (AASHTO M6, M80)
4. Air entraining admixture conforming to ASTM C260, (AASHTO M154)
5. Chemical Admixtures: In accordance with ASTM C494. (AASHTO M194)
6. Fly Ash: Meet requirements of ASTM C618 Class C or Class F. (AASHTO M295)
7. Granulated Blast Furnace Slag: In accordance with ASTM C989.

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall follow the guideline set forth in ACI 229, except non standard materials shall not be used.

3.02 PREPARATION

A. Pipes and all other members to be encased in CLSM shall be temporarily secured in place to prevent displacement during fill placement.

B. To reduce hydrostatic pressure and limit displacement potential, Contractor may use a high air generator in the fill mixture to lower unit weights.

C. Pre-job test all pump applications prior to day of placement with actual equipment.

D. Secure site during the placement for the CLSM. Cautions include but are not limited to barricades, fences, lights and steel plates.

E. Work shall be sequenced so as to keep traffic flowing within the project area.

3.03 INSTALLATION

A. CLSM shall be batched at concrete plants and hauled to job sites in ready-mix trucks with continuous agitating drums.

B. During waiting period prior to discharge, truck drums shall agitate mixture.

C. CLSM shall be installed in accordance with suppliers recommendations.

3.04 FIELD QUALITY CONTROL

A. All CLSM to be used in the work shall be subject to testing to determine whether it conforms to the requirements of the specifications. The methods of testing shall be in accordance with the Standard Specification.

B. The place, time, frequency, and method of sampling will be determined by the Engineer in accordance with the particular conditions of this project.

3.05 PROTECTION

A. Open trenches shall not be left uncovered overnight.

END OF SECTION

SECTION 02272

GEOTEXTILE MATERIALS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for installation of geotextile filter fabric in trenches and under riprap.

B. Related Sections

1. Section 02100 - Site Preparation
2. Section 02200 – Earthwork
3. Section 02215 – Aggregate Materials

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D3786, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method
2. D4355, Test Method for Deterioration of Geotextiles From Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
3. D4491, Test Method for Water Permeability of Geotextiles by Permittivity
4. D4533, Test Method for Trapezoid Tearing Strength of Geotextiles
5. D4632, Test Method for Grab Breaking Load and Elongation of Geotextiles
6. D4751, Test Method for Determining Apparent Opening Size of a Geotextile
7. D4833, Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
8. D5261, Measuring Mass Per Unit Area of Geotextiles.
9. D6241, Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.03 QUALITY ASSURANCE

A. General

1. Producer of fabric to maintain competent laboratory at point of manufacture to insure quality control in accordance with ASTM testing procedures.
2. Laboratory to maintain records of quality control results.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with SECTION 01300
2. Include manufacturer’s recommended method of joining of adjacent fabric panels.

B. Certificate of Conformance

1. Upon each shipment/delivery of product to the work site, furnish mill certificate(s) from the company manufacturing the fabric attesting that the fabric meets the chemical, physical, manufacturing and performance requirements specified. Fabric will be rejected if it is found to have defects, rips, flaws, deterioration or other damage.

1.05 DELIVERY, STORAGE AND HANDLING

A. Provide fabric in rolls wrapped with a heavy-duty protective covering to protect fabric from, mud, dirt, dust, debris and other deleterious sources until it is installed. Label each roll of fabric with number or symbol to identify production run.

B. Do not expose fabric to ultraviolet radiation (sunlight) for more than 20 days total in period of time following manufacture until fabric is installed and covered.

C. If Engineer determines material is damaged in any way or has excessive sunlight exposure, the Contractor shall immediately make all repairs and replacements as directed by the Engineer, at no additional cost to the Owner.

1.06 SCHEDULING

A. Schedule Work so that the covering of the fabric with a layer of the cover material is accomplished immediately after inspection and approval of the placed fabric by the Engineer. Failure to comply with this requirement shall require replacement of the fabric.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURER/MATERIAL

A. The geotextile fabric shall be nonwoven polypropylene designated as MIRAFI 140N as manufactured by US Fabrics, Cincinnati, Ohio; or acceptable equivalent and shall meet the following minimum requirements:

Minimum Property (Unit)	Unit	Test Method	Requirements
Weight	oz/sy	ASTM D5261	4.5
Grab Tensile Strength	lbs	ASTM D4632	120
Grab Tensile Elongation	%	ASTM D4632	50
CBR Puncture Strength	lbs	ASTM D6241	310
Trapezoid Tear Strength	lbs	ASTM D4533	50
Apparent Opening Size (AOS)	US Std. Sieve (mm)	ASTM D4751	70 (0.21)
Permittivity	sec^{-1}	ASTM D4491	1.7
Permeability	cm/sec	ASTM D4491	0.22
Flow Rate	gal/min/sf	ASTM D4491	135
Ultraviolet Resistance (strength retained at 500 hrs)	%	ASTM D4355	70

B. To keep the number of overlay joints to a minimum, fabric shall be provided in sections not less than fifteen (15) feet in width unless otherwise approved by the Engineer prior to delivery to the site.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. For Riprap

1. Prepared areas to receive geotextile in accordance with SECTION 02100 and SECTION 02200
2. Clear subgrade of all sharp objects, large stones, roots, debris, or any other foreign materials that may contribute to puncturing, shearing, rupturing or tearing of the geotextile.
3. Grade area as smooth as possible and compact in accordance with SECTION 02200, with a vibratory roller or other method approved by the Engineer.
4. Inspect subgrade and repair all unstable areas or soft spots with the installation of gravel and recompact prior to the placement of geotextile.

3.02 FABRIC INSTALLATION

A. For Riprap

1. Place at the locations shown on the Contract Drawings.
2. Unroll directly onto the prepared slope in a continuous manner. Join adjacent sections by overlapping the fabric a minimum of 12-inches. Join end sections by overlapping the fabric a minimum of 2-feet with field-sewn joints or as recommended by the manufacturer.
3. Place fabric on slopes creating a “shingled” effect in the direction of anticipated water flow.
4. Lay fabric smooth, maximizing surface contact with the prepared subbase, free of tension, stress, folds, wrinkles, or creases.
5. Securely anchor fabric sections at the top of the slope as recommended by the manufacturer. Use anchoring pins, nails, staples or other such means to secure fabric to the subbase surface to prevent fabric movement caused by wind uplift, and/or placement of cover material.
6. Maintain sufficient amount of cover material (minimum depth of 6-inches) to protect fabric during placement of riprap. Dozer buckets or blades, or other heavy or damaging equipment shall not be in direct contact with the fabric.
7. Minimize the height from which cover material is dumped and/or dropped directly onto the fabric material in order to avoid fabric damage or movement. Equipment used for spreading and compacting the cover material shall be of the type and size to avoid damage or movement to the underlying geotextile fabric.
8. Spread cover material in the direction of fabric overlap and in a manner that avoids creating undue tension, stress, sagging, buckling and/or other movement of the underlying fabric.

B. Fabric Installation in Trenches

1. In accordance with manufacturers recommendations
2. Place fabric in trench prior to placing crushed stone pipe bedding.
3. Overlap fabric 18-inches minimum for unsewn lap joints.
4. Do not permit equipment to travel directly on fabric.
5. Place fabric in smooth condition to prevent tearing or puncture.
6. Lay fabric loosely, without wrinkles or creases.
7. Leave slack in fabric to allow for adjustment.

3.03 PROTECTION

A. Protect the work before, during and after installation, and protect the installed work covered by other Sections.

3.04 REPAIR

A. Geotextile fabric damaged during installation shall be repaired by a piece of geotextile material cut, placed and adequately anchored over the damaged area, subject to a 3-foot minimum overlap requirement or as directed by the Engineer.

B. If detrimental movement of the geotextile fabric occurs during any step of the installation, as determined solely by the Engineer, the Contractor shall remove the cover material and/or sections of fabric to the limits deemed necessary and reinstall the fabric.

C. Any fabric damage during its installation or during placement of cover materials shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION

SECTION 02277

STRAW WATTLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish and install straw wattles, as indicated on the Drawings and as herein specified.

1.02 SUBMITTALS

A. In accordance with SECTION 01300 submit product details, manufacturers installation instructions and certifications.

1.03 STORAGE

A. Store wattles off the ground and covered to protect from site construction damage, precipitation, sunlight (ultraviolet light), chemicals, open flames, sparks or other conditions which may damage the rolls.

PART 2 PRODUCTS

2.01 MATERIALS

A. Straw Wattles

1. Machine produced.
2. Straw filled tubes of compacted straw of rice, wheat or barley.
3. Straw wattles to be certified as weed free.
4. Netting for tubes to be seamless, high density polyethylene with ultra violet inhibitors.
5. Roll length to be 10.0 feet to 25.0 feet.
6. Weight per linear foot,

    a. 12-inch: 2.5 lbs. minimum
    b. 9-inch: 1.5 lbs. minimum

7. Stakes shall be wooden, 1 1/8-inch x 1 1/8-inch x 2.5 feet long, with lower ends tapered to facilitate driving into compacted soil. Rebar may be substituted for wooden stakes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Straw Wattles

1. Install at locations indicated on the Drawings or as directed by the Engineer.
2. Remove all rocks, vegetation or other obstructions at straw wattle location.
3. Excavate a trench approximately 2 to 3-inches deep to accept the straw wattle and place straw wattle in trench.
4. Anchor straw wattle with stakes placed a maximum of 4-feet apart.
5. The end stakes shall be placed 6-inches from the end of straw wattle and angled toward previously laid straw wattle to force straw wattles together.
6. Refer to detail on Drawings for additional installation requirements.

3.02 MAINTENANCE

1. Maintain straw wattles throughout the duration of the project.
    a. Damaged or displaced straw wattles shall be replaced by the Contractor at no additional cost to the Owner.
2. Remove sediments when depths accumulate to 50% of the depth of the straw wattle height, or as necessary.

3.03 REMOVAL AT PROJECT COMPLETION

A. Remove all sediment collected by the straw wattle, remove the straw wattle, and restore the area to pre-construction condition to the satisfaction of the Engineer.

END OF SECTION

SECTION 02500

HOT MIX ASPHALT (HMA) PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for construction of all temporary and permanent pavements on paved areas affected or damaged by the Contractors operations, whether inside or outside the normal trench limits, as indicated on the Drawings and as herein specified.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading

1.02 REFERENCES

A. This specification makes reference to the requirements of additional specifications as listed. The Contractor shall obtain and familiarize himself with all requirements referenced by this specification prior to preparation and installation of any pavements.

1. Rhode Island Department of Transportation, Standard Specifications for Road and Bridge Construction, including all addenda, issued by the State of Rhode Island Department of Public Works. (Referred to as the Standard Specification).

1.03 PAVEMENT SCHEDULE

A. The Contractors attention is directed to the various pavements required under this Contract, and their locations as detailed on the Contract Drawings.

1. All pavement thickness indicated on the Contract Drawings shall be of the thickness required after compaction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Tack

1. Tack coat shall conform to the applicable provisions of Section M0.3, Materials, and Section 403, Asphalt Emulsion Tack Coat of the Standard Specifications.

B. Hot Mix Asphalt Base Course for Trench Width (Temporary and Permanent Pavement)

1. Surface Course shall conform to the requirements of the RIDOT Standard Specification Section 401, Class 12.5.

C. Hot Mix Asphalt Surface Course for Cold Planning and Overlay

1. Surface Course shall conform to the requirements of the RIDOT Standard Specification Section 401, Class 9.5.

D. Gravel Base Course

1. The Gravel Sub-Base Course in accordance with Standard Specification Subsection M01.09, meeting the gradation requirements of Table 1, Column 1, with 100% passing 3-inch Square Mesh Sieves.

2.02 SOURCE QUALITY CONTROL

A. The paving plant used by the Contractor for preparation of all paving materials shall be acceptable to the Engineer who shall have the right to inspect the plant and the making of the material as specified in RIDOT Standard Specification.

B. The Contractor shall provide Quality Control including but not limited to preparing and maintaining an approved Quality Control Plan, preparing HMA mix designs, conducting construction quality and pre pavement placement meetings, providing a field reference system, performing QC inspection, sampling and testing. Evaluating all QC data and maintaining all QC records. Providing samples and construction of test/control strip if required.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to placing pavement, all backfill shall have been properly compacted as specified under Section 02200 to eliminate settling of backfill. No pavement shall be placed over poorly compacted backfill. Backfill and gravel base course shall be compacted, brought to the proper elevation, and dressed so that new pavement construction shall be at the required grade. The Contractor shall maintain the surfaces of all excavated and disturbed areas until the pavement is placed. If there is a time lapse of more than 24 hours between completion of preparation of subgrade or placing of gravel base course and placing of pavement, or if subgrade or gravel base course has been eroded or disturbed by traffic, the subgrade or gravel base course shall be restored before placing pavement.

B. When installing permanent trench pavement on roadways with existing bituminous pavement, the edges of existing pavement shall be cut back 12-inches, or more as required, from the trench excavation wall or damaged area to sound undamaged material, straightened, and cleaned. Existing surface courses shall be stripped from the bituminous base course for at least a 6-inch width and trimmed square and straight so that new pavement shall be placed on existing, sound bituminous base course. Existing pavement that will underlay or butt new pavement shall be swept clean and have all edges and surfaces exposed to new pavements painted with asphalt emulsion to ensure a satisfactory bond.

C. Before permanent pavement is installed all undelaying temporary pavement and excess gravel base shall be removed and the base shall be brought to the proper grade

D. All manhole covers, catch basin grates, valve and meter boxes, curbs, walks, walls and fences shall be adequately protected and left in a clean condition. Where required, the grades of manhole covers, catch basin grates, valve boxes, and other similar items shall be adjusted to conform to the finished pavement grade.

E. The Contractor shall remove and acceptably dispose of all surplus and unsuitable material.

3.02 INSTALLATION

A. General

1. Unless indicated otherwise, all temporary and permanent HMA pavements shall be installed in multiple courses.
2. Trench width HMA base courses shall be carefully spread and raked to a uniform surface and thoroughly rolled.
3. All surface courses of permanent paving shall be applied with acceptable mechanical spreaders in widths of at least 9 feet.
4. The rolling for all HMA and gravel base courses shall conform to the standards listed in the appropriate Subsection of the RIDOT Standard Specification.
5. Pavements shall be placed so that the entire roadway or paved area shall have a true and uniform surface, and the pavement shall conform to the proper grade and cross section with a smooth transition to existing pavement.

B. Gravel Base Course

1. Place to such depth that the finished compacted base course is the depth as indicated on the Contract Drawings and specified herein.
2. The top of the base course shall be below the finish grade a distance required to accommodate the compacted pavement material as indicated on the Contract Drawings and specified herein.
3. The gravel base shall be spread and compacted in layers not exceeding 8 inches in depth compacted measurement, to not less than 95 percent of the maximum dry density of the material, as determined by the Standard AASHTO Test Designation T99 compaction test Method C within 5% of optimum moisture content as determined by the Engineer. Any stone with a dimension greater than the maximum size specified shall be removed from the base material before the gravel is compacted. Compaction shall continue until the surface is even and true to the proposed lines and grades within a tolerance of ½-inch above or below the required cross sectional elevations and to a maximum irregularity not exceeding ½ inch under a l0 foot line longitudinally. Any specific area a gravel sub-base which, after being rolled, does not form a satisfactory, solid, stable foundation shall be removed, replaced and recompacted by the Contractor without additional compensation.

C. Temporary Pavement

1. Install over all trenches in paved areas where directed by the Engineer.
2. Construct upon completing the backfilling and compaction of the trenches and the placing of the gravel base courses in the streets or other paved areas unless directed otherwise by the Engineer.
3. Install in multiple courses to the thicknesses indicated on the Contract Drawings, as specified or as directed by the Engineer.
4. Maintain in good repair and flush with the existing pavement at all times until the permanent pavement is placed.

5. The temporary pavement shall not be removed until 60 days after installation or until such time that the Engineer authorizes the placement of permanent pavement at an earlier time.
6. The temporary pavement shall be placed over all trenches in paved areas where directed by the Engineer at minimum of weekly.

D. HMA Base Course

1. Install in streets or as indicated on the Contract Drawings.
2. Install in accordance with the applicable requirements of Section 401 of the RIDOT Standard Specification and as detailed in the Contract Drawings.
3. Prior to placing Base Course, all temporary pavement and sufficient gravel base course shall be removed, to proper depths as detailed in the Contract Drawings.

E. HMA Surface Course

1. Install in the streets or as indicate on the Contract Drawings.
2. Install in accordance with the requirements of the applicable requirements of Section 401 the RIDOT Standard Specification and as detailed in the Contract Drawings.

F. Sidewalks, Driveways, Parking Lots and Curbing

1. Sidewalks, driveways, parking lots and curbing that are removed or damaged by the Contractor's operations shall be restored to a condition at least equal to that in which they are found immediately prior to the start of operations. Materials and methods used for such restoration shall be in conformance with the requirements of the RIDOT Standard Specification and this Section.
2. Where the trench location is in a sidewalk, the entire width of the sidewalk shall be replaced with new material. Side forms shall be set so as to obtain and preserve a straight edge along both sides of the walk.
3. Where trench is in a driveway, the driveway shall be repaved across its entire width with even edges.
4. Parking lots shall be repaved to the limits and thicknesses as indicated on the Contract Drawings or as directed by the Engineer.
5. Gravel base course under sidewalks and driveways shall not be less than 8-inches thick.

G. Surface Maintenance

1. During the guarantee, period, the Contractor shall maintain the new HMA surface in a safe and satisfactory condition for traffic, and shall promptly make good all defects such as cracks, depressions, and holes that may occur. After removing the defective HMA, the Contractor shall correct the cause of the defect and replace all pavements in accordance with these specifications.

END OF SECTION

SECTION 02618

DUCTILE-IRON PIPE AND FITTINGS
FOR BURIED SERVICE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish, lay, joint, and test ductile-iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

1.02 REFERENCES

A. American Water Works Association (AWWA)/American National Standards Institute (ANSI)

1. C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
2. C105/A21.5, Polyethylene Encasement for Ductile Iron Pipe Systems
3. C110/A21.10, Ductile-Iron and Gray-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
4. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings.
5. C116, Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
6. C150/A21.50, Thickness Design of Ductile-Iron Pipe.
7. C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast for Water.
8. C153/A21.53, Ductile-Iron Compact Fittings, 3 inches through 64 inches for Water Service
9. C219, Bolted, Sleeve-Type Couplings for Plain-End Pipe
10. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances
11. C65l, Disinfecting Water Mains

B. American Society of Testing and Materials (ASTM)

1. A536, Standard Specification for Ductile Iron Castings

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

B. Shop Drawings

1. Piping layouts in full detail.
2. Location and type of backup block or device to prevent separation.
3. Schedules of all pipe, fittings, special castings, couplings, expansion joints, restrained joints and other appurtenances.
4. Detailed disinfection plan consistent with AWWA C651.
5. Sworn certificates of shop tests showing compliance with appropriate standard.

C. Manufacturer’s Literature

1. Catalog cuts of joints, couplings, harnesses, expansion joints, restrained joints gaskets, fasteners and other accessories.

2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

A. Pipe and fittings to be inspected and tested at the foundry as required according to ANSI Standards.

B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Owner reserves right to perform visual and hammer test prior to installation.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile-Iron Pipe

1. Designed in accordance with AWWA/ANSI C150/ A21.50.
   a. Ductile iron pipe used for sewer force mains and water mains shall be cement lined thickness class 52 push-on or mechanical joint, size as indicated on the Drawings.
   b. For sewer pipeline use a minimum thickness class 52 ductile iron pipe. **Gravity sanitary sewer pipe lines and fittings shall be ductile iron pipe lined with a ceramic-filled amine-cured epoxy, Protecto 401 by Indurall**. The lining thickness shall be 40 mils minimum. Application shall be performed by an applicator approved by the coating manufacturer, in accordance with manufacturer's instructions and under controlled conditions at the applicator's shop or the pipe manufacturer's plant. Applicator shall submit a certified affidavit of compliance with manufacturer's instructions and requirements specified herein.

2. Manufactured in accordance with AWWA/ANSI C151/A21.51.
   a. Unless otherwise indicated or specified, ductile-iron pipe shall be at least thickness Class 52

B. Pipe For Use With Couplings

1. As specified above except that the ends shall be plain (without bells or beads) cast or machined at right angles to the axis.

2.02 FITTINGS

A. General

1. Push-on or mechanical-joint fittings shall be all-bell fittings unless otherwise indicated or specified.
2. Compact fittings in accordance with AWWA/ANSI C153/A21.53 and shall have a working pressure rating of 350 psi

B. Nuts and Bolts

1. Ductile Iron or Kor-10 steel T bolts and nuts or approved equal.

C. Nonstandard Fittings

1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design.
2. Manufactured to meet the requirements of these specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

A. Push-On and Mechanical

1. In accordance with AWWA/ANSI C111/A21.11.
2. The plain end of push-on pipe shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
3. Push-on and mechanical-joint pipe and fittings shall be provided with sufficient quantities of accessories conforming to AWWA/ANSI C111/A21.11.

B. Restrained

1. Location of restrained joints shall be based on Thrust Restraint Design for Ductile Iron Pipe (Second Edition), published by Ductile Iron Pipe Research Association.
2. Restraining glands will be required on all fittings.
3. Pipe, fittings and appurtenances for restrained joints shall be in accordance with AWWA/ANSI C153/A21.53. Only restraining glands which impart multiple wedging action against the pipe increasing its pressure as the pipe pressure increases will be allowed. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. Twist off nuts shall be used to insure proper actuating of the restraining device.
4. Mechanical joint restraint shall have a working pressure rating of at least 250 psi.
5. Manufactured by EBAA Iron, Inc., Eastland, Texas, or equal.

C. Gaskets

1. Force main and water main gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.
2. Gravity sewer main gaskets shall have flouroelastomer (FKM) gaskets, such as Viton gaskets, as manufactured by DuPont, or an acceptable equivalent.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings, or mechanical-joint pipe and/or fittings as herein specified.

B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
   a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
   a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be high strength, low alloy steel, unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Solid Sleeve Couplings

1. Solid sleeve couplings and accessories shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed.
2. Couplings shall be ductile iron with gaskets of a composition suitable for exposure to the liquid within the pipe.

2.06 ACCESSORIES

A. Tapped Connections

1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections exceeds that given above for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or permitted by the Engineer.
3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

2.07 POLYETHYLENE ENCASEMENT

A. In accordance with AWWA C105.

2.08 FINISHES

A. Lining

1. Inside of sewer force main and water main pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AWWA/ANSI C104/A21.4.

2. Ductile iron pipe and fittings for the influent sewer shall be lined with a ceramic-filled amine-cured epoxy, Protecto 401 by Indurall. The lining thickness shall be 40 mils minimum. Application shall be performed by an applicator approved by the coating manufacturer, in accordance with manufacturer's instructions and under controlled conditions at the applicator's shop or the pipe manufacturer's plant. Applicator shall submit a certified affidavit of compliance with manufacturer's instructions and requirements specified herein.

B. Coating

1. Outside of pipe and fittings shall be coated with the standard bituminous coating conforming to AWWA/ANSI C151/A21.51

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1. Every care shall be taken in handling and laying pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any pipe or fitting which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is laid so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches form the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
2. Cut ends to be used with push-on joints shall be carefully chamfered to prevent cutting the gasket when the pipe is laid or installed.

3.03 INSTALLATION

A. Pipe and Fittings

1. No defective pipe or fittings shall be laid or placed in the piping, and any piece discovered to be defective after having been laid or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being laid and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be laid accurately to the lines and grades indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.

4. Pipe shall have a firm bearing along its entire length. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.
5. The deflection of alignment at a joint shall not exceed the appropriate permissible deflection as specified in the tabulation titled PIPE DEFLECTION ALLOWANCES.

PIPE DEFLECTION ALLOWANCES

Maximum permissible deflection, in.*

Size of pipe, in.	push-on joint	Mechanical joint
4	19	31
6	19	27
8	19	20
10	19	20
12	19	20
14	11	13-1/2
16	11	13-1/2
18	11	11
20	11	11
24	11	9
30	11	9
36	11	8
42	7-1/2	7-1/2
48	7-1/2	7-1/2
54	5-1/2	--

*Maximum permissible deflection for 18-ft. lengths; maximum permissible deflections for other lengths shall be in proportion of such lengths to 18 ft.

6. When mechanical joint, push-on joint or similar pipe is laid, the bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted into it. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.

B. Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Temporary Plugs

1. At all times when pipe laying is not actually in progress, the open ends of pipe shall be closed by temporary watertight plugs or by other approved means. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

D. Appurtenances

1. Valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

3.04 ASSEMBLING

A. Push-On Joints

1. Make up by inserting the gasket into the groove of the bell and applying a thin film of special nontoxic gasket lubricant uniformly over the inner surface of the gasket which will be in contact with the spigot end of the pipe.
2. The chamfered end of the plain pipe shall be inserted into the gasket and then forced past it until it seats against the bottom of the socket.

B. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

C. Mechanical Joints

1. Surfaces against which the gasket will come in contact shall be thoroughly brushed with a wire brush prior to assembly of the joint. The gasket shall be cleaned. The gasket, bell, and spigot shall be lubricated by being washed with soapy water.
2. The gland and gasket, in that order, shall be slipped over the spigot, and the spigot shall be inserted into the bell until it is correctly seated.
3. The gasket shall then be seated evenly in the bell at all points, centering the spigot, and the gland shall be pressed firmly against the gasket.
4. After all bolts have been inserted and the nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint to the proper tension, preferably by means of a torque wrench.
5. The correct range of torque as indicated by a torque wrench and the length wrench (if not a torque wrench) used by an average man to produce such range of torque, shall not exceed the values specified in the tabulation titled TORQUE RANGE VALUES.

TORQUE RANGE VALUES

Nominal pipe size, in.in.	Bolt diameter, ft.-lb.	Range of torque, in.	Length of wrench,
3	5/8	40-60	8
4 thru 24	3/4	60-90	10
30, 36	1	70-100	12
42, 48	1-1/4	90-120	14

If the effective sealing of the joint is not attained at the maximum torque indicated above, the joint shall be disassembled and thoroughly cleaned, then reassembled. Bolts shall not be over stressed to tighten a leaking joint.

D. Restrained Joints

1. Install in accordance with manufacturers written instructions.
2. Do not exceed manufacturer’s permissible pipe deflection allowance.

E. Piping Restraint: Restrain all fittings and restrain all PVC piping according to the following table.

4 inch Nominal Pipe Diameter			
Horizontal Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	2	4	7
Downstream	2	4	7
Vertical Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	6	12
Downstream	3	6	12
6 inch Nominal Pipe Diameter			
Horizontal Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	5	9
Downstream	3	5	9
Vertical Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	4	8	17
Downstream	4	8	17
8 inch Nominal Pipe Diameter			
Horizontal Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	3	6	12
Downstream	3	6	12
Vertical Bends	**11.25°**	**22.5°**	**45°**
	Length of pipe needed to be restrained both sides (ft.)		
Upstream	6	11	22
Downstream	6	11	22

Assumptions:
1) Pipe material is Ductile Iron
2) Soil type is Silty Sand (SM)
3) Safety Factor is 2 to 1
4) Trench Type 3
5) Minimum depth of pipe is at 5 feet below grade
6) The Test Pressure is at 200 psi
7) 90 degree elbows are not to be used in vertical bend situations due to extreme forces.

1. Should conditions vary from those presented in the assumptions, consult Engineer for direction.

E. Sleeve-Type Couplings

1. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.

6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts. The correct torque as indicated by a torque wrench shall not exceed the manufacturers recommended values
7. After assembly and inspection and before being backfield, all exterior surfaces of buried sleeve-type couplings, including the middle and follower rings, bolts, and nuts, shall be thoroughly coated with an approved heavy-bodied bituminous mastic. Care shall be taken and appropriate devices used to ensure that the undersides, as well as the more readily accessible parts, are well coated.

3.05 POLYETHYLENE ENCASEMENT

A. When required, install in accordance with AWWA C105.

3.06 SOCKET PIPE CLAMPS, TIE RODS AND BRIDLES

A. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, suitable pipe clamps, tie rods or bridles shall be provided. Bridles and tie rods shall be at least 3/4 in. diameter except where they replace flange bolts of smaller size, in which case they shall be fitted with a nut on each side of the pair of flanges. The socket clamps, tie rods or bridles shall be coated with an approved bituminous paint after assembly or if necessary, prior to assembly.

3.07 PIPING SUPPORT (THRUST BLOCK)

A. Where necessary, bends, tees, and other fittings in pipelines buried in the ground may be backed up with 3000 psi concrete placed against undisturbed earth where firm support can be obtained. If the soil does not provide firm support, then restraining devices shall be provided.

3.08 CLEANING

A. Prior to the pressure and leakage tests, thoroughly clean piping of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.09 TESTING

A. Except as otherwise directed, pipelines shall be given combined pressure and leakage tests in sections of approved length.

1. Provide 24 hour notice to Engineer for all testing
2. The Contractor shall make arrangements for procuring water for testing and be responsible for all associated fees.

B. Furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, other necessary equipment; and all labor required.

C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.

D. However, pipelines to be embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.

E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps. After completion of the tests, if directed by the Engineer, remove corporations and plug said holes.

F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.

G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Do not apply this pressure to items of equipment known to be incapable of withstanding such pressure.

H. If the Contractor cannot achieve the specified pressure and maintain it for a period of two hour with no additional pumping, the section shall be considered as having failed to pass the test. Allowable leakage over the two hour period shall be calculated per AWWA C-600 as summarized in the following table.

Hydrostatic Testing Allowance per 1,000 ft. of Pipe
(Loss in U.S. Gallons Following a **2** Hour Test)

	Nominal Pipe Diameter					
Avg. Pipe Press. (psi)	6 in.	8 in.	12 in.	16 in.	24 in.	36 in.
150	1.10	1.48	2.20	2.94	4.42	6.61
175	1.18	1.60	1.38	3.18	4.76	7.16
200	1.28	1.70	2.56	3.40	5.10	7.64

I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.

J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirement.

K. All testing to be witnessed by the Engineer.

3.10 DISINFECTING AND FLUSHING

A. The Contractor shall disinfect the lines carrying potable water.

B. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in the AWWA Standard C651 except as otherwise specified herein.

C. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.

D. The dosage shall be such as to produce a chlorine concentration of not less than 10 PPM (mg/l) after a contact time of not less than 24 hours.

E. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM (mg/l).

F. Before disposing of the water used in disinfecting and flushing water mains thoroughly neutralize it through the application of a reducing agent, as referenced in AWWA C651.

G. Dispose of the water used in disinfecting and flushing in an approved manner.

H. Connection at cut ins shall be swabbed with 50 PPM solution of chlorine at locations when above methods are not possible.

I. Bacteriological sampling and testing shall be done in accordance with AWWA C651 for each main and each branch. Sampling shall be accomplished with sterile bottles treated with sodium thiosulfate, as required by Standard Methods. No hose or fire hydrants shall be used in collection of samples. A corporation stop installed on the main, with a removable copper tube gooseneck assembly, is the recommended method.

J. Testing shall be done by a laboratory approved by the Engineer, in accordance with Standard Methods, and shall show the absence of coliform organisms. A standard plate count may be required at the option of the Engineer.

3.11 CONNECTION TO EXISTING WATER MAINS

A. In general, connection to existing water mains will not be allowed prior to the new water main successfully passing pressure and bacteria tests that can be verified with written confirmation. Any exception to this requirement will be at the sole discretion of the Engineer and/or Owner.

END OF SECTION

SECTION 02629

UNDERGROUND UTILITY MARKING TAPE

GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing metallic (detectable) and non-metallic (non-detectable) marking tape over buried pipelines and conduits.

1.02 REFERENCES

A. A.P.W.A. - American Public Works Association

1.03 SUBMITTALS

A. Shop Drawings

1. Submit in accordance with SECTION 01300 - SUBMITTALS

B. Samples

1. Provide samples of submitted products.

1.04 DESCRIPTION

A. General

1. Marking tape to be installed over all pipe lines and conduits installed under this Contract.
2. Marking tape for non-ferrous pipe or conduits to be Detectable, magnetic type.
3. Marking tape for ferrous pipe or conduits to be Non-detectable, non-magnetic type.
4. Tape to be 6-inches wide.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Underground utility marking tape to be:

1. Detectable: Magnatec by THOR Enterprises, Inc., Sun Prairie, WI.
2. Non-detectable: Shieldtec by THOR Enterprises, Inc., Sun Prairie, WI.
3. Or product deemed equal by the Engineer.

2.02 MATERIALS

A. Detectable Underground Utility marking Tape

1. Minimum overall thickness: 5.0 mil (0.005”).
2. Aluminum foil core: 35 gauge (0.00035”) minimum.
3. Foil visible from both sides of tape.
4. Protective plastic jacket applied to both sides of foil.
5. Jacket adhesive applied directly to the film and foil.
6. No printing to extend to the edges of the tape.

7. No Dilutants, pigments or contaminants in the adhesive.
8. Adhesive formulated to resist degradation by elements normally found in soil.

B. Non-detectable Underground Utility marking Tape

1. Minimum overall thickness: 4.0 mil (0.004”).
2. Polyethylene plastic film: 100% virgin, low density acid and alkali-resistant.
3. Printing: Permanent, black, environmentally safe.
4. Coloring: color-fast, lead free, organic pigments suitable for direct burial and prolonged exposure to the elements normally found in soil.

C. Marking

1. Tape to printed with “BURIED *UTILITY* LINE BELOW”, replacing the word “*UTILITY”* with the word “WATER”, “SEWER”, “DRAIN”, “ELECTRIC’, “GAS”, or otherwise appropriate, repeating continuously every 30-inches max.

D. Color Code in accordance with A.P.W.A. Standards as follows:

1. Safety Red	Electric power and high voltage lines
2. High Visibility Safety Yellow	Gas and oil distribution/Transmission Dangerous materials/Steam
3. Safety Alert Orange	Fiber optic/telephone/CATV
4. Safety Precaution Blue	Water and irrigation lines
5. Safety Green	Sewer/storm/sanitary systems, non-potable water
6. Safety Brown	Force mains and effluent lines
7. Alert Purple	Reclaimed and effluent re-use lines

PART 3 EXECUTION

3.01 INSTALLATION

A. Install marking tape directly above the pipe line or conduit tape is to identify, approximately, 24-inches below the proposed finished grade.

B. Install marking tape in accordance with manufacturers recommendations.

C. Install marking tape over existing utilities disturbed by the Contractors operation.

END OF SECTION

SECTION 02650

RELOCATION OF EXISTING UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to relocate existing utilities which conflict with the proposed Work.

1. Relocations by Contractor

a. The Contractor shall coordinate with the respective utility company to the extent necessary to relocate the conflicting utility with the Contractor's forces, comply with the Utility Company's requirements and not cause delays in this Contract.

2. Relocation by the Utility Company

a. The Contractor shall coordinate with the respective utility company in order schedule the work with the Utilities forces and not cause delays in this Contract.

1.02 SUBMITTALS

A. In accordance with Section 01300 submit utility relocation plans indicating limits and details of the relocation work.

1.03 PROJECT/SITE CONDITIONS

A. Existing conditions

1. The presence of utilities within the streets, roads and right of ways customarily indicate service lines connecting the buildings and structures along the route. Safeguard all utilities and there respective service connections from damage during the performance of the Work.

2. The presents of utility poles indicates overhead wires for electric, telephone and cable TV also exist. Protect all overhead wires, including service lines, from damage caused by equipment used to perform the Work.

3. Existing utilities, as indicated on the Drawings are from the best available information. The accuracy of such is not guaranteed.

B. Relocation of Utilities

1. Relocation of existing utilities will be required when;

a. The existing utility interferes with the location of a proposed open cut piping installations.
b. Realignment of the proposed Work will have detrimental effects on the proposed Work or existing utility.

C. Support of Utilities

1. Support of existing utilities will be allowed when;

a. The location of the existing utility does not interfere with the proposed installation of piping or appurtenances
b. Support in place will not be detrimental to the utility itself.
c. Support of utility is in accordance with the requirements of the utility in question.

1.04 SCHEDULING

A. Coordination

1. Coordinate all existing utility relocation work with the appropriate utility company.
2. Notify underground utility locating service (Dig Safe, Call Before You Dig, etc.) in accordance with State requirements.
3. Conduct test pits to identify utility locations needed to perform the Work only after coordination with the utility company and in time to prevent delay of the Work.
4. Coordinate with local water authority to operate water valves as required.

PART 2 PRODUCTS

2.01 MATERIALS

A. As required by the utility company, or as specified, or as approved by the Engineer.

B. To be new.

PART 3 EXECUTION

3.01 EXAMINATION

A. After test pit excavations are performed, submit as built information to utility company and the Engineer.

3.02 INSTALLATION

A. In strict accordance with the requirements of the Utility Company responsible for the Work.

3.03 TESTING

A. Perform pressure and leakage testing on water lines relocated and infiltration or exfiltration testing on storm drains and sewers relocated in accordance with local agencies responsible for the utility.

3.04 INSPECTION

A. Allow access to the relocation work for inspections and recording as-built information.

END OF SECTION

SECTION 02769

DISPOSAL OF MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for disposal of materials resulting from the cleaning of sewer pipes.

1.02 SUBMITTALS

A. In accordance with Specification Section 01300, submit the following

1. Outline of the procedures proposed to accomplish the work.
2. Include a detailed description of disposal methods and locations of disposal.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION

3.01 DISPOSAL PROCEDURES

A. Material encountered in the cleaning of sewer lines is considered “Solid Waste” by the Rhode Island Department of Environmental Management (RIDEM**)**. The materials include sludge, sand, grit, debris, etc.

B. The Contractor is required to test and dispose of any waste material removed from pipeline, manholes, etc. within the project area in accordance with State and Federal requirements. Testing of waste material will be at the Contractor’s expense.

C. The materials being removed from the pipelines and manholes during the cleaning process shall be deposited in such a manner as to not endanger the public, plant personnel or persons performing the work. Such debris deposits may be of such nature, high in biological organic contents, or chemically aggressive that they will require proper disposal in a safe, health risk free, environment. The Contractor shall contact the Owner and Engineer and all agencies having jurisdiction thereof, for approval of debris disposal methods and locations of disposal, prior to disposing of any or all debris removed from pipe cleaning methods. All solids or semi-solids resulting from the cleaning operations shall be removed and satisfactorily disposed of off-site at the Contractor’s expense.

D. Debris must be transported in a watertight vehicle. The Contractor must ensure that no water leaks from the vehicle in any manner during the transportation. The Contractor is solely responsible for any cleanup of debris on route to disposal at a licensed disposal facility. The Contractor is also responsible for the payment of any fines that are incurred as a result of any incident which occurs during the transportation and/or disposal of the contents of the vehicle.

E. Disposal must be at a licensed facility that is regulated to accept and properly dispose of the debris that is normally expected to be in a wastewater collection system.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish and install the 10 foot high chain-link fence, gates, and accessories.

1.02 DESIGN REQUIREMENTS

A. The fence shall be of the height indicated and shall have a top and bottom rail.

B. Fence materials and installation shall meet or exceed the standards of the Chain Link Fence Manufacturers Institute, Columbia, MD., except as otherwise specified in this section; also fence materials shall meet or exceed Fed. Spec. RR-F-191G/GEN for Fencing, Wire and Post Metal (and Gates, Chain-link Fence Fabric, and Accessories), and shall conform to the ASTM Standards noted in this Specification.

1.03 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete.

1.04 REFERENCES

A. Fed. Spec. RR-F-191/1A, Type V, for Fencing, Wire and Post, Metal (Chain-link Fence Fabric).

B. American Society for Testing and Materials

1. A392, Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
2. F 626, Specification for Fencing Fittings
3. F668, Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
4. F669, Standard Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.
5. F900, Standard Specification for Industrial and Commercial Swing Gates.
6. F934, Standard Specification for Standard Colors for Polymer Coated Chain Link Fence Materials.
7. F1043, Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework
8. F1083, Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
9. F1234, Protective Coatings on Steel Framework for Fences.
10. F1664, Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Tension Wire Used with Chain Link Fence.

1.05 SUBMITTALS

A. Shop Drawings, submit in accordance with SECTION 01300.

1. Include detailed information, specifications, sizes and dimensions for all materials, accessories, and finishes.

B. Samples

1. Submit samples of the fencing materials to be used, in accordance with the requirements of SECTION 01300.
2. Each sample shall be identified by mark or tag.
3. Samples to include:
   a. 2-inch length of each type of post.
   b. 2-inch length of each type of brace and railing.
   c. 2-inch length of framework for gates.
   d. 2-inch length of diagonal truss brace.
   e. 2-inch length of tension wire.
   f. Each type of fitting used at terminal posts.
   g. Fittings used at line posts.
   h. Fittings for the gate leaf frame.
   i. Gate hinge.
   j. Gate latch.
   k. Stretcher bar, 2-inch length.
   l. Bolt and nut fastener.
   m. Fence fabric, 2 weaves, 2 meshes long.
   n. Tie.
   o. Padlock with key and steel chain, 6-inch length.
4. Accompanying the samples, the Contractor shall submit a written statement that samples submitted comply with the requirements of these Contract Documents.
5. Samples shall be submitted for review at least 30 days prior to fence installation.

C. Quality Control Submittals

1. Manufacturer’s recommended installation instructions.
2. Evidence of Supplier and installer qualifications.

PART 2 PRODUCTS

2.01 GENERAL

A. Match style, finish, and color of each fence component with that of other fence components.

B. All fittings, post, fence and gate framework, and all accessories shall be galvanized steel, then coated with PVC.

2.02 CHAIN LINK FABRIC

A. Vinyl-coated steel chain link fabric shall be Class 2B thermally fused and bonded vinyl coated, woven wire, to a uniform square mesh measuring 2±1/8-inches between its parallel sides. Galvanized core wire shall be No. 9 gauge, of good commercial quality steel and shall be uniformly galvanized with a zinc-coat-weight of at least 0.30 oz per sq. ft. The

galvanized wire shall then be coated with a molecular bonding layer and a minimum 20 mil vinyl coating, continuously extrusion-bonded (not sprayed or dipped) by a thermal extrusion-bonding process to insure a dense and impervious covering, free of voids and having a smooth and lustrous appearance. Unbonded coatings are not acceptable. The vinyl coating shall not be capable of being stripped from the wire with wire strippers. The wire shall be vinyl-clad before weaving and shall be free and flexible at all joints. The bond shall exhibit equal or greater strength than the cohesive strength of the vinyl. All cut ends shall be coated with vinyl at the factory during the weaving process.

B. Fabric shall measure 8-feet in height and be knuckled at top selvage and twisted and barbed at bottom selvage.

C. Color of the PVC coating: Black, and shall match the color of the total fence system.

2.03 FENCE POSTS, RAILS AND BRACES

A. General

1. In accordance with ASTM F669, Heavy Industrial Fence.
2. Protective Coatings: Zinc Coating; ASTM F1234, Type A external and internal coating.
3. Color coating: ASTM F934, minimum 10 mils thickness of PVC over zinc coating to match color of chain link fabric.
4. All framework shall be SS-40 pipe.

B. Line Posts

1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft.,

C. End, Corner, and Pull Posts

1. 4.00 inch outside diameter steel pipe weighing not less than 6.56 lb. per ft.,

D. Top and bottom railings and railings for top, middle and bottom braces between terminal posts and adjacent line posts.

1. 1 5/8 inch outside diameter steel pipe weighing not less than 1.84 lb. per ft.,

2.04 TENSION WIRE

A. No. 7-gage, marcelled, coated steel wire conforming to ASTM A824 Type ll Zinc coated Class 2, 1.20 oz/sf.

2.05 TIE WIRES

A. 6 gage (outside diameter) galvanized steel wire for fastening fence fabric to line posts and rails.

2.06 STRETCHER BARS

A. Flat bars with minimum cross section dimensions of not less than 3/16 inch by 3/4 inch.

B. Not less than 2 inches shorter than height of the fabric with which they are to be used.

2.07 BANDS OR CLIPS

A. Bar bends of not less than 11-gage sheet steel, ¾ inches wide for posts 4 inch OD or less and 7/8 inches wide for posts greater than 4 inch OD, in accordance with ASTM F626, and bolted with 5/16 inch diameter galvanized carriage bolts and nuts.

2.08 DIAGONAL TRUSS

A. Use between terminal and adjacent line posts and for gate framework.

1. 3/8 inch diameter steel rod.

2.09 FITTINGS

A. Malleable iron or pressed steel of suitable size to produce strong construction.

B. Post Caps

1. Accommodate passage of top rail.

2.10 GATES

A. General

1. In accordance with ASTM F900.
2. Gate capable of being opened and closed easily by one person.
3. Paint welded steel joints with zinc-based paint.
4. Attach chain link fabric securely to gate frame at intervals not exceeding 15 inches.

B. Gate posts for gate leaves up to and including 6 ft. wide.

1. 2.875 inch outside diameter steel pipe weighing not less than 4.64 lb. per ft.,
2. or 3.50 inch by 3.50 inch roll-formed, steel corner section weighing not less than 5.00 lb. per ft.

C. Gate posts for gate leaves over 6 ft. up to and including 12 ft. wide.

1. 4.00 inch outside diameter steel pipe weighing not less than 6.56 lb. per ft.,

D. Gate Posts for gate leaves over 13 ft. wide and up to and including 18 ft. 6.625 in. outside diameter steel pipe weighing not less than 18.02 lb. per ft.

E. Gate Leaf framework

1. 2 inch outside diameter steel pipe weighing not less than 2.28 lb. per ft.

F. Hinges

1. Heavy pattern of adequate strength for the gate size.
2. Large bearing surfaces for clamping or bolting in position.

G. Gate Stops

1. Mushroom type or flush plate with anchors, suitable for setting in concrete.

H. Cantilever Sliding Gate

1. The cantilever sling gate shall be ”freehanging” type, single leaf, and sized as shown on the Drawings. The gate manufacturer shall supply sliding gates of appropriate construction, which will be structurally stable and meeting the intended dimensions. The gate shall be manufactured by Anchor Fence/Master Halco Inc., Cyclone Fence, Page Fence, or approved equal.
2. The gate shall be provided with two roller truck assemblies, which operate within a combined track and top gate frame member. The roller truck assemblies shall provide vertical support and lateral movement control to insure alignment of the truck in the track. The roller truck assemblies shall be fastened to gate posts with 7/8-inch diameter ball bolts with ½-inch shank.
3. The gate frame shall be constructed of 2-inch square aluminum tubing alloy 6063-T6, weighing 0.94 lbs per linear foot, welded at the joints. The combined track and top frame member shall be extruded aluminum-sized per manufacturer’s recommendations. The bottom frame member shall be 2-inch by 4-inch aluminum tubing weighting 1.71 pounds per linear foot.
4. Support posts for the cantilever slide gate shall be of 4-inch outside diameter, Schedule 40 steel pipe, ASTM A-120, as specified above.
5. Vertical uprights and diagonal truss rods shall be provided as necessary to insure rigidity of the gate frame and prevent sagging.
6. Appurtenant hardware including roller guide assemblies for each support post, latch assembly with provisions for padlocking, and gate stop assembly shall be provided.

I. Locking Mechanism

1. Provide with a suitable latch accessible from both sides and with provision for padlocking.
2. Double leaf swing gates shall have a center bolt, center stop, and automatic backstops to hold leaves in open position.
3. Padlocks
   a. Solid brass cases.
   b. Hardened steel shackles.
   c. Removable core cylinders.
   d. Galvanized steel chains attached to the shackle by a clevis.
   e. Padlocks shall be manufactured by Eaton Corp Lock & Hardware Div., Yale Marketing Dept., Charlotte, N.C.; & P&F. Corbin, Div. of Emhart Corp., Berlin, Conn.; Best Universal Lock Co., Inc., Indianapolis, Ind.; or be an acceptable equivalent product.
   f. Padlocks shall be furnished with four keys each.

2.11 FOUNDATIONS

A. Concrete for post foundation bases shall be in accordance with SECTION 03300.

B. Grout for posts set in solid rock shall consist of one part Portland cement and three parts of clean, sharp, well-graded sand with just enough water for proper workability.

PART 3 EXECUTION

3.01 GENERAL

A. The fence and gates shall be erected by skilled mechanics.

B. Any change in direction of the fence line of 30 degrees or more shall be considered corners. Pull posts shall be used at any abrupt change in grade.

C. Maximum area of unbraced fence shall not exceed 1,500 square feet.

D. Terminal posts shall be braced to adjacent posts with horizontal brace rails and diagonal truss rods brought to proper tension so that posts are plumb.

E. There shall be no loose connections or sloppy fits in the fence framework. The fence framework shall withstand all wind and other forces due to the weather.

3.02 POST SETTING

A. Post spacing shall uniform with maximum spacing of 10 ft. in fences erected along straight lines. All posts shall be placed plumb and centered in the concrete foundations.

B. Post foundations in earth shall be concrete cylinders with a minimum diameter of 12 inches, crowned at grade to shed water, and shall not be less than 36 inches deep in the ground. Posts shall be set in the full depth of the foundations except for 3 inch of concrete under the posts.

C. Coat portion of galvanized or aluminum-coated steel post that will be embedded in concrete with Bitumastic Super Service Black, manufactured by the Koppers Co.; 450 Heavy Themecol, manufactured by Tnemec Co., North Kansas City, MO; or an acceptable equivalent product. Extend coating to 1-inch above top of finished concrete.

D. If foundation holes are excavated in peat or other unstable soil, the Engineer shall be notified for determination of suitable construction precautions.

E. If solid ledge is encountered without overburden of soil, posts shall be set into the rock a minimum depth of 12 inch for line posts and 18 inch for terminal posts. Post holes shall be at least 1 inch greater in diameter that the post and the grout shall be thoroughly worked into the hole so as not to leave voids, and shall be crowned at the top to shed water. Where solid rock is covered by an overburden, the total setting depth shall not exceed the depths required for setting in earth, and the posts shall be grouted into the rock as described.

3.03 FENCE FABRIC

A. Fabric shall be stretched taut and tied to posts, rails, and tension wires with the bottom edge following the finished grade not more than 2 inch above the grade. The fabric shall be installed on the security side of the fence and shall be anchored to the framework so that the fabric remains in tension after pulling force is released. The fabric shall be attached to line posts with tie wires spaced at not more than 15 inch intervals and to rails and braces at not

more than 24 inch intervals. The fabric shall be attached to the tension wire with hog ring ties on 24 inch centers.

3.04 GATES

A. Gates shall be installed plumb, level, and secure for the full width of the opening and the hardware adjusted for smooth operation.

3.05 GATE OPERATOR SYSTEMS

A. Install gate operator system in accordance with manufacturer's recommendations.

B. Furnish with equipment and accessories necessary for complete installation.

3.06 ELECTRICAL GROUNDING

A. Ground fences in accordance with applicable requirements of National Electric Safety Code.

END OF SECTION

SECTION 02930

LOAMING AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for loaming, fertilizing, seeding, and related work in areas disturbed in the process of performing the Work under this contract.

1.02 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

1. Submit with seed, certificates confirming seed mixture, purity, germinating value, and crop year identification.
2. Submit test samples of loam.

1.03 DELIVERY, STORAGE AND HANDLING

A. Fertilizer:

1. Delivered mixed as specified in standard size, unopened containers showing weight, analysis, and name of manufacturer.
2. Store in weather proof place.

B. Seed:

1. Delivered in original unopened containers with mixture listed.

PART 2 PRODUCTS

2.01 LOAM

A. Fertile, natural topsoil, typical of locality, without admixture of subsoil, refuse or other foreign materials, and obtained from well-drained arable site. Mixture of sand, silt and clay particles in approximately equal proportions. Free of stumps, roots, heavy or stiff clay, stones large than 1 inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other deleterious matter.

B. Not less than 4 percent nor more than 20 percent organic matter as determined by loss on ignition of oven-dried samples.

C. Loam test samples dried to constant weight at temperature of 230 degrees. F., plus or minus nine degrees.

D. Use loam, having prior vegetative growth that did not contain toxic amounts of either acid or alkaline elements.

2.02 LIME, FERTILIZER AND SEED

A. Ground agricultural limestone containing not less than 85 percent of total carbonates.

B. Complete fertilizer, at least 50 percent of nitrogen derived from natural organic sources of ureaform and containing following percentages by weight:

Nitrogen 10% Phosphorus 10% Potash 10%

C. Turf grass seed, clean, high in germinating value and latest year's crop mixture as follows:

Name	Minimum Proportion by Weight	Percent Purity	Percent Germination
Kentucky bluegrass	20%	87%	85%
Merion Kentucky bluegrass	20%	87%	85%
Red Chewings fescue	45%	98%	85%
Italian rye	15%	98%	90%

PART 3 EXECUTION

3.01 GENERAL

A. Supply suitable quantities of water, hose and appurtenances.

3.02 LOAM

A. Spread loam on areas to 6-inch depth after compaction, fine grade and compact.

3.03 LIME, FERTILIZER AND SEEDING

A. Apply lime by mechanical means at rate of 3000 pounds per acre.

B. Apply fertilizer at rate of 1200 pounds per acre.

C. Remove weeds or replace loam and reestablish finish grades, if any delays in seeding lawn areas and weeds grow on surface or loam is washed out prior to sowing seed and without additional compensation. Sow seed at rate of 175 pounds per acre on calm day, by mechanical means. "Hydro-Seeding" not permitted unless otherwise permitted or required by Engineer. Sow one-half of seed in one direction, and other half at right angles to original direction. Rake seed lightly into loam, to depth of not more than 1/4 inch and compact by means of an acceptable lawn roller weighing 100 to 150 pounds per linear foot of width.

D. Water lawn areas adequately at time of sowing and daily thereafter with fine spray, and continue throughout maintenance and protection period.

E. Seed during approximate time periods of April 1 to May 15 and August 15 to October 1, and only when weather and soil conditions are suitable for such work, unless otherwise permitted.

3.04 MAINTENANCE OF SEEDED AREAS

A. Maintain lawn areas and other seed areas at maximum height of 2-1/2 inches by mowing at least three times. Weed thoroughly once and maintained until time of final acceptance. Reseed and refertilize with original mixtures, watering or whatever is necessary to establish over entire area of lawn and other seeded areas a close stand of grasses specified, and reasonably free of weeds and undesirable coarse native grasses.

B. Begin maintenance immediately after each portion of lawn is seeded and continue for minimum of 45 days.

C. Repair or replace all seeded areas which, in judgment of Engineer, have not survived and grown in satisfactory manner, for a period of one year after acceptance.

D. Seeding replacement, same seed mixture as specified and furnished and installed as specified.

3.05 TEMPORARY COVER CROP

A. Sow a temporary cover crop of buckwheat, domestic rye grass or other acceptable seed if there is insufficient time in the planting season to complete seeding, fertilizing, and permanent seeding at the option of Contractor or order of Engineer. Cut and water cover crop as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into soil, the areas shall be fertilized and permanent seed crop sown as specified.

END OF SECTION

DIVISION 03

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for forms to be used for all concrete masonry including footings, except as otherwise permitted.

B. Related Sections

1. Section 03200 - Concrete Reinforcement.
2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Concrete Institute (ACI)

1. ACI 350, Code Requirments for Environmental Engineering Concrete Structures
2. ACI 347R, Guide to Formwork for Concrete.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300.

B. Shop Drawings:

1. Layout of panel joints, tie hole pattern, and form liners.
2. Form Ties - Tapered Through-Bolts: Proposed method of sealing form tie hole; coordinate with details shown.

C. Samples: One each as follows:

1. Form liners.
2. Form ties.

D. Quality Control Submittals:

1. Statements of qualifications for formwork designer.
2. Manufacturer’s Certificate of Proper Installation. (After installation)

1.04 QUALITY ASSURANCE

A. Qualifications: Formwork, falsework, and shoring designs prepared by an engineer licensed in the State of Rhode Island.

PART 2 PRODUCTS

2.01 FORM MATERIALS

A. Surfaces to be given burlap-rubbed finish.

1. Form surface in contact with the concrete shall be made of heavy gage metal, new plywood (used plywood which, in the opinion of the Engineer, is substantially equal to new plywood may be used), tempered wood fiberboards with smooth surface, or similar materials.
2. Metal forms or form linings shall have square edges so that the concrete will not have fins or fluting. Joints between form panels shall be well fitted so as to be tight and result in substantially flush concrete surfaces on opposite sides of the joints.
3. Forms shall not be pieced out by use of materials different from those in the adjacent form or in such manner as will detract from the uniformity of the finished surface.

B. Surfaces other than those to be given burlap-rubbed finish.

1. Forms shall be made of wood, metal, or other acceptable material. Wooden forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots. Plywood shall be reasonable good, as accepted. Metal forms shall be of an acceptable type for the work involved. Edges of forms in contact with concrete shall be flush within 1/16 in.

C. Forms shall be of suitable material, design, and construction as to be rigid, tight enough to prevent the passage of mortar, and plane surfaces shall be plane within 1/16 in. in 4 ft. Particular care shall be taken to ensure that forms are true to line where deviations in the concrete would be obvious or objectionable, as where building superstructures are to be built thereon, or where the tops of walls are exposed. All such deviations which may occur shall be corrected by, and at the expense of the contractor, as directed, even to the extent of tearing down and rebuilding the concrete.

D. Forms for walls, columns, or piers shall have removable panels at the bottom forcleaning, inspection, and scrubbing-in of bonding grout. Forms for thin sections (such as walls or columns) of considerable height shall be arranged with suitable openings so that the concrete can be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or reinforcement above the fresh concrete, unless special spouts are used to place concrete, and so that construction joints can be properly keyed and treated.

E. Forms shall be sufficiently rigid to prevent displacement or sagging betweensupports, and so constructed that the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

F. Wall Forms and Underside of Slabs and Beams:

1. Materials: Plywood, hard plastic finished plywood, overlaid waterproof particle

board, or steel in “new and undamaged” condition, of sufficient strength and surface smoothness to produce specified finish. Use in combination with form liners where required.

G. All Other Forms: Materials as specified for wall forms.

H. Form Sealer:

1. Material: Surface sealer will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces, when applied to most forms of form liners. A ready-to-use water based material formulated to reduce or eliminate surface imperfections, containing no mineral oil or organic solvents. Environmentally safe, meeting local, state, and federal regulations and can be used in clean water treatment plants.
2. Manufacturer and Product: Master Builders, Inc.; Rheofinish; or Equal.

I. Rustication Grooves and Beveled Edge Corner Strips: Nonabsorbent material,compatible with form surface, fully sealed on all sides prohibiting loss of paste or water between the two surfaces. Match the rustication grooves with the existing configuration and style located at the plant.

2.02 FORM TIES

A. Form ties to be encased in concrete shall not be made of through-bolts or commonwire, but shall be of a well-established type, so made and installed as to embody the following features:

1. After removal of the protruding part of the tie, there shall be no metal nearer than 1 in. to the face of the concrete.
2. The part of the tie which is to be removed shall be at least 1/2 in. in diameter, or if smaller, it shall be provided with a wood or metal cone 1 in. long placed against the inside of the forms. cones shall be carefully removed from the concrete after the forms have been striped.
3. Ties which pass through walls subject to hydrostatic pressure shall be provided with acceptable water stops, such as washers, securely fastened to the ties.

B. Form Ties:

1. Material: Steel.
2. Spreader Inserts.
   a. Conical or spherical type.
   b. Design to maintain positive contact with forming material.
   c. Furnish units that will leave no metal closer than 1 inch to concrete surface when forms, inserts, and tie ends are removed.
3. Wire ties not permitted.
4. Flat bar ties for panel forms, furnish plastic or rubber inserts with minimum 1 inch depth and sufficient dimensions to permit patching of tie hole.
5. Water Stop Ties: For water-holding structures, basements, pipe galleries, and accessible spaces below finish grade, furnish one of the following:
   a. Integral steel water stop 0.103-inch thick and 0.625 inch in diameter tightly and continuously welded to tie.
   b. Neoprene water stop 3/16-inch thick and 15/16 inch in diameter whose center

hole is 1/2 diameter of tie, or a molded plastic water stop of comparable size.
c. Water Stop: Oriented perpendicular to tie and symmetrical about center of tie.
d. Design ties to prevent rotation or disturbance of center portion of tie during removal of ends and to prevent water leaking along tie.

6. Through-Bolts: Tapered minimum 1-inch diameter at smallest end.
7. Elastic Vinyl Plug: Design and size of plug to allow insertion with tool to enable plug to elongate and return to original length, and diameter upon removal forming a watertight seal.
   a. Manufacturer and Product: Dayton Superior Co., Miamisburg, OH; Dayton Sure Plug, or equal.

PART 3 EXECUTION

3.01 SYSTEM DESIGN REQUIREMENTS

A. Design formwork in accordance with ACI 347R and ACI 318 to provide the concrete finishes specified in Section 03300, CAST-IN-PLACE CONCRETE.

B. Make joints in forms watertight.

C. Limit panel deflection to 1/360 of each component span to achieve tolerances specified.

3.02 ERECTION

A. General: Unless specified otherwise, follow the applicable recommendations of ACI347R.

B. Forms shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, and to the elevations indicated on the drawings or specified, and exposed concrete will be substantially free from board or grain marks, poorly matched joints, and other irregularities or defects.

C. Beveled Edges (Chamfer):

1. Form 3/4-inch bevels at concrete edges, unless otherwise shown.
2. Where beveled edges on existing adjacent structures are other than 3/4-inch, obtain ENGINEER’s approval of size prior to placement of beveled edge.

D. Wall Forms:

1. Do not reuse forms with damaged surfaces.
2. Locate form ties and joints in an uninterrupted pattern for smooth and uniform surface.
3. Inspect form surfaces prior to installation to assure conformance with specified tolerances.

E. Forms for Curbs, Sidewalks, and Driveways:

1. Provide standard steel or wood forms to prevent movement.
2. Set forms to true lines and grades, and securely stake in position.

F. Form Tolerances: Provide forms in accordance with ACI 347R and ACI 318 and the following tolerances for finishes specified:

1. Wall Tolerances:
    a. Straight Vertical or Horizontal Wall Surface: Flat planes within tolerance specified.
    b. Plumb within 1/4-inch to 10-feet.
    c. Depressions in Wall Surface: Maximum 5/16-inch when 10-foot straightedge is placed on high points in all directions.
    d. Thicknesses: Maximum 1/4-inch minus or 1/2-inch plus from dimensions shown.
2. Slab Tolerances:
    a. Exposed Slab Surfaces: Comprise of flat planes as required within tolerances specified.
    b. Slab Finish Tolerances and Slope Tolerances: Crowns on floor surface not too high as to prevent 10-foot straight edge from resting on end blocks, nor low spots that allow a block of twice the tolerance in thickness to pass under the supported 10-foot straightedge.
    c. Steel gauge block 5/16-inch thick.
    d. Slab drainage.
        1) Finish Slab Elevation: Slope slabs to floor drain and gutter, and shall adequately drain regardless of tolerances.
        2) Thickness: Maximum 1/4-inch minus or 1/2-inch plus from thickness shown, except where thickness tolerance will not affect slope, drainage, or slab elevation.

3.03 FORM SURFACE PREPARATION

A. Thoroughly clean form surfaces in contact with concrete or previous concrete, dirt, and other surface contaminants prior to coating surface.

B. Exposed Wood Forms in Contact with Concrete: Apply form sealer as recommended by the sealer material manufacturer.

C. Steel Forms: Apply form sealer to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust.

3.04 FORM COATINGS

A. All forms shall be oiled with an acceptable nonstaining oil or liquid form coating before reinforcement is placed.

B. Before form material is reused, all surfaces that are in contact with the concrete shall be thoroughly cleaned, all damaged pieces repaired, and all projecting nails withdrawn.

3.05 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer. forms shall not be removed until the concrete has aged for the following number of day-degrees*:

1. Formwork not supporting weight of concrete, (i.e., sides of beams, walls, columns, and similar parts of the Work) may be removed after cumulatively curing at not less than a total of three 50-degree F days after placing concrete,

provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing protection operations are maintained.

2. Leave forms and shoring for elevated structural slabs or beams in place, in accordance with ACI 318, Chapter 6, and until concrete has reached compressive strength equal to 80 percent of the specified 28-day compressive strength as determined by test cylinders.
3. *Day-degree: total number of days times average daily air temperature at surface of concrete. For example, 5 days at a daily average temperature of 60 deg. F. equals 300 day-degrees.

3.06 MANUFACTURER'S SERVICES

A. Provide form manufacturer's representative at site for installation assistance, and inspection.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Requirements for reinforcing steel bars, wire fabric and accessories as shown on the drawings, specified herein, and as needed for a complete and proper installation.

B. Related Sections
   1. Section 03100 - Concrete Formwork.
   2. Section 03300 - Cast-In-Place Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).
   1. A82, Specification for Steel Wire, Plain for Concrete Reinforcement.
   2. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
   3. A497, Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
   4. A615, Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
   5. A706, Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
   6. A775, Specification for Epoxy-Coated Reinforcing Steel Bars.

B. American Concrete Institute (ACI).
   1. ACI 350, Code Requirments for Environmental Engineering Concrete Structures

1.03 SUBMITTALS

A. In accordance with Section 01300 submit cutting and bending drawings and schedules for all reinforcement to be furnished.

B. Shop Drawings:
   1. Prepare in accordance with Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice and ACI SP-66 Detailing Manual:
      a. Bending lists.
      b. Placing drawings.
   2. Welded splice, Cadweld splice, and mechanical threaded splice.

C. Quality Control Submittals:

1. Lab test reports for reinforcing steel showing stress-strain curves and ultimate strengths.
2. Mechanical Threaded Connections:
    a. Current International Conference of Building Officials (ICBO) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.
    b. Manufacturer's instructions.
    c. Verification that device threads have been checked and meet all requirements for thread quality, in accordance with manufacturer's published methods.
3. Epoxy-Coated Reinforcing Bars: Written certification in accordance with paragraph 4.2.1 of ASTM A775.
4. Welding Qualification: Prior to welding, submit welder qualifications and radiographic nondestructive testing procedures.
. Test results to field testing.

1.04 QUALITY ASSURANCE

A. The steel shall be newly rolled stock substantially free from mill scale, rust, dirt, oil, grease, or other foreign matter. Bars shall be of billet steel and, unless otherwise indicated, shall be Grade 60 bars.

B. Billet steel bars shall conform to ASTM A 615.

C. All bars shall be rolled by an acceptable mill. The Contractor shall submit at his own expense certified copies of tests of the bars furnished. The tests shall be as specified in the appropriate ASTM Specification referred to above and shall be made by an acceptable laboratory.

D. Welder Qualifications: Certified in accordance with AWS D1.4-79.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Unload, store, and handle bars in accordance with CRSI publication "Placing Reinforcing Bars."

B. Coated Bars:
    1. Protect epoxy-coated bars contact areas from handling equipment.
    2. Lift bundles of coated bars at multiple pickup points to minimize bar-to-bar abrasion from sags in bundles.
    3. Do not drop or drag coated bars or bundles of coated bars.
    4. Store coated bars on protective cribbing.
    5. Color fading of coating is not cause for rejection of epoxy-coated reinforcing bars.

PART 2 PRODUCTS

2.01 MATERIALS

A. Deformed Billet-Steel Reinforcing Bars:
   1. Includes stirrups, ties, and spirals.
   2. ASTM A615, Grade 60, including Supplemental Requirements S1 where welding is not required.
   3. ASTMA706, Grade 60, including Supplemental Requirements for reinforcing to be welded.

B. Splices and Mechanical Connections:
   1. Metal Sleeve: Furnish with cast filler metal, capable of developing, in tension or compression, 125 percent of minimum tensile strength of the bar.
   2. Mechanical Threaded Connections: Furnish metal coupling sleeve for splicing reinforcing in secondary members or in areas of low stress with internal threads engaging threaded ends of bars developing in tension or compression 125 percent of yield strength of bar.
      a. Manufacturers and Products:
         1) Erico Products, Inc., Cleveland, OH; Lenton Reinforcing Steel Couplers.
         2) Richmond Screw Anchor Co., Inc. Fort Worth, TX; Richmond DB-SAE Dowel Bar Splicers.
         3) Or equal.

C. Epoxy-Coated Reinforcing Bars: ASTM A775, deformed bars, with bond strength not less than 80 percent of uncoated bars.

D. Welded Wire Fabric:
   1. ASTM A185, or A497, and ACI 318/318R, using ASTM A82, wire of 75 ksi minimum tensile strength.
   2. Furnish flat sheets only, rolled sheets not permitted.

E. Reinforcement shall be accurately formed to the dimensions indicated on the drawings. Stirrups and tie bars shall be bent around a pin having a diameter not less than two times the minimum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness except for bars larger than 1 in., in which case the bends shall be made around a pin of eight bar diameters. All bars shall be bent cold.

F. Bars shall be shipped to the work site with bars of the same size and shape fastened in bundles with securely wired-on metal identification tags giving size and mark.

G. Deformations on bars for concrete reinforcement shall conform to the requirements of the above-mentioned ASTM Specifications.

2.02 ACCESSORY MATERIALS

A. Tie Wire:
   1. Black, soft-annealed 16-gauge wire.
   2. Nylon-, epoxy-, or plastic-coated wire.

B. Bar Supports and Spacers:
   1. Precast concrete bar supports, cementitious fiber-reinforced bar supports, or all-plastic bar supports and side form spacers meeting the requirements of CRSI Manual of Standard Practice. Do not use other types of supports or spacers.
   2. In Beams, Columns, Walls, and Slabs Exposed to View After Stripping: Small rectangular concrete blocks made up of same color and strength as concrete being placed around them or all-plastic bar supports and side form spacers.
   3. Use supports made of dielectric material for epoxy-coated reinforcing bars supported from formwork.
   4. If epoxy-coated reinforcing is used, furnish epoxy-coated reinforcing bars for spreader bars.
   5. Precast concrete supports of same strength as concrete for reinforcing in concrete place don grade.

C. Welded steel wire fabric shall conform to the ASTM A 185. The gage and spacing of wires shall be as indicated on the drawings.

D. Soffit Clips: Made galvanized steel wire not lighter than No. 12 Stl. W.C. They shall be shared so that the greater portion of the wire is held about 1 in. from the flange of the steel beam, and shall be spaced not less than 9 in. on centers, the spacing being maintained by suitable longitudinal wires.

2.03 FABRICATION

A. Follow CRSI Manual of Standard Practice.

B. Bend all bars cold.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify ENGINEER when reinforcing is ready for inspection and allow sufficient time for inspection prior to placing concrete.

B. Repair epoxy coating damaged due to handling, shipment, and placing. Repair with patching material in accordance with ASTM A775, and manufacturer’s recommendations.

C. Clean metal reinforcement of loose mill scale, oil, earth, and other contaminants.

D. Coat wire projecting from precast concrete bar supports with dielectric material, epoxy, or plastic.

E. Before being placed in position, reinforcement shall be thoroughly cleaned of loose mill and rust scale, dirt, and other coatings, including ice, that tend to interfere with development of proper bond. Where there is delay in depositing concrete after reinforcement is in place, bars shall be reinspected and cleaned when necessary.

F. Reinforcement which is to be exposed for a considerable length of time after having been placed shall be painted with a heavy coat of cement grout, if required.

3.02 Reinforcing Bar Installation

A. Bundle or space bars, instead of bending where construction access through reinforcing is necessary.

B. Spacing and Positioning: Conform to ACI 350.

C. Location Tolerances:In accordance with CRSI publication,"PlacingReinforcing Bars".

D. Splicing:
1. Follow ACI 318/318R.
2. Use lap splices unless otherwise shown or permitted in writing by ENGINEER.
3. Welded Splices: Accomplish by full penetration groove welds and develop at least 125 percent of yield strength of bar.
4. Stagger splices in adjacent bars.
5. Metal sleeves may be used.

E. Mechanical Splices and Connections:
1. Use only in areas specifically approved in writing by the ENGINEER.
2. Install as required by manufacturer with threads tightened and in accordance with ICBO Research Report.
3. Maintain minimum edge distance and concrete cover.

F. Tying Deformed Reinforcing Bars:
1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
2. Bend all noncoated tie wire to prevent tie wire from being closer than 1 inch from the surface of concrete.
3. Epoxy-Coated Bars:
   a. Use epoxy-coated or nonmetallic clips.
   b. Repair coating damage at clipped or welded intersection.

G. Reinforcement Around Openings: Place an equivalent area of steel bars or fabric around pipe or opening and extend as shown, on each side sufficiently to develop bond with each bar. See drawing details.

H. Welding Reinforcement:
   1. Only A706/A706M bars may be welded.
   2. Do not perform welding until welder qualifications are approved.
   3. Provide suitable ventilation when welding epoxy-coated reinforcing bars.
   4. After completion of welding on epoxy-coated reinforcing bars, repair coating damage, welds, and steel splice members with same material as used for repair of coating damage.

I. Straightening and Rebending: Field bending of reinforcing steel bars is not permitted.

J. Unless permitted by Engineer, do not cut reinforcing bars in the field. When epoxy-coated reinforcing bars are cut in the field, coat ends of bars with same material used for repair of coating damage.

K. Reinforcement shall be accurately positioned as indicated on the drawings, and secured against displacement by using annealed iron wire ties or suitable clips at intersections. Concrete blocks having a minimum bearing area of 2 in. by 2 in., and equal in quality to that specified for the slab, shall be used for supporting reinforcing bars for slabs on grade. Where the underside of slabs will be exposed to view in the finished work, stainless-steel supports shall be used

L. Furnish and place all concrete reinforcement as indicated on the drawings and as herein specified. Concrete reinforcement in sizes No. 3 (3/8 in.) and larger shall be deformed steel bars of the shapes and sizes indicated on the drawings.

3.03 WELDED WIRE FABRIC INSTALLATION

A. Extend fabric to within 2 inches of edges of slab, and lap splices at least 1-1/2 courses of fabric or minimum 8 inches.

B. Tie laps and splices securely at ends and at least every 24 inches with tie wire.

C. Place welded wire fabric on concrete blocks at correct distance as shown, above bottom of slab and rigidly support equal to that provide for reinforced bars. Do not use broken concrete, brick, or stone.

D. Follow ACI 350 and current Manual of Standard Practice, Welded Wire Fabric.

E. Do not use fabric that has been rolled. Install flat sheets only.

3.04 TESTS AND INSPECTION

A. Test 10 percent of all welds using radiographic, nondestructive testing procedures referenced in AWS D1.4-79.

B. Inspect each splice and verify each component is in accordance with manufacturer's instructions and ICBO Research Report.

END OF SECTION

SECTION 03250

EXPANSION, CONSTRUCTION, AND CONTROL JOINTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Requirements for making joints in concrete and masonry.

B. Related Sections
   1. Section 03200 - Concrete Reinforcing
   2. Section 03300 - Cast-In-Place Concrete
   3. Section 03604 – Non Shrink Grout
   4. Section 07920 - Joint Sealants

1.02 REFERENCES

A. Army Corp. of Engineers.
   1. CRD-C-572, Specification for Polyvinyl chloride Waterstop.

B. American Society for Testing and Materials (ASTM)
   1. A36, Specification for Carbon Structural Steel.
   2. D226, Specification for Asphalt-Saturated Organic Felt used in Roofing and Waterproofing.
   3. D227, Specification for Smooth-Surfaced Asphalt Roll Roofing and Waterproofing.
   4. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
   5. D1506, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
   6. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

C. National Sanitation Foundation (NSF).
   1. 61-90,

1.03 SUBMITTALS

A. Shop Drawings:
   1. Plastic Type Water Stops: Details of splices to be used and method of securing water stop in the forms and supporting water stop so as to maintain proper orientation and location during concrete placement.
   2. Construction Joints: Layout and location indicating type to be used.
   3. Joint fillers for horizontal and sloped joints.
   4. Preformed control joints.
   5. Water stop.

B. Samples: Splice, joint, and fabricated cross of each size, shape, and fitting of water stop(s) proposed for use.

C. Quality Control Submittals:
   1. Water stop manufacturer's written instructions for product shipment, storage, handling, installation field splices, and repair.
   2. Joint filler and primer. Manufacturer's written instructions for product shipment, storage, handling, application and repair.
   3. Preformed Control Joint: Manufacturer's written instructions for product shipment, storage, handling, application, and repair.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Acceptance of pourable joint filler for potable water structures by federal EPA or by a state health agency.
   1. Pourable Joint Filler: Certified as meeting NSF 61-90.

1.05 DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site: Verify that water stops delivered are in accordance with cross-section dimensions as shown and manufacturer's product data prior to unloading and storing on site.

PART 2 PRODUCTS

2.01 PLASTIC WATER STOP

A. Extruded from an elastomeric plastic compound of which the basic resin shall be polyvinyl chloride (PVC). Reclaimed PVC in the compound is not acceptable.

B. Specific Gravity: Approximately 1.37.

C. Shore Durometer Type A Hardness: Approximately 80.

D. Performance Requirements: Corps of Engineers' Specification CRD-C-572.

E. Type: Center bulb with a number of parallel ribs or protrusions on each side of strip center.

F. Corrugated or tapered type water stops are not acceptable.

G. Thickness: Constant from bulb edge to the outside stop edge.

H. Minimum Weight per Foot of Water Stop:

1. 0.90 pound for 3/16 inch by 4 inch.
2. 1.62 pounds for 3/8 inch by 6 inch.
3. 2.30 pounds for 3/8 inch by 9 inch.

I. Manufacturers and Catalog Numbers:
1. Vulcan Metal Products, Inc., Construction Materials Division, Birmingham, AL; Catalog No. 3/81-15M: Type 8067 (4 inch by 3/16 inch), Type 8069 (6 inch by 3/8 inch), and Type 8070 (9 inch by 3/8 inch).
2. Vinylex Corp., Knoxville, TN; Catalog No. 03250/VIN (1987): No. RB6-38H (6 inch by 3/8 inch) and No. RB9-38H (9 inch by 3/8 inch).
3. Greenstreak Plastic Products, St. Louis, MO; Catalog No. 03250/GRD (1987): Style 732 (6 inch by 3/8 inch) and Style 735 (9 inch by 3/8 inch).
4. A.C. Horn, Inc., Beltsville, MD; Catalog No. CSP-162 (1987): Type 3 (4 inch by 3/16 inch), Type 9 (6 inch by 3/8 inch), and Type 10 (3/8 inch by 9 inch).

2.02 WIRE LOOPED PLASTIC WATER STOP

A. Furnish as an alternative to plastic water stops.

B. Same material and geometry as plastic water stops.

C. Furnish with continuous galvanized wire looping at edge for convenience in positioning and securing stop in place in the forms.

D. Manufacturers and Catalog Numbers:
1. Paul Murphy Plastics, Roseville, MI; “Wire Stop Water Stop”; geometry numbers ACR 6380, ACR 9380, as shown on Paul Murphy Plastics Co. Drawing No. CCP-120-12M dated 12-89.
2. Or equal.

2.03 BOND BREAKER

A. Tape for Expansion Joints: Adhesive-backed glazed butyl or polyethylene tape, same width as the joint, that will adhere to the premolded joint material or concrete surface.

B. Use either bond breaker tape or a bond prevention material as specified in SECTION 03300, except where a tape is specifically called for.

2.04 PREMOLDED JOINT FILLER

A. Bituminous Type: ASTM D994 or D1751.

B. Sponge Rubber: Neoprene, closed-cell, expanded; ASTM D1056-85, Type 2C5, with a compression deflection, 25 percent deflection (limits), 119 to 168 kPa (17 to 24 psi) minimum.
1. Manufacturer and Product:
a. Rubatex Corp.; R451N
b. Or equal.

2.05 PREFORMED CONTROL JOINT

A. One-Piece, Flexible, Polyvinyl Chloride Joint Former:
   1. Manufacturer and Product:
      a. Vinylex Corp., Knoxville, TN; Kold-Seal Zip-Per Strip KSF-150-50-50.
      b. Or equal.

B. One-Piece Steel Strip with Preformed Groove:
   1. Manufacturer and Product:
      a. Burke Concrete Accessories, Inc., San Mateo, CA; Keyed Kold Retained Kap.
      b. Or equal.

C. Furnish in full-length, unspliced pieces.

2.06 POURABLE JOINT FILLERS

A. Filler for Nonpotable Water Structure:
   1. Specific Gravity: Greater than 1.0 for cured, in-place filler.
   2. Sloped Joints: Furnish Gun Grade material that will remain as placed in joints and will not run down slope.
   3. Manufacturers and Products:
      a. W.R. Meadows, Inc., Elgin, IL: No. 164 Polymeric sealing compound, hot-pour, or Hi-Spec Polymeric joint sealing, hot-pour compound; or
      b. A.C. Horn, Inc., North Bergen, NJ: No-Track two-component material (Code 2323), cold-applied, self-leveling filler; or
      c. W.R. Meadows, Elgin, IL: Gardox, two-component, cold-applied compound filler.

2.07 STEEL EXPANSION JOINT DOWELS

A. Dowels: ASTM A36 round smooth steel bars.

B. Bar Coating: Two-coat system, fusion bonded, steel dowel coating, with a factory-applied lubricating coating.

2.08 ACCESSORIES

A. Joint Sealants: As specified in SECTION 07920, JOINT SEALANTS.

B. Nonshrink Grout:
   1. As specified in SECTION 03604.
   2. Compatible with joint sealant.

C. Roofing Felt: ASTM D226, Type II, 30-pound asphalt-saturated or equal weight of ASTM D227 coal-tar saturated felt.

D. Reinforcing Steel: As specified in SECTION 03200.

E. Nails: As required for securing bituminous type premolded joint filler.

F. Masking Tape: As required to temporarily adhere to concrete at each side of joint to receive filler.

PART 3 EXECUTION

3.01 GENERAL

A. Construct straight joints; make vertical or horizontal, except where walls intersect sloping floors.
B. Commence concrete placement after the joint preparation is complete.

C. Time Between Concrete Pours: As specified in SECTION 03300.

3.02 SURFACE PREPARATION

A. Construction Joints: Prior to placement of abutting concrete, clean contact surface:
   1. Remove laitance and spillage from reinforcing steel and dowels.
   2. Roughen surface to a minimum of 1/4-inch amplitude:
      a. Sandblast after the concrete has fully cured.
      b. Water blast after the concrete has partially cured.
      c. Green cut fresh concrete with high pressure water and hand tools.
   3. Perform cleaning so as not to damage water stop, if one is present.

B. Expansion Joint with Pourable Filler:
   1. Use motorized wire brush or other motorized device to mechanically roughen and thoroughly clean concrete surfaces on each side of joint from plastic water stop to the top of the joint.
   2. Use clean and dry high pressure air to remove dust and foreign material, and dry joint.
   3. Prime surfaces before placing joint filler.
   4. Avoid damage to water stop.

C. Expansion Joint without Pourable Filler:
   1. Coat concrete surfaces above and below plastic water stop with bond breaker.
   2. Do not damage water stop.

D. Control Joint:
   1. Coat concrete surfaces above and below plastic water stop with bond breaker.
   2. Do not damage water stop.
   3. Furnish correct type and size of reinforcing and dowels.

3.03 INSTALLATION OF WATER STOPS

A. General:

1. Join water stops at intersections to provide continuous seal.
2. Center water stop on joint.
3. Secure water stop in correct position to avoid displacement during concrete placement.
4. Repair or replace damaged water stop.
5. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints.
6. Joints in Footings and Slabs:
    a. Ensure that space beneath plastic water stop is completely filled with concrete.
    b. During concrete placement, make a visual inspection of the entire water stop area.
    c. Limit concrete placement to elevation of water stop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab.
    d. Apply procedure to full length of plastic water stops.

B. Plastic Water Stop:
1. Install in accordance with manufacturer's written instructions.
2. Splice in accordance with the water stop manufacturer's written instructions using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise.
    a. Allow at least 10 minutes before the new splice is pulled or strained in any way.
    b. Finished splices shall provide a cross-section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials.
3. Wire looped plastic water stop may be substituted for plastic water stop.

3.04 EXPANSION JOINT INSTALLATION

A. General:
1. Place bond breaker above and below water stop when premolded joint filler and pourable joint filler is not used.
2. Premolded Joint Filler:
    a. Sufficient in width to completely fill the joint space where shown.
    b. If a water stop is in the joint, cut premolded joint filler to butt tightly against the water stop and the side forms.
3. Precut premolded joint filler to the required depth at locations where joint filler or sealant is to be applied.
4. Form cavities for joint filler with either precut, premolded joint filler, or smooth removable accurately shaped material. Entire joint above water stop, in slabs, shall be formed and removed so that entire space down to water stop can be filled with the pourable joint filler.
5. Vibrate concrete thoroughly along the joint form to produce a dense, smooth surface.

B. Bituminous Type Premolded Joint Filler:

1. Drive nails approximately 1 foot 6 inches on center through the filler, prior to installing, to provide anchorage embedment into the concrete during concrete placement.
2. Secure premolded joint filler in forms before concrete is placed.
3. Install in walkways, at changes in direction, at intersections, at each side of driveway entrances, and at 45-foot intervals, maximum.

C. Pourable Joint Filler:
1. General: Install in accordance with the manufacturer's written instructions, except as specified below:
   a. Apply primer prior to pouring joint filler.
   b. Fill entire joint above the water stop with joint filler as shown.
   c. Use masking tape on top of slabs at sides of joints; clean spillage. Remove masking tape afterwards.
2. Rubber Asphalt Type, Hot-Applied:
   a. Heat filler material in a double-walled boiler.
   b. Place filler in the joint by means of a nozzle from a portable pouring type container to prevent spillage outside of the joint.
   c. Begin pouring joint filler at the bottom of the horizontal joint and proceed upwards in a manner that will preclude the possibility of trapping air in the joint.
3. Rubber Asphalt Type, Cold-Applied: Place cold-applied two-component fillers in accordance with manufacturer's written instructions.
4. Multicomponent Type for Potable Water Structures: Install in accordance with manufacturer's written instructions.

D. Steel Expansion Joint Dowels:
1. Install coated and lubricated bars parallel to wall or slab surface and in true horizontal position perpendicular to the joint in both plan and section view, so as to permit joint to expand or contract without bending the dowels.
2. Secure dowels tightly in forms with rigid ties.
3. Install reinforcing steel in the concrete as shown to protect the concrete on each side of the dowels and to resist any forces created by joint movement.

3.05 CONTROL JOINT INSTALLATION

A. Locate reinforcing and dowels as shown.

B. Install PVC water stop.

C. Concrete surfaces shall be dense and smooth.

D. Install bond breaker to concrete surfaces above and below water stop.

3.06 PREFORMED CONTROL JOINTS

A. Use only where specifically shown; do not use in water-holding basins.

B. Locate flush, or slightly below the top of slab.

C. Install in accordance with manufacturer's written instructions in straight, full-length unspliced pieces.

D. Steel Strip Type with Preformed Groove: Brace to withstand pressure of concrete during and after placement.

END OF SECTION

SECTION 03252

WATERSTOPS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes requirements for,

1. Flexible PVC waterstops at construction joints in new concrete construction as shown on the Contract Drawings.
2. Hydrophilic rubber waterstops at construction joints between new and existing concrete, or where installation of center bulb-type waterstops is not possible.
3. Preparation of existing concrete surfaces where hydrophilic rubber waterstops are to be installed.

1.02 RELATED SECTIONS

A. Section 03250 – Expansion, Construction and Control Joints

B. Section 03000 – Cast-In-Place Concrete

1.03 REFERENCES

A. Except as noted, work shall conform to the latest edition of the following codes specifications and standards:

1. American Society for Testing and Materials (ASTM)
2. Army Corps of Engineers, “Specifications for Polyvinyl chloride Waterstop”, CRD-C572-74

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Section 01300.

B. Manufacturer’s Data: for all types and sizes of waterstops, including but not limited to:

1. Product data and material specifications
2. Installation instructions
3. Accessories including: crosses, tees, splices, fasteners and adhesives

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: shall demonstrate five years (minimum) continuous, successful experience in production of waterstops.

B. Installer Qualifications: Qualified to perform work specified by reason of experience or training provided by the product manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

A. Store Products in a location protected from dampness, damage, construction activity, dirt, and direct sunlight in strict accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

A. PVC Waterstop

1. Provide flexible PVC waterstop as detailed on the Contract Drawings.
2. The PVC waterstop shall be extruded from an elastomeric plastic material of which the basic resin is prime virgin polyvinyl chloride. The PVC compound shall not contain any scrapped or reclaimed material or pigment whatsoever.
3. Performance requirements are as follows:
   a. Minimum Tensile Strength, 2000 psi
   b. Specific Gravity, Approx. 1.4
   c. Shore Durometer Type A Hardness , 65 to 80
4. Type: Center bulb with a number of parallel ribs or protrusions on each side of strip center.
5. Corrugated or tapered type waterstops are not acceptable.
6. Thickness: Constant from bulb edge to the outside stop edge.
7. Minimum Weight per Foot of Waterstop:
   a. 0.90 pound for 3/16 inch by 4 inch.
   b. 1.62 pounds for 3/8 inch by 6 inch.
   c. 2.30 pounds for 3/8 inch by 9 inch.
8. Manufacturers of Products:
   a. Greenstreak, Inc., St. Louis, MO; Style 702 (3/16 inch by 4 inch), Style 732 (3/8 inch by 6 inch) and Style 735 (3/8 inch by 9 inch).
   b. Vinylex Corp., Knoxville, TN; No. RB4-316H (3/16 inch by 4 inch), No. RB6-38H (3/8 inch by 6 inch) and No. RB9-38H (3/8 inch by 9 inch).
   c. Vulcan Metal Products, Birmingham, AL; Type 8069 (3/8 inch by 6 inch) and Type 8070 (3/8 inch by 9 inch).
   d. Or approved equal.

B. Hydrophilic Rubber Waterstop

1. Provide hydrophilic rubber waterstop at construction joints between new and existing concrete and as indicated on the Contract Drawings.
2. The waterstop shall be a combination of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.
3. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.
4. Performance requirements are as follows:
   a. Minimum Tensile Strength
      (Chloroprene Rubber) 1300 psi
   b. Minimum Tensile Strength

(Modified Chloroprene Rubber) 350 psi

c. Specific Gravity Approx. 1.4

d. Shore Durometer Type A Hardness 45 to 55

5. Manufacturers of Products

a. Hydrophilic Waterstop:

1) Greenstreak, Inc., St. Louis, MO; No. CJ-0725-3K.

2) Adeka Ultraseal North America, distributed by Unique Techniques, Inc., West Coxsackie, NY; No. MC-2010M.

3) Or approved equal.

b. Hydrophilic Sealant:

1) Adeka Ultraseal North America, distributed by Unique Techniques, Inc., West Coxsackie, NY; No. P-201.

2) Greenstreak, Inc., St. Louis, MO; No. LV-1.

3) Or approved equal.

2.02 ACCESSORIES

A. PVC Waterstop

1. Provide factory made waterstop fabrications for all changes in direction, intersections, and transitions leaving only straight butt joint splices for the field.
2. Provide hog rings or grommets spaced at 12 inches on center along the length of the waterstop.
3. Provide Teflon coated thermostatically controlled splicing irons for field butt splices.

B. Hydrophilic Rubber Waterstop

1. Provide manufacturer's recommended adhesives for the appropriate field conditions. Provide adhesives for each surface to be adhered to (wet or dry concrete, either rough or smooth).
2. Provide a one-component sealant for sealing exposed cells.
3. Provide manufacturer's recommended adhesive for all splices.

PART 3 EXECUTION

3.01 INSTALLATION

A. PVC Waterstop

1. Field butt splices shall be heat fused welded using a Teflon coated thermostatically controlled waterstop splicing iron at the manufacturer's recommended temperature. Follow approved manufacturer's installation procedures.

a. Lapping of waterstop, use of adhesives, or solvents shall not be allowed.

b. Allow at least 10 minutes before the new splice is pulled or strained in any way.

c. Finished splices shall provide a cross-section that is dense and free of porosity.

2. Center waterstop in joint and secure waterstop in correct position using hog rings or grommets at 12 inches on center along the length of the waterstop and wire tie to adjacent reinforcing steel. In no case shall the waterstop be bent over inside the keyways.
3. Place concrete and vibrate to obtain impervious concrete in the vicinity of the waterstop area.
4. Joints in footings and slabs:
    a. Ensure that the space beneath PVC waterstop is completely filled with concrete.
    b. During concrete placement, make a visual inspection of the entire waterstop area.
    c. Limit concrete placement to elevation of waterstop in first pass, vibrate the concrete under the waterstop, lift the waterstop to confirm full consolidation without voids, then place remaining concrete to full height of slab.
    d. Apply procedure to full height of PVC waterstops. Follow similar procedures for joints in walls.

B. Hydrophilic Rubber Waterstop

1. Cut Coil ends square (or at proper angle for mitered corners) with shears or sharp blade to fit splices together without overlaps.
2. Apply a continuous bead of manufacturer's recommended hydrophilic sealant before fastening waterstop. The waterstop shall be fastened to the existing concrete surfaces with appropriate fasteners as recommended by the waterstop manufacturer.
3. Splices shall be made using the manufacturer's recommended splicing adhesive. Manufacturer's recommended adhesive sealant shall also be applied to all joints after gluing.
4. Seal watertight any exposed cells with appropriate sealant.
5. A continuous bead of manufacturer's recommended hydrophilic sealant shall be applied along the edge of the waterstop.
6. Follow approved manufacturer's installation procedures.
7. Place concrete and vibrate to obtain impervious concrete in the vicinity of the waterstop area. Care shall be taken to avoid displacing waterstop during concrete placement.

3.02 FIELD QUALITY CONTROL

A. Waterstop splicing defects which are unacceptable include, but are not limited to the following:

1. Tensile strength that is less than 80 percent of parent section.
2. Misalignment of center bulbs, ribs, and end bulbs greater than 1/16 inch.
3. Bond failure at joint deeper than 1/16 inch or 15 percent of material thickness.
4. Misalignment that reduces waterstop cross section more than 15 percent.
5. Visible porosity in the weld.
6. Bubbles or inadequate bonding.
7. Visible signs of splice separation when cooled splice is bent by hand at a sharp angle.

8. Charred or burnt material.
9. Inadequate or incomplete bond between hydrophilic rubber waterstop and concrete surface.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing forms, reinforcing steel, concrete and expansion and/or construction joints.

B. Related Section

1. Section 03100 – Formwork
2. Section 03200 – Reinforcement
3. Section 03250 – Expansion, Construction, And Control Joints

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A185, Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. A615, Specification for deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
3. C31, Practice for Making and Curing Concrete Test Cylinders in the Field.
4. C33, Specification for Concrete Aggregates.
5. C39, Test Method for Compressive Strength of Cylindrical Concrete Specimens.
6. C42, Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. C94, Specification for ready Mixed Concrete.
8. C143, Test Method for Slump of Hydraulic Cement Concrete.
9. C150, Specification for Portland Cement.
10. C172, Practice for Sampling Freshly Mixed Concrete.
11. C231, Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. C260, Test Method for Air-Entraining Admixtures for Concrete.
13. C494, Specification for Chemical Admixtures for Concrete.
14. C920, Specification for Elastomeric Joint sealants.
15. D994, Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
16. D1056, Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

17. D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

B. American Concrete Institute (ACI):

1. ACI 301, Specification for Structural Concrete for Buildings.
2. ACI 304, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
3. ACI 305, Recommended Practice for Hot Weather Concreting.
4. ACI 306, Recommended Practice for Cold Weather Concreting.
5. ACI 315, Building Code Requirements for Reinforced Concrete.
6. ACI 347, Guide to Formwork for Concrete.

C. Concrete Reinforcing Steel Institute (CRSI):

1. Manual of Standard Practice.

1.03 SUBMITTALS

A. Submit Shop Drawings in accordance with SECTION 01300 for the following:

1. Reinforcing Steel
   a. Furnish in detail and completeness that all fabrication and placement at the site can be accomplished without the use of contract drawings for reference.
   b. Include number of pieces, sizes, and grade of reinforcing steel, accessories, and any other information required for fabrication and placement.
   c. Show joint layout and design
   d. Check structural and site drawings for anchor bolts, anchors, inserts, conduits, sleeves, and any other items which are required to be embedded in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.
2. Concrete mix designs.
3. Grout manufacturer/design mix (if included in this section)
4. Manufacturer’s data for ancillary materials such as joint fillers and sealants, epoxy bonding compound.

1.04 QUALITY ASSURANCE

A. Selection of testing laboratory in accordance with SECTION 01410.

B. Sample and Test Concrete as follows:

1. Test Specimens: Make, cure and have tested, a minimum of one set of four test specimens from the concrete of each day's pour and for each fifty cubic yards of concrete cast in accordance with ASTM C172, C31 and C39. One cylinder shall be broken after seven days and three cylinders after twenty-eight day.
2. Slump: A slump test shall be made for each truckload of concrete in accordance with ASTM C143. Slumps greater than design mix limit will be grounds for rejection of the concrete.

3. Air Content: An air content test shall be made from each day's pour of concrete by the pressure method in accordance with ASTM C231. Air contents above or below the limits specified will be grounds for rejection of the concrete.

4. In the event the compressive strength of the cylinders, when tested, is below the specified minimum, the Engineer may require test cores of the hardened structure to be taken by the Testing Laboratory in accordance with ASTM C42. If such test indicates that the core specimen is below the required strength, the concrete in question shall be removed and replaced without cost to the Owner. Any other work damaged as a result of this concrete removal shall be replaced with new materials to the satisfaction of the Engineer at no additional cost to the Owner. The cost of coring will be deducted from the contract amount. Where the Testing Laboratory has taken core cylinders and the concrete proves to be satisfactory, core holes shall be filled in a manner satisfactory to the Engineer at no additional cost to the Owner.

5. The Contractor shall coordinate the date and location of tests with the Engineer before any concrete work is started.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcing steel.

1. Transport to the site, store, and cover in a manner which will ensure that no damage shall occur to it from moisture, dirt, grease, or any other cause that might impair bond to concrete, or chip protective epoxy coating if applicable.

2. Store on the site at all times, a supply of approved reinforcing steel to ensure that there will be no delay of the work.

3. Identification of steel shall be maintained after bundles are broken.

PART 2 PRODUCTS

2.01 MATERIALS

A. Portland Cement.

1. Portland Cement used for building footings, base slabs, foundation walls, columns, and beams shall be in accordance with ASTM C150, Type V of U.S. manufacture.

2. All other Portland Cement shall be in accordance with ASTM C150, Type II of U.S. manufacture.

B. Aggregates.

1. Fine aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to fines.

2. Coarse aggregate, in accordance with ASTM C33, clean and graded from 1/4 inch to maximum sizes hereinafter specified.

C. Air Entraining Agent.

1. In accordance with ASTM C260.

D. Water Reducing Agent.

1. In accordance with ASTM C494 Type A.

E. Microsilica Admixture.

1. Packaged in easily dispersing form.

F. Water.

1. Clean and potable,
2. Free of impurities detrimental to concrete.

G. Reinforcing Bars.

1. See Section 3200.

H. Welded Wire Fabric

1. See Section 3200.

I. Accessories.

1. See Section 3200.

J. Tie wire.

1. See Section 3200.

K. Form Ties and Spreaders.

1. See Section 3100.

L. Form Coatings.

1. Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface.
2. "Nox-Crete Form Coating" as manufactured by Nox-Crete Company, or approved equal.
3. Coatings containing mineral oils or the non-drying ingredients will not be permitted.

M. Grout.

1. See Section 3604.

2.02 CONCRETE STRENGTHS AND PROPORTIONS

A. Cast-in-place concrete shall have the minimum compressive strength at 28 days as indicated on the Drawings.

B. The exact proportions for the mix, including amounts admixture (if any), and water, shall be determined by the concrete supplier.

C. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement, but without permitting the materials to segregate or excess free water to collect on the surface.

D. Air-Entrainment: The air content in all concrete shall be maintained at 5 to 7 percent.

2.03 PREMOLDED JOINT FILLER

1. See Section 3250.

2.04 POURABLE JOINT FILLERS

1. See Section 3250.

2.05 JOINT SEALANTS

A. In slabs.

1. In accordance with ASTM C920 for poured 2-component polyurethane sealant.

2. Sikaflex-2c, as manufactured by Sika Corporation or approved equivalent.

B. In walls.

1. Type II, Class A, compound conforming to Interim Federal Specification TT-S-00227E (3) (COM-NBS) for Sealing Compound; Elastomeric Type, Multi-Component (for Caulking, Sealing, and Glazing in Buildings and Other Structures).

2. Sikaflex-1a, as manufactured by Sika Corporation or approved equivalent.

2.06 EPOXY BONDING COMPOUND

A. The epoxy bonding compound shall be a three-component, solvent-free, moisture-tolerant, epoxy modified, cementitious product specifically formulated as a bonding agent and anti-corrosion coating. The product shall have suitable contact time, fluidity, and application temperature for this type of application.

2.07 WATERSTOPS

A. PVC Waterstops shall be in accordance with Section 03250 – Expansion, Construction, and Control Joints.

PART 3 EXECUTION

3.01 FORMWORK

1. See Section 3100.

3.02 REINFORCING STEEL

1. See Section 3200.

3.03 CONCRETE

A. Mixing of Concrete

1. All concrete shall be ready-mixed concrete, and shall be mixed and delivered in accordance with ASTM C 94. The batch plant of the concrete producer shall be certified for compliance with the standards established by the National Ready-Mixed Concrete Association.

2. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept to a minimum, and in any event not more than thirty (30) minutes. Trucks shall be in first class condition and kept in constant rotation during delivery.

3. Concrete shall be placed within 90 minutes after cement has been mixed with aggregate or 45 minutes after addition of water and admixtures.

4. No admixtures, except those mentioned in paragraph 2.1 shall be used. Calcium chloride will not be permitted.

5. Truck delivery slips of all concrete delivered to the job shall indicate the quantity and quality of concrete, additives, date and time of batching and delivery, and the location of placement. Delivery slips shall be forwarded to the Engineer at the end of each pour.

B. Cold Weather Concreting.

1. In accordance with ACI 306.

2. Concrete shall not be mixed or placed when the temperature is below 40 degrees F, or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours unless precautions are taken to protect the concrete.

3. Concrete temperature shall be maintained, when deposited, at not less than 60 degrees F. Reinforcement, forms, and ground which concrete will contact must be completely free of frost.

4. Concrete and formwork must be kept at a temperature of not less than 50 degrees F. for not less than 96 hours after placing.

5. Calcium chloride shall not be used.

C. Hot Weather Concreting.

1. In accordance with ACI 305.

2. The maximum temperature of the concrete, when deposited, shall be 85 degrees F. If the weather causes the placing temperature to exceed 85 degrees F., the mix shall be cooled by methods approved by the Engineer.

3. No concrete shall be deposited when the air temperature is greater than 90 degrees F.

D. Conveying and Placing Concrete.

1. In accordance with ACI 304.

2. Notification: Before placing concrete, forms shall be thoroughly inspected. All chips, dirt, etc., shall be removed, all temporary bracing and cleats taken out, all openings for pipes, etc., properly boxed, all forms properly secured in their correct position and made tight, all reinforcement, anchors, and embedded items secured in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off, and the forms and steel washed off before proceeding. Remove all foreign matter from forms and excavations.

3. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. Any flow of water into an excavation shall be diverted through proper side drains into a sump, or shall be removed by other approved methods which will avoid washing away the freshly deposited concrete.
4. Soil on which concrete will be poured shall be thoroughly wetted (except in freezing weather).
5. Anchors and Embedded Items: Anchors, bolts, sleeves, inserts, wood blocking, and any other items to be embedded in concrete shall be accurately secured in position before the concrete is placed. Aluminum shall not be embedded in concrete.

E. Handling and Depositing

1. Before any concrete is placed, notify all whose work is in any way connected with or influenced by the concrete work, and give them reasonable time to complete all portions of their work that must be completed before concrete is deposited.
2. Immediately before concrete is placed, inspect all forms to insure that they are in proper position, sufficiently rigid, thoroughly clean, properly oiled and free from foreign materials, and that all reinforcement is in proper position.
3. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
4. Concrete shall be conveyed as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. It shall be deposited, as nearly as practicable, in its final position to avoid rehandling or flowing.
5. Concrete shall not be dropped freely where reinforcement will cause segregation, nor shall it be dropped freely more than six (6) feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
6. Concrete that has partially hardened shall not be deposited in the work.

F. Pumping

1. Concrete may be placed by pumping if first approved in writing by the Engineer for the location proposed.
2. Equipment for pumping shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end without separation of materials.
3. The concrete mix shall be designed to the same requirements as herein before specified, and may be richer in lubricating components in order to allow proper pumping.
4. Concrete shall not be pumped through aluminum pipes.

G. Vibrating and Compacting

1. All concrete shall be thoroughly consolidated and compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded items, and into the corners of the forms. All concrete against forms shall be thoroughly spaded. Internal vibrators shall be used under

experienced supervision, and shall be kept out of contact with reinforcement and wood forms. Vibrators shall not be used in a manner that forces mortar between individual form members.

2. Vibrators shall be flexible electric type or approved compressed air type, adequately powered and capable of transmitting to the concrete not less than seven thousand (7,000) impulses per minute. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place without separation of the ingredients. A sufficient number of vibrators shall be employed so that complete compaction is secured throughout the entire volume of each layer of concrete. At least one (1) vibrator shall be kept in readiness as a spare for emergency use. Vibrators shall be such that the concrete becomes uniformly plastic with their use.

3. Vibration shall be close to the forms but shall not be continued at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Care shall be taken to not disturb concrete that has its initial set.

4. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete shall first be deposited in the forms, to a depth of at least one inch.

5. The responsibility for providing fully filled out, smooth, clean, and properly aligned surfaces free from objectionable pockets shall rest entirely with the Contractor.

H. Construction Joints

1. Construction joints shall be located a maximum of 40 feet apart. If, for any reason, the contractor feels a change is necessary, he shall prepare a placing plan and submit it to the Engineer for approval.

2. Where a joint is to be made, the surface of the concrete shall be sandblasted or thoroughly picked, thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and slushed with a coat of grout immediately before the placing of new concrete.

3. Approved keys shall be used at all joints, unless detailed otherwise.

4. Forms shall be retightened before placing of concrete is continued. There shall be an interval of at least 48 hours between adjacent pours.

I. Bonding Concrete at Construction Joints

1. To new concrete construction joints:
   a. Thoroughly clean and saturate joint with water.
   b. Cover horizontal wall surfaces as specified in this Section, and immediately place concrete.
   c. Limit concrete lift placed immediately on top of bonding compound to 12 inches thick.
   d. Thoroughly vibrate to mix and consolidate bonding compound and concrete together.

J. Bonding new concrete to old concrete:

1. Mechanically roughen existing concrete surfaces to a clean, rough surface using appropriate mechanical means to remove the existing concrete surface, and provide a minimum roughness profile of ¼-inch.
2. Saturate surface with water for 24 hours, cover with epoxy bonding compound and place concrete as specified for new concrete.

K. Expansion Joints

1. Expansion joints shall be located as shown on contract drawings.
2. The joint shall include a joint filler, a bond breaker and joint sealant and installed as indicated on contract drawings.

L. Joint Sealants.

1. See Section 7920.

M. Patching

1. Immediately after stripping forms, patch minor defects, form-tie holes, honeycombed areas, etc., before concrete is thoroughly dry.
2. Repair gravel pockets by cutting out to solid surface, form key, and thoroughly wet before placing patching mortar consisting of 1 part cement to 2 parts fine sand; compact into place and neatly finish. Honeycombed areas or gravel pockets which, in the Engineer's opinion are too large and unsatisfactory for mortar patching as described above, shall be cut out to solid surface, keyed, and packed solids with matching concrete to produce firm bond and surface.
3. The Contractor shall do all the cutting as required by himself or other trades. All such work shall be of the minimum size required. No excessive cutting will be permitted, or shall any structural members or reinforcement be cut.
4. The Contractor shall do all patching after work by other trades has been installed, where required, using Portland Cement Mortar 1:2 mix.

N. Protection and Curing

1. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.
2. Keep concrete in a thoroughly moist condition from the time it is placed until it has cured, for at least (7) days.
3. Carefully protect exposed concrete corners from damage.
4. Allow no slabs to become dry at any time until curing operations are complete. In general, slabs shall be cured with non-staining curing paper, hosing or fog spray; vertical surfaces shall be curing with Burlene or fog spray or an approved curing compound.
5. Protect fresh concrete from drying winds, rain, damage, or spoiling. Curing paper shall be lapped 4 inches minimum at joints and sealed with waterproof tape.

O. Finishing Formed Surfaces

1. General: Addition of Material: The addition of cement, sand, water or mortar to slab surfaces while finishing concrete is strictly prohibited.

2. Rough-Formed Finish: This finish has an as-cast texture imparted by the form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding the limits specified by ACI 117 for the class of surface specified.
   a. All surfaces that will be permanently concealed below grade shall have a Rough-Formed Finish.
3. Smooth-Formed Finish: This finish has an as-cast texture imparted by the form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove all fins and other projections.
   a. Apply a Smooth-Formed Finish to all surfaces to be covered with a coating or covering material applied directly to the concrete such as waterproofing, dampproofing, veneer plaster or painting.
   b. Apply to the interior surfaces of tanks holding process water.
   c. Apply to baffle walls in the wet well.
   d. Do not apply rubbed finish to smooth-formed finish.
4. Rubbed Finish:
   a. Smooth-Rubbed Finish: Not later than one day after form removal, moisten the concrete surfaces and rub with a silicon-carbide brick to produce a uniform color and texture. Do not apply cement grout other than that created by the rubbing process. Apply to the surfaces that will be permanently exposed to view.
   b. Grout-Cleaned Finish: Wet the concrete surfaces and apply a grout of a consistency of thick paint to coat the surfaces and small holes. Mix one part Portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. When the grout whitens, rub the surface with clean burlap and keep the surface damp with a fog spray for at least 36 hours. Apply Grout-Cleaned Finish to the surfaces of all channels that will carry flowing process water. This requirement is applicable to the concrete surfaces of the wet well.
5. Related Unformed Surfaces:
   a. At tops of walls, horizontal offsets and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise specified.
6. Finishing Floors and Slabs
   a. General: Addition of Material: The addition of cement, sand, water, or mortar to slab surfaces while finishing concrete is strictly prohibited.
   b. Comply with the recommendations of ACI 302.1R for screeding, restraightening and finishing operations for concrete surfaces.
   c. Float Finish:
      1) Consolidate the surface with power-driven floats or by hand floating if the area is small or inaccessible to power-driven floats. Restraighten, cut down high spots and fill in low spots. Repeat float passes and

restraightening until the surface is left with a uniform, smooth granular texture.

2) Apply float finish surfaces to receive a trowel finish.

d. Trowel Finish:

1) After applying float finish, apply first trowel finish and consolidate concrete by hand or power driven trowel. Continue troweling passes and restraighten until the surface is free of trowel marks and is uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

2) Apply a trowel finish to interior floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet or ceramic tile and the wet well trench floor.

3) Finish surfaces to the following tolerances measured within 24 hours of troweling according to ASTM E 1155 for a randomly trafficked floor surface.

4) Specified overall values of flatness, FF 25; and levelness, FL 20; with minimum local values of flatness, FF 17; and levelness, FL 15.

e. Broom Finish

1) Immediately after float finishing, slightly roughen trafficked surface by brooming with a fiber-bristle broom. Broom transverse to traffic or at right angles to the slope of the slab. Permit surface to harden sufficiently to retain the scoring or ridges.

2) Apply a broom finish to all exterior concrete pads, walkways and slabs on grade.

P. Defective Work

1. The following concrete work shall be considered defective and may be ordered by the Engineer to be removed and replaced at Contractor's expense:
   a. Incorrectly formed.
   b. Not plumb or level.
   c. Not specified strength.
   d. Containing rock pockets, voids, honeycomb, or cold joints.
   e. Containing wood or foreign matter.
   f. Otherwise not in accordance with the intent of the Drawings and Specifications.

END OF SECTION

SECTION 03320

CONCRETE SEALANT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to seal all exposed concrete shown on the drawings or specified herein.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).
   1. C309, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

1.03 SUBMITTALS

A. In accordance with Section 01300.

B. Shop Drawings:
   1. Curing methods proposed.
   2. Manufacturer's data for the following products:
      a. Exposed aggregate finish retardant on formed surface.
      b. Evaporation retardant.
      c. Curing compound.
      d. Clear sealer.
      e. Clear floor hardener.

C. Quality Control Submittals:
   1. Curing Compound: Manufacturer's Certificate of Compliance showing moisture retention requirements.
   2. Retardants for Exposed Aggregate Finish: Manufacturer's Certification of Compliance.

PART 2 PRODUCTS

2.10 MATERIALS

A. Curing Compound:
   1. Solvent-based, high chlorinated rubber solids content curing compound meeting requirements of ASTM C309.
      a. Moisture Loss: 0.030 gm/square cm/72 hours maximum.
      b. Capable of meeting moisture retention with one coat.
   2. Manufacturers and Products:

a. Master Builders Co., Cleveland, OH; Masterkure CR.
b. Euclid Chemical Co., Cleveland, OH; Euco Super Floor Coat.
c. Or equal.

B. Evaporation Retardant:
1. Optional: Fluorescent color tint that disappears completely upon drying.
2. Manufacturers and Products:
a. Master Builders Co., Cleveland, OH; CONFILM.
b. Euclid Chemical Co., Cleveland, OH; Eucobar.
c. Or equal.

C. Clear Sealer (One-Component Penetrating Silane Siloxane Sealer):
1. Manufacturers and Products:
a. Master Builders, Inc.; MASTERSEAL SL.
b. Euclid Chemical Co.; Eucoguard 200.
c. Or equal.

D. Clear Floor Hardener:
1. Colorless, aqueous premixed solution of zinc and magnesium fluosilicate.
2. Each gallon of fluosilicate solution shall contain minimum 2 pounds of crystals.

E. Water: Clean and potable, containing less than 50 ppm of chlorides.

PART 3 EXECUTION

3.10 CURING OF CONCRETE

A. Use one of the following methods as approved by ENGINEER:
1. Walls:
a. General: Where walls are to receive coatings, painting, cementitious material, or other similar finishes, or where solvent-based coatings are not permitted, use only water curing procedures.
b. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 7 days.
c. Method 2: Apply curing compound, where allowed, immediately after removal of forms.
d. Method 3: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.
2. Slabs and Curbs:
a. Method 1: Protect surface by water ponding for 7 days.
b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
d. Method 4: Continuously sprinkle exposed surface for 7 days.

e. Other agreed upon method that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.
f. Where water curing for slabs during cold weather is not possible, use an ENGINEER-approved curing compound at manufacturer's recommended coverage per gallon.
g. Where curing compound cannot be used, special methods using moisture shall be agreed upon prior to placing the concrete slabs.
h. Protect slabs during cold weather with plastic sheets or other materials inside required heated enclosure if foot traffic is permitted on slabs.

B. Use only water curing on potable water structures.

C. Use only water curing methods where solvents in the curing compounds are prohibited by state or federal air quality laws.

D. Use only water curing where additional finishes such as clear sealer, hardeners, painting, and other special coatings are required.

3.20 EVAPORATION RETARDANT APPLICATION

A. Spray onto surface of fresh flat work concrete immediately after screening to react with surface moisture.

B. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.30 CLEAR SEALER APPLICATION

A. Apply where indicated in Finish Schedule.

B. Before application, water cure concrete walls and floors to receive sealer for a minimum of 28 days, keep clean, unpainted, free from membrane curing compounds, with Work above them completed.

C. Apply with stiff brush, short nap roller, squeegee, garden sprayer, or conventional paint spray equipment.

D. Apply at a coverage rate of 125 to 200 square feet per gallon and cure the sealer on slabs for the following minimum cure time at the ambient temperatures shown prior to allowing foot traffic:
1. 90 degrees F - 2 hours.
2. 75 degrees F - 4 hours.
3. 50 degrees F - 8 hours.
4. 35 degrees F - 16 hours.

3.40 CLEAR HARDENER APPLICATION

A. Before application, water cure floors to receive hardener for minimum 28 days, keep clean, unpainted, free to membrane curing compounds, and perfectly dry with all work above them completed.

B. Apply hardener evenly, using three coats, allowing 24 hours between coats.
   1. First coat 1/3 strength, second coat 1/2 strength, and third coat 2/3 strength, mix with water.
   2. Apply each coat so as to remain wet on surfaces for 15 minutes.
   3. Apply approved hardeners in accordance with manufacturer's instructions.
   4. After final coat is completed and dry, remove surplus hardener from surface by scrubbing and mopping with water.

3.50 MANUFACTURER'S SERVICES

A. Provide manufacturer's representative at site for installation assistance, inspection, and certification of proper installation for products specified.

B. Provide clear sealer manufacturer's representative to demonstrate proper application of product.

C. Provide floor hardener manufacturer's representative to demonstrate proper mixing and application of product.

D. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat.

END OF SECTION

SECTION 03415

STRUCTURAL PRECAST CONCRETE - PLANT CAST

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for structural precast concrete tank cover.

B. Related Section:

1. Section 03300 - Cast-in-Place Concrete.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A36, Standard Specification for Carbon Structural Steel.
2. A47, Standard Specification for Ferritic Malleable Iron Castings.
3. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
4. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
7. A307, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
8. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. A497, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
10. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
11. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
12. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
13. C33, Standard Specification for Concrete Aggregates.
14. C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
15. C94, Standard Specification for Ready-Mixed Concrete.
16. C150, Standard Specification for Ready-Mixed Concrete.

17. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
18. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
19. C330, Standard Specification for Lightweight Aggregates for Structural Concrete.
20. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
21. C404, Standard Specification for Aggregates for Masonry Grout.
22. C494, Standard Specification for Chemical Admixtures for Concrete.
23. C567, Standard Test Method for Determining Density of Structural Lightweight Concrete.
24. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
25. C1077, Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
26. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout.
27. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
28. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

B. American Association of State Highway and Transportation Officials (AASHTO)

1. Standard Specification for Roads and Bridges, 17th Edition, Section 5.

C. American Concrete Institute (ACI)

1. 211-1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
2. 211-2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
3. 301, Specification for Structural Concrete for Buildings.
4. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
5. 305R, Hot Weather Concreting.
6. 306R, Cold Weather Concreting.
7. 309R, Guide for Consolidation of Concrete.
8. 318, Building Code Requirements for Reinforced Concrete.

D. American Welding Society (AWS)

1. D1.1, Structural Welding Code-Steel.
2. D1.4, Structural Welding Code-Reinforcing Steel.

E. Concrete Reinforcing Steel Institute (CRSI)

1. Manual of Standard Practice.

F. Precast Prestressed Concrete Institute (PCI)

1. MNL-116, Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.
2. MNL-120, Design Handbook.
3. MNL-124, Design for Fire Resistance of Precast Prestressed Concrete.
4. MNL-127, Recommended Practice for Erection of Precast Concrete.

G. Society for Protective Coatings (formally Steel Structures Painting Council) (SSPC)

1. SP-3, Power Tool Cleaning.
2. PA-1, Shop, Field, and Maintenance Painting of Steel.
3. Paint 20, Zinc-Rich Coating, Type I-Organic and Type II-Inorganic.

H. Military Specification

1. DOD-P-21035A, Paint High Zinc Dust Content, Galvanizing Repair.

I. Federal Specification

1. FS-TT-P-664, Primer Coating, Alkyd, Corrosion Inhibiting, Lead and Chromate Free, VOC-Compliant.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer, fabricate, and install structural precast concrete tank cover to withstand design loadings indicated within limits and under required conditions.

1. Tank cover shall be designed to resist HS-25 loading.
2. Tank cover shall be designed to resist the lateral loads established by the AASHTO “Standard Specifications for Highways and Bridges”, 17th Edition, Section 5. The lateral earth pressure shall be considered to be as a minimum at rest (Ko).

B. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering structural precast concrete structures by employing a qualified professional engineer to prepare design calculations, fire-resistance calculations, shop drawings, and other structural data.

1.04 SUBMITTALS

A. Submit in accordance with Section 01300

1. Product data and instructions for manufactured materials and products.
   a. Certification by paint and curing compound manufacturers that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
2. Shop drawings prepared by or under the supervision of a qualified professional engineer detailing fabrication and installation of precast concrete units. Indicate member

dimensions and cross-sections; locations, sizes, and types of reinforcement, including special reinforcement; locations and dimensions of all penetrations; locations and sizes of voids within precast cover for anchorage devices; and lifting devices necessary for handling and erection.

a. Indicate layout and dimensions, and identify each precast concrete unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail loose, cast-in, and field hardware, inserts, connections, and joints, including accessories and construction at openings in precast units.
b. If applicable, indicate locations and details of anchorage devices that are to be embedded in other construction elements. Furnish templates, if required, for accurate placement.
c. Indicate locations and sizes of voids within precast cover for anchorage devices that are placed prior in other construction elements. Furnish templates, if required, for accurate placement.
d. Indicate locations, dimensions, and details of any penetrations present within the structural precast concrete tank cover.
e. For structural precast concrete tank cover indicated to comply with design loadings or calculated fire-resistance requirements, include structural analysis data sealed and signed by the qualified professional engineer responsible for their preparation.

3. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

4. Design mixes for each concrete mix. Submit revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

5. Material test reports from a qualified independent testing agency evidencing compliance with requirements of the following based on comprehensive testing of current materials:

a. Concrete materials.
b. Reinforcing materials.
c. Admixtures.

6. Material certificates in lieu of agency test reports, when permitted by Engineer, signed by fabricator certifying that each material item complies with requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed structural precast concrete work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Fabricator Qualifications: Firm experienced in producing structural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance as well as sufficient production capacity to produce required units without delaying the Work.

1. Fabricator must participate in the PCI Plant Certification Program and be designated a PCI Certified Plant for the following product group and category:

2. Product Group and Category: Group C, Category C1.

C. Professional Engineer Qualifications: A professional engineer legally authorized to practice in the jurisdiction where Project is located and experienced in providing engineering services of the kind indicated that have resulted in the installation and successful in-service performance of precast concrete units similar to this Project in material, design, and extent.

D. If applicable, design and install the structures to withstand hydrostatic uplift caused by a groundwater elevation at grade level or equal to the top of the structure, whichever produces the most severe condition. Use only the weight of the empty structure (no fill) and submerged soil directly over any base perimeter to resist hydrostatic uplift with a minimum safety factor of 1.10. The weight of submerged soil may be 60 pounds per cubic foot maximum. Do not include side friction of soil on walls.

E. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Engineer's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C1077 and ASTM E329, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

F. PCI Design Standard: Comply with recommendations of PCI MNL-120 applicable to types of structural precast concrete units indicated.

G. PCI Quality-Control Standard: Comply with requirements of PCI MNL-116 including manufacturing and testing procedures, quality-control recommendations, and camber and dimensional tolerances for types of units required.

H. ACI Publications: Comply with the following ACI publications applicable to types of structural precast concrete units indicated:

1. ACI 301 "Specifications for Structural Concrete for Buildings."
2. ACI 318 (ACI 318M) "Building Code Requirements for Reinforced Concrete."

I. Welding Standards: Comply with applicable provisions of AWS D1.1 and AWS D1.4.

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

J. Calculated Fire-Test-Response Characteristics: When fire-resistance-rated assemblies are indicated, provide structural precast concrete units whose calculated fire resistance has been determined according to ASTM E119 and PCI MNL-124 and is acceptable to authorities having jurisdiction.

K. Fire-Test-Response Characteristics: Provide structural precast concrete units that comply with the following requirements:

1. Fire-response tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency includes UL or another agency that is acceptable to authorities having jurisdiction and performs testing and follow-up services.
2. Fire-resistance-rated assemblies indicated are identical in materials and construction to those tested for fire resistance per ASTM E119.

3. Fire-resistance-rated assemblies are indicated by design designations listed in the UL "Fire Resistance Directory" or in the listings of another qualified testing and inspecting agency.
4. Products are identified with appropriate markings of applicable testing and inspecting agency.

L. Product Options: The drawings indicate size, profiles, and inside dimensional requirements of structural precast concrete tank cover.

M. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings".

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural precast concrete tank cover to the Project site in such a manner and time to ensure continuity of installation. Store structures at the Precaster yard to prevent cracking, distorting, warping, staining, or other physical damage, and so that markings are visible.

B. Lift and support unit only at designated lifting or supporting points as shown on final shop drawings.

C. Deliver anchorage items that are to be embedded in other construction elements before starting such work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE FABRICATORS

A. Fabricators: Subject to compliance with requirements, suggested fabricators offering products that may be incorporated in the Work include, but are not limited to, the following:

1. CSI Concrete Systems, Hudson, N.H.
2. Chase Precast, N. Brookfileld, MA.
3. Oldcastle Precast, Avon, CT, Rehoboth, MA

2.02 FORMWORK

A. Forms: Provide forms and, where required, form facing materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish surfaces.

2.03 MATERIALS AND COMPONENTS

A. Reinforcing

1. Reinforcing Bars: ASTM A615, Grade 60 (ASTM A615M, Grade 400), deformed.

2. Low-Alloy-Steel Reinforcing Bars: ASTM A706, Grade 60 (ASTM A706M, Grade 400).
3. Steel Wire: ASTM A82, plain, cold drawn.
4. Steel-Welded Wire Fabric: ASTM A185, plain, cold drawn.
5. Deformed-Steel-Welded Wire Fabric: ASTM A497, cold drawn.
6. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.
    a. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected with plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

B. Concrete

1. Portland cement: ASTM C150, Type I or Type III.
    a. Use only one brand and type of cement throughout Project, unless otherwise acceptable to Architect.
2. Fly Ash: ASTM C618, Class C or F.
3. Normal-Weight Aggregates: ASTM C33, Class 5S. Provide aggregates from a single source.
4. Lightweight Aggregates: ASTM C330.
5. Water: Potable.
6. Admixtures, General: Provide admixtures for concrete that contain not more than 0.1 percent chloride ions by mass of Portland cement or cementitious material.
7. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
8. Water-Reducing Admixture: ASTM C494, Type A.
9. Water-Reducing and Accelerating Admixture: ASTM C494, Type E.
10. Water-Reducing and Retarding Admixture: ASTM C494, Type D.

C. Connections and Finishes

1. Steel Shapes and Plates: ASTM A36 (ASTM A 36M).
2. Malleable Iron Castings: ASTM A47 (ASTM A 47M).
3. Plate Stainless Steel: ASTM A666, Type 304, of grade suitable for application.
4. Bolts and Studs: ASTM A307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.
5. High-Strength Bolts and Nuts: ASTM A325 (ASTM A325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
6. Welded Headed Studs: AWS D1.1, Type B headed studs, cold-finished carbon-steel bars.
7. Deformed-Steel Wire Bar Anchors: ASTM A497.

8. Welding Electrodes: Comply with AWS standards.
9. Accessories: Provide clips, hangers, shims, and other accessories required to install precast concrete units.
10. Hot-Dip Galvanized Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by the hot-dip process, complying with the following requirements:
    a. ASTM A123 for galvanizing rolled, pressed, and forged shapes, plates, bars, and strips.
    b. ASTM A153 for galvanizing iron and steel hardware.
11. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.
12. Shop-Primed Finish: Prepare surfaces of interior steel items, except those with galvanized finish or those surfaces to be embedded in concrete, according to requirements of SSPC-SP 3 and shop-apply primer according to SSPC-PA 1.
    a. Primer: Fast-curing, lead- and chromate-free, VOC-conforming, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements of FS TT-P-664.

D. Grout

1. Cement Grout: Portland cement, ASTM C150, Type I, and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
2. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and an extended working time.
3. Epoxy Grout: ASTM C881, 2-component epoxy resin, of type, grade, and class to suit requirements.

E. Curing Materials

1. Clear, Solvent-Borne, Liquid, Membrane-Forming Curing Compound: ASTM C309, Type I, Class A or B, wax free.
2. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type I, Class B.
    a. Provide material that has a maximum volatile organic compound (VOC) rating of 350 g/L.

2.04 CONCRETE MIXES

A. Prepare design mixes for each type of concrete required.

1. Limit use of fly ash to not exceed, in aggregate, 25 percent of the Portland cement by weight.

B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast manufacturing plant personnel at precast fabricator's option.

C. Normal-Weight Concrete: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1 and ACI 301, using materials to be used on the Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28-Day): 5000 psi (34.5 MPa).
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.40.

D. 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, with a tolerance of plus or minus 1-1/2 percent:

1. Severe exposure conditions where the concrete will be exposed to freezing.
    a. Air Content: 6 percent for 1-inch (25-mm) maximum aggregate.
    b. Air Content: 6 percent for 3/4-inch (19-mm) maximum aggregate.
    c. Air Content: 7 percent for 1/2-inch (13-mm) maximum aggregate.
2. Mild exposure conditions where the concrete will NOT be exposed to freezing.
    a. Air Content: 2.5 to 4.5 percent.

E. Lightweight Concrete: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.2 and ACI 301, using materials to be used on the Project, to provide lightweight concrete with the following properties:

1. Compressive Strength (28-Day): 5000 psi (34.5 MPa).
2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft. (1842 kg/cu. m), plus or minus 3 lb/cu. ft. (48 kg/cu. m), according to ASTM C567.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in lightweight concrete at point of placement having an air content as follows:

1. Severe exposure conditions where the concrete will be exposed to freezing.
    a. Air Content: 4 to 6 percent for 3/4-inch (19-mm) maximum aggregate.
    b. Air Content: 4.5 to 7.5 percent for 3/8-inch (10-mm) maximum aggregate.
2. Mild exposure conditions where the concrete will NOT be exposed to freezing.
    a. Air Content: 4 percent, minimum.

G. Other Admixtures: Use water-reducing, water-reducing and accelerating, or water-reducing and retarding admixtures according to manufacturer's directions.

H. Concrete-Mix Adjustments: Concrete-mix design adjustments may be proposed when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.05 FABRICATION

A. Formwork: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and for pretensioning and detensioning operations. Maintain formwork to provide completed precast concrete units of

shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL-116.

1. Coat surfaces of forms with bond-breaking compound before reinforcement is placed. Provide commercial-formula, form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.
2. Unless forms for precast, prestressed concrete units are stripped prior to detensioning, design forms so that stresses are not induced in precast units due to deformation of concrete under prestress or movement during detensioning.

B. Built-In Anchorages: Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect the position of the main reinforcement or placing of concrete. Do not relocate bearing plates in units, unless acceptable to Architect. LIFTING

C. Voids: Accurately locate and cast-in voids for anchorage devices to penetrate into structural precast concrete tank cover. Contractor to coordinate with Precast Manufacturer for exact locations and sizing of voids, as detailed on the contract drawings.

D. Cast-in openings larger than 8 inches (200 mm) in diameter or 8 inches (200 mm) square according to final shop drawings. Contractor to coordinate with Precast Manufacturer for locations and sizing of required penetrations, as detailed on the contract drawings. Other smaller holes may be field cut by trades requiring them, as acceptable to Engineer.

E. Reinforcement: Comply with the recommendations of CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
2. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required.
3. Place reinforcement to obtain at least the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
4. Install welded wire fabric 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.

F. Concrete Mixing: Comply with requirements and with ASTM C94. Following concrete batching, no additional water may be added.

G. Concrete Placement: Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast units. Comply with requirements of ACI 304R for measuring, mixing, transporting, and placing concrete.

1. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with ACI 309R.
2. Comply with ACI 306R procedures for cold-weather concrete placement.
3. Comply with ACI 305R procedures for hot-weather concrete placement.

H. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on final shop drawings. Imprint casting date on each precast unit on a surface that will not show in the finished structure.

I. Cure concrete according to the requirements of PCI MNL-116 by moisture retention without heat or by accelerated heat curing, using low-pressure live steam or radiant heat and moisture.

J. Finish formed surfaces of precast concrete as indicated for each type of unit, and as follows:

1. Standard Finish: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls will be tolerated. Major or unsightly imperfections, honeycombs, or structural defects are not permitted.

K. Finish unformed surfaces by trowel, unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

2.06 EXTERIOR COATING

A. The material shall be:

1. TREMproof 260 Spray-Applied Waterproofing Membrane made by Tremco Incorporated, 3735 Green Road, Beachwood, Ohio 44122; or
2. TREMproof 201/60 Fluid-Applied Waterproofing Membrane made by Tremco Incorporated, 3735 Green Road, Beachwood, Ohio 44122; or
3. Or product deemed acceptable by the Engineer.

2.07 SOURCE QUALITY CONTROL

A. The Owner may employ an independent testing agency to evaluate precast fabricator's quality control and testing methods.

1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.

B. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL-116 requirements.

C. Strength of precast concrete units will be considered potentially deficient when precast concrete units fail to comply with requirements, including the following:

1. Fail to meet compressive-strength test requirements.
2. Reinforcement does not conform to fabrication requirements.
3. Concrete curing and protection of precast units against extremes in temperature fail to meet requirements.
4. Precast units are damaged during handling and erecting.

D. Testing: When there is evidence that the strength of precast concrete units may be deficient or may not meet requirements, the Owner will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42.

1. A minimum of 3 representative cores will be taken from precast concrete units of suspect strength, from locations directed by Engineer.
2. Cores will be tested, following immersion in water, in a wet condition per ACI 301 when precast concrete units will be wet under service conditions.
3. Cores will be tested in an air-dry condition per ACI 301 when precast concrete units will be dry under service conditions.
4. Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is at least 85 percent of the 28-day design compressive strength and no core compressive strength is less than 75 percent of the 28-day design compressive strength.
5. Test results will be made in writing on the same day that tests are made, with copies to Engineer, Contractor, and precast fabricator. Test reports will include the Project identification name and number, date, name of precast concrete fabricator, name of concrete testing agency; identification letter, name, and type of precast concrete unit or units represented by core tests; design compressive strength, compressive strength at break and type of break, corrected for length-diameter ratio, and direction of applied load to core with respect to horizontal plane of concrete as placed.

E. Patching: Where core test results are satisfactory and precast concrete units meet requirements, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.

F. Dimensional Tolerances: Units having dimensions smaller or greater than required and not meeting tolerance limits may be subject to additional testing.

1. Precast units having dimensions greater than required will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to meet construction conditions.

G. Defective Work: Precast concrete units that do not conform to requirements, including strength, manufacturing tolerances, and finishes, are unacceptable. Replace with precast concrete units that meet requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions for compliance with requirements, including installation tolerances, true and level bearing surfaces, and other conditions affecting performance of precast concrete units. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Welding: Perform welding in compliance with AWS D1.1 and AWS D1.4, with qualified welders.

1. Protect precast concrete units from damage by field welding or cutting operations and provide noncombustible shields as required.
2. Repair damaged metal surfaces by cleaning and applying a coat of galvanizing repair paint to galvanized surfaces.
3. Repair damaged metal surfaces by cleaning and repriming damaged painted surfaces.

B. Erection Tolerances: Install precast units level, plumb, square, and true, without exceeding the recommended erection tolerances of PCI MNL-127.

C. Shore and brace precast concrete units to maintain location, stability, and alignment until permanent connections are installed.

D. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at keyways, connections, and joints using suitable grout approved by the Engineer.

1. Provide forms or other acceptable method to retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

3.03 CLEANING

A. Clean exposed surfaces of precast concrete units after erection to remove weld marks, other markings, dirt, and stains.

1. Wash and rinse according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes.

3.04 ASSEMBLY

A. Assembly of this structural precast concrete tank cover will include all the mechanical equipment installed and tested. The equipment will be installed at the yard of the precaster and shipped as a completed unit. The precaster will be required to cooperate with the equipment installer by supplying a safe work area, sufficient electrical power, and water. Sanitary facilities will be the responsibility of the equipment installer.

END OF SECTION

SECTION 03600

EPOXY BONDING COMPOUND/GROUT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes
   1. Requirements for a two-component, solvent-free moisture insensitive epoxy resin bonding adhesive used to bond fresh, plastic concrete to clean sound hardened concrete and for grouting bolts and the bonding of mating materials.

B. Alternatives
   1. Should the Contractor wish to use any brand or type of material other than as specified herein, he shall so state in writing to the Engineer naming the proposed substitution and manufacturer. This letter shall be accompanied by:
      a. A current test report and notarized certificate of compliance from an approved independent testing laboratory that the proposed substitute meets or exceeds the specified requirements and has been tested within the past 12 months in accordance with the specified test standards.
      b. Documented proof, to the Engineer's satisfaction, that the proposed brand or type of material has proven record of performance when used in the intended application.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. C-882, Test Method for Bond Strength of Epoxy Resin Systems used with Concrete by Slant Shear.
   2. D-570, Test Method for Water Absorption of Plastics.
   3. D-638, Test Method for Tensile Properties of Plastics.
   4. D-695, Test Method for Compressive Properties of Rigid Plastics.
   5. D-732, Test Method for Shear Strength of Plastics by Punch Tool.
   6. D-790, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

1.03 SUBMITTALS

A. Shop Drawings.
   1. In accordance with SECTION 01300.
B. Certificates of Conformance.
   1. Prior to delivery, submit manufacturer's notarized certification attesting to compliance with the requirements of this specification.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS AND PRODUCTS

A. Sikadur 32 Hi-Mod, as manufactured by Sika Corp., Lyndhurst, NJ, or acceptable equivalent product manufactured by H.B. Fuller Co., Palatine, IL, or Protex Industries, Inc., Denver, CO.

B. Sure-Klean Degreaser and Etch, as manufactured by ProSoCo, Inc., Kansas City, KS, or acceptable equivalent product manufactured by Drew Chemical Co., Tampa, FL or Goldblatt Tool Co., Kansas City, KS.

2.02 MATERIAL

A. The epoxy material shall conform to the following requirements:
   1. Component A shall be a modified epoxy resin of the Epichlorohydrin Pisphenol A type containing suitable viscosity control agents. It shall not contain butyl glycidyl ether.
   2. Component B shall be primarily a reaction product of a selected amine blended with an epoxy resin of the Epichlorohydrin Bisphenol A type containing suitable viscosity control agents, pigments and accelerators.
   3. The ratio of Component A:B shall be 1:1 by volume.
   4. The materials hall not contain asbestos.

B. Properties of the mixed material:
   1. Pot Life: 25 to 35 minutes.
   2. Tack-Free Time to Touch (20 mil thickness): 3 to 5 hours.
   3. Initial Viscosity (Brokfield Viscometer Spindle No. 3, Speed 100): 1,900 to 3,700 cps.
   4. Color: Gray

C. Properties of the cured material. Note: All test data is based upon material and curing conditions of 73± degrees F, 50± 5% relative humidity.
   1. Compressive Properties (ASTM D-695) at 28 days:
      a. Compressive Strength: 8,500 psi minimum.
      b. Modulus of Elasticity: 3.75×10^5 psi minimum.
   2. Tensile Properties (ASTM D-638) at 14 days:
      a. Tensile Strength: 4,000 psi minimum.
      b. Elongation at Break: 1.5 - 2.25%.
      c. Modulus of Elasticity: 2.75×10^5 psi minimum.
   3. Flexural Properties (ASTM D-790) at 14 days:
      a. Flexural Strength (Modulus of Rupture): 6,300 psi minimum.
      b. Tangent Modulus of Elasticity in Bending: 4.0×10^5 psi minimum.
   4. Shear Strength (ASTM D-732) at 14 days:
      a. Shear Strength: 5,000 psi minimum.
   5. Water Absorption (ASTM D-570: Section 6.5) at 14 days:
      a. Water Absorption: 1% maximum.
   6. Bond Strength (ASTM C-882) Hardened to Plastic:
      a. Bond Strength (14 days moisture cure): 1,500 psi minimum.

D. Aggregate: As recommended by the manufacturer.

E. Degreasing and etching chemical:
   1. Composition and materials: A blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.
   2. Color: Water White.
   3. Flash Point: Above 150 degrees F.

4. Weight/Gallon: 9.0 lbs.

PART 3 EXECUTION

3.01 GENERAL

A. Mix and apply the epoxy compound in accordance with the manufacturer's instructions.

3.02 PREPARATION OF CONCRETE SURFACES

A. All work involving epoxy, cement base coating and protective coating to adhere strictly to the manufacturer's current printed recommendations as to temperatures at time of application. No use of epoxy materials allowed when either the temperature of the concrete to be repaired or the ambient temperature is below 50 degrees F, 24 hours before, during, or for a period of 48 hours after the completion of the repair. Temporary heat may be used to meet the specified requirements.

B. All epoxy, cement base coating, and protective coating materials to be new and used within the shelf life limitations set forth by the manufacturer. The shelf life limitations to be clearly marked on each container.

C. All existing reinforcement and concrete to be sound and clean before receiving new materials.

D. Surfaces shall be clean and sound. Surfaces may be dry, damp or wet, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials by mechanical abrasion methods such as sandblasting. Sandblast steel to appropriate finish.

E. If the concrete surfaces are sound and it is only necessary to remove laitance, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's written instructions and as specified herein.

F. Application of degreaser and etching compound: Pre-wet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand three to four minutes and reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi and a minimum volume of 5 to 10 gallons per minute.

3.03 PROPORTIONING, MIXING AND APPLYING EPOXY COMPOUND

A. Volumetric ratio of bonding compound shall be 1:1 (B:A) to mix, proportion one part B and one part A into clean pail. Mix thoroughly for three minutes with a steel mixing paddle on a low speed (400 to 600 rpm) drill until blend is a uniform gray color. Mix only that amount of epoxy that can be used in 30 minutes at 73 degrees F.

B. Application for Bonding: Cover the area to be overlaid with one coat of the epoxy compound applied with long-nap paint rollers, brushes, brooms or by spray. Apply at the rate of 80 square feet/gallon maximum on smooth concrete.

C. As the concrete increases in roughness, decrease the rate of coverage proportionately. While the epoxy compound is still tacky (three to five hours at 73 degrees F), place the concrete. If the bonding compound should harden before the concrete is placed, reprepare surface. Then recoat with additional epoxy bonding compound and proceed.

D. Application for Grouting: To prepare a grout for anchor bolts, mix the epoxy compound with aggregate recommended by the epoxy manufacturer. The amount of aggregate used shall be the maximum amount possible while still maintaining a pourable consistency. The ratio shall be approximately 1:1, 1/2 by loose volume of aggregate. Apply grout in accordance with the manufacturer's instructions.

E. Limitations:
   1. Do not thin the epoxy bonding compound, as solvents will prevent proper cure.
   2. Use only oven-dry aggregate to avoid encapsulation of moisture.

END OF SECTION

SECTION 03604

NON-SHRINK CONSTRUCTION GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section specifies furnishing and installing non-shrink grout for interior and exterior use, as indicated.

1.02 REFERENCES

A. U.S. Corps of Engineers CRP - C - 588

B. ACI - 305, American Concrete Institute

C. ACI - 306, American Concrete Institute

1.04 SUBMITTALS

A. Product Data: Provide data on non-shrink grout.

B. Submit certificate of compliance attesting to conformance of products to the requirements of this Section.

C. Submit manufacturers' installation and application instructions for products.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, tightly sealed, polyethylene lined, multiple ply bags, clearly labeled with manufacturer's name, brand name and number, and batch number of the material.

1.06 JOBSITE CONDITIONS

A. Ensure surfaces to be grouted or patched are clean and sound, and are not feathered at edges. Handle grout as concrete with regard to temperature and curing, as specified in Section 03300.

B. Observe safety precautions as outlined in the manufacturer's literature and as printed on containers and labels.

PART 2 - PRODUCTS

2.01 GENERAL

A. Premixed grout comprised of blended portland cements, graded silica aggregates, special plasticizing agents and other ingredients.

B. Conform to requirements of U.S. Corps of Engineers CRD-C-588 and to the following performance requirements listed in Article 2.02 when tested at the moderate fluidity, flowable, level.

C. The grout shall exhibit a small but predictable amount of expansion sufficient to counteract the normal shrinkage of cement, and shall be dimensionally stable. The expansion shall

occur after initial set to insure maximum contact between grout and base plates. The grout shall be extremely flowable at low water levels and shall not bleed at the moderate fluidity level specified nor exhibit segregation of aggregates. At a highly flowable consistency, high compressive strength shall be attainable in a 24-hour period with continuous build-up for 28 days. The resulting cured material shall be very hard and highly resistant to penetration and breakdown by oils, water or vibration grout shall contain no iron particles, gypsum, gas forming agents, no added chloride, and shall not react with magnesium.

2.02 PERFORMANCE REQUIREMENTS

A. When tested as provided herein, grout shall meet the following performance requirements:

1. When tested as provided herein, grout shall meet the following performance requirements:

    1. Expansion at 3, 14, and 28 days: 0.4 percent maximum at any of these ages.

    2. Expansion at 3 and 14 days: not greater than expansion at 28 days.

    3. Shrinkage at 28 days: none, these requirements will be met if expansion tests give a positive value at 28 days.

    4. Compressive strength:

        a. At seven days: 2500 psi min.
        b. At 28 days: 5000 psi min.

    5. Time of final setting: eight hours max.

    6. Moderate fluidity, flowable: 124-145 (flow table, 5 drops, CRDC-277).

2.03 DEGREASING AND ETCHING CHEMICAL

A. Composition and Materials: Blend of organic and inorganic acids with a special solvent system incorporating wetting agents for emulsification.

B. Color: Water White

C. Flash Point: Above 150°F

D. Weight per gallon: 9.0 Pounds

PART 3 EXECUTION

3.01 PREPARATION OF CONCRETE SURFACES

A. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials by mechanical abrasion methods such as sandblasting. Sandblast structural and reinforcing steel to remove loose material and expose sound metal.

B. If the concrete surfaces are sound and it is only necessary to remove laitances, grease or dust, the Contractor may, with the prior written approval of the Engineer, forego sandblasting and wash the concrete with a degreasing and etching chemical applied in accordance with the manufacturer's written instructions and as specified herein.

C. Application of Degreaser and Etching Compound. Prewet concrete surfaces with clean water. Brush concentrated cleaner onto concrete surface. Let stand three to four minutes and

reapply, brushing stained areas vigorously. Rinse off with fresh water applied at a minimum pressure of 800 psi and a minimum volume of five gallons per minute.

D. Construct appropriate sturdy forms to contain grout at the fluidity level at which it will be used. Saturate foundations and forms for a minimum of six hours prior to grouting. Remove all standing water or puddles prior to application of grout. Take special care to eliminate water from bolt holes and other cavities.

3.02 MIXING

A. Mix only with cool, clean, drinkable water. Do not overwater grout. Do not mix more grout than can be properly placed within 20 minutes of mixing.

3.03 APPLICATION

A. Place grout only from one side of base plates to avoid entraping air. Provide adequate air vent holes in large base plates. Work or flow grout into place, filling all cavities. Shut down near-by equipment which may cause vibration. Allow adequate curing time for strength development before placing a load on the grout.

B. Place grout within twenty minutes of the addition of water to the batch.

C. Reinforce grout pads or applications three inches or more in thickness with wire mesh or reinforcement bars.

D. Rodding or chaining is acceptable to assist in placement or consolidation of grout. Excessive mechanical vibration may cause segregation of aggregates and will not be permitted.

E. Cool mixing water and grout when temperature exceeds 80°F. in the area to be grouted. Comply with ACI-305. Cure and seal exposed grout with epoxy membrane curing compound to prevent rapid surfacing drying, shrinkage and cracking, or damp cure the grout.

F. Heat mixing water and grout when temperature falls below 50°F in the area to be grouted. Do not exceed 80°F. Comply with ACI-306. Do not add accelerators to grout.

3.04 AGGREGATE EXTENSIONS

A. Where indicated, extend the yield of expansive-cement type grout by utilizing aggregate filler in the size range of 3/8 inch washed pea gravel. Run trial mixes verifying the acceptability of this extended grout mix to the Engineer prior to use.

END OF SECTION

DIVISION 05

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to fabricate, furnish, erect, set, fasten and install miscellaneous metalwork as indicated on the Drawings and as specified.

B. Related Sections

a. Section 03300 – Cast In Place Concrete
b. Section 15050 – Pipe Penetrations

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A36, Specification for Carbon Structural Steel.
2. A48, Specification for Gray Iron Castings.
3. A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded Seamless.
4. A123, Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
5. A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
7. A276, Specification for Stainless Steel Bars and Shapes.
8. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
9. A325, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
10. A489, Specification for Carbon Steel Lifting Eyes.
11. A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
12. A501, Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
13. B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
14. B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
15. B308, Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
16. B429, Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
17. B632, Specification for Aluminum-Alloy Rolled Tread Plate.
18. B660, Standard Practices for Packaging/Packing of Aluminum and Magnesium Products.

19. F436, Specification for Hardened Steel Washers.
20. F468, Specification for Nonferrous Bolts, Hex Cap Screws, Studs for General Use.
21. F593, Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
22. F594, Specification for Stainless Steel Nuts.
23. F844, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

1.03 SUBMITTALS

A. In accordance with Section 01300 submit the following:

1. Manufacturer's technical data sheets for the following:
   a. Bitumastic coating.
   b. Grout.
   c. Chemical Anchors
2. Shop Drawings:
   a. Details of the fabrication and erection of each metal fabrication indicated on the Drawings.
   b. Plans, elevations, sections, and details of metal fabrications and their connections.
   c. Anchorage and accessory items.
   d. The shop drawings shall furnish the required information in sufficient detail and completeness that the work may be accomplished without the use of the Contract Drawings as a reference.
3. Welding Certificates: Copies of certificates for welding procedures and personnel.
4. Qualification Data: Firms and persons specified in the "Quality Assurance" Article shall demonstrate their capabilities and experience. Firms shall include a list of at least three (3) recently completed projects with project names and addresses. The name, address, and phone number of a contact (architect, engineer, or owner) shall be provided for each project in the list, as well as any other required information hereinafter or hereinbefore specified.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. Fabrication Company to be experienced in the production of metal fabrications similar to those indicated for this Project, with a record of successful in-service performance.
2. Fabrication Company to possess sufficient production capacity to produce the work required and complete the work within the duration of the contract.

B. Welding:

1. Procedures and personnel shall be qualified according to the latest revisions of the following American Welding Society designation:
   a. AWS D1.1, Structural Welding Code - Steel.
   b. AWS D1.2, Structural Welding Code - Aluminum.

c. AWS D1.6, Structural Welding Code - Stainless Steel.
d. Certification shall be provided stating that each welder has passed the AWS qualification tests for the welding processes involved and has maintained that certification as required by AWS.

1.05 DELIVERY STORAGE AND HANDLING

A. Aluminum to be delivered to the fabricator in accordance with ASTM B 660, complying with the commercial packing and preservation requirements.

B. Epoxy Adhesive

1. Store epoxy cartridges on pallets or shelving in a covered storage area.
2. Control temperature above 60 degrees F and dispose of cartridges if shelf life has expired.

C. Vinyl Ester Products

1. Store components on pallets or shelving in a covered storage area with locking door.
2. Control temperature within 41 to 77 degrees F and dispose of product if shelf life has expired.

1.06 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit within reinforced concrete walls and other construction, dimensions shall be verified by field measurements before fabrication. The fabrication schedule shall be coordinated with the Construction Progress Schedule to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, proceed with fabricating metal fabrications upon receipt of Engineer reviewed and approved shop drawings, without field measurements. Allowance shall be made for trimming and fitting.

1.07 SCHEDULING

A. Installation of anchorages for metal fabrications shall be coordinated with the Contractor. Setting drawings, templates, and instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, items with integral anchors, and any items that are to be embedded in concrete shall be provided to the Contractor. Items to be embedded in concrete shall be delivered to Project site sufficiently in advance to allow time for installation, as determined by the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel, in accordance with the following ASTM Designations unless otherwise indicated:

1.	Steel plates and structural shapes	ASTM A36.
2.	Steel Pipe	A501 or A53, Type E or S, Grade B
3.	Structural Steel Tubing	A500, Grade B
4.	Steel Bolts and Nuts:	
	a. Carbon Steel	A307 or A36
	b. High-Strength	A325, Type 3
	c. Galvanized Steel Bolts and Nuts	A307 or A36, with A153 Zinc Coating, and ANSI B1.1
	d. Eyebolts	A489
	e. Threaded Rods	A36
	f. Flat Washers (Unhardened)	F844; use A153 for Zinc Coating
	g. Flat Washers (Hardened)	F436

B. Stainless Steel, Type 316 and in accordance with the following ASTM designations unless otherwise indicated:

1.	Bars and Shapes	A276, AISI Type 316
2.	Plate, Sheet, and Strip	A167, AISI Type 316
3.	Bolts and Threaded Rods	F593, AISI Type 316,
4.	Nuts	F594, AISI Type 316,
5.	Welding Rods and Bare Electrodes: Compatible with the material to be welded per the AWS D1.6 specifications.	

C. Aluminum, in accordance with the following ASTM designations and alloy and temper designations of The Aluminum Association:

1.	Structural shapes	B 308, 6061-T6 mill finish.
2.	Extruded shapes	B 221, 6061-T6 mil finish
3.	Structural Plates	B 209, 6061-T6 mil finish
4.	Sheets	Alclad 3003-H14 and 3003
5.	Bolts and nuts	F468, 2024-T4
6.	Aluminum Tread Plate:	
	a. In accordance with ASTM B 632, 6061-T6.	
	b. Provide a clear, Class II, anodized finish in accordance with Aluminum Association Designation AA-A31, 0.4 mils thick minimum.	
7.	Structural Aluminum Tubes	ASTM B 429, 6063-T52, mill finish.
8.	Welding Rods and Bare Electrodes:	
	a. Compatible with the material to be welded per the AWS D1.2 specifications.	
	b. Aluminum items to be anodized shall not be welded using 4043 weld rod.	

D. Cast Iron

1. In accordance with ASTM A48, Class 35.

2.02 GROUT

A. In accordance with SECTION 03600.

2.03 FASTENERS

A. Provide Stainless steel fasteners for all connections unless indicated otherwise

B. Bolts:

1. Stainless steel in accordance with ASTM F 593, Alloy Group 2, Type 316,
2. CW with hexagonal heads shall be provided for connections.

C. Nuts:

1. Stainless steel in accordance with ASTM F 594, Alloy Group 2, Type 316,
2. CW with hexagonal heads, and thread designation to match stainless steel bolts shall be provided for connections.

D. Washers:

1. In accordance with ASTM F 436, except that the material shall be Type 316 stainless steel in accordance with ASTM A 276.

E. Stainless steel fasteners for framing connections

1. Provide bolts, nuts, and washers of the size and quantity as indicated on the Drawings. One nut shall be provided per each bolt unless otherwise indicated on the Drawings. A washer shall be provided at the contact surface between framing members or clips and the heads of bolts and nuts, minimum two (2) washers per bolt.

F. Machine Screws:

1. Stainless steel in accordance with ASME B18.6.3, Type 316.

2.04 ALUMINUM FRAMING AND SUPPORTS FOR COVERS AND GRATING

A. Fabricated from structural aluminum shapes, structural aluminum tubes, and aluminum extrusions, of the size and quantity as indicated on the Drawings.

2.05 ABRASIVE NOSINGS

A. Aluminum.

1. In accordance with ASTM B221 for extrusions.
2. Class 30 for cast aluminum tread plate.

B. Abrasive, Two (2) part Epoxy combined with aluminum oxide grit.

C. Manufactured by Balco Inc, Wichita, KS or equal.

2.06 PIPE BOLLARDS

A. Fabricated from Schedule 40, welded, galvanized steel pipe in accordance with ASTM A53

B. Provide size and quantity indicated on the Drawings.

2.07 ALUMINUM ACCESS HATCH

A. General

1. Provide size and quantity indicated on the Drawings. The door leaf shall be 1/4-inch aluminum diamond pattern plate to withstand a live load of 300 pounds per square foot and an AASHTO HS20 loading unless specified or indicated otherwise on the Contract Drawings.

B. Construction

1. Channel frame shall be 1/4-inch aluminum with an anchor flange around the perimeter.
2. Door(s) shall be 1⁄4-in. aluminum diamond plate, reinforced to withstand a 25-foot column of stationary water
3. Stainless steel cam locks shall be provided to work in conjunction with a 9/16-in. diameter EPDM compression gasket, mounted to the underside of the door. Door shall open to 90 degrees and automatically lock with a T-316 stainless steel hold-open arm with an aluminum release handle.
4. All hardware shall be stainless steel.
5. Factory finish shall be mill finish with bituminous coating applied to exterior portions of the frame which will be in contact with concrete.

C. Warrantee

1. Manufacturer shall guarantee against defects in materials and/or workmanship for lifetime of the hatch.

D. Manufacturer

1. The access hatch shall be type F1H as manufactured by the Halliday Products of Orlando, Florida or be an acceptable equivalent product.

E. Fall Protection Grating System

1. Furnish and install on all vault access doors fall protection grating system. Door manufacturer shall install the grating system when the door is fabricated or field install (by others) on existing doors already in use. If field installation is necessary, grating system shall be installed per the manufacturer’s instructions.
2. Performance characteristics:

a. Grating panel(s) shall be high visibility in color.
b. Grating panel(s) shall lock automatically in the full open position.
c. Grating system shall have a twenty-five year warranty.
d. Grating panel(s) shall have a provision for locking to prevent unauthorized opening.

3. Grating: Panels shall be aluminum with a powder coat paint finish and designed to meet OSHA OSHA 29 CFR 1926.502(c) requirements for fall protection.
4. Hold open feature: A Type 316 stainless hold open device shall be provided to lock the cover in the fully open 90 degree position.
5. Hardware: All hardware shall be Type 316 stainless steel.

2.08 WALL SLEEVES

A. In accordance with SECTION 15050.

2.09 ANCHOR BOLTS

A. To be Stainless Steel.

B. Configuration and specific type as specified, as listed in the associated equipment specifications and as detailed on the Contract Drawings.

C. Provide Antiseizing Lubricant for all stainless steel threads.

D. Anchor Bolt Sleeves

1. High Density Polyethylene Plastic:
   a. Single unit construction with deformed sidewalks such that the concrete and grout lock in place.
   b. The top of the sleeve shall be self-threading to provide adjustment of the threaded anchor bolt projection.
   c. Material requirements:
      1) Plastic: High density polyethylene.
      2) Density: ASTM D 1505
   d. Manufacturer:
      1) Sinco West, Simi Valley, CA
      2) Or equal
2. Fabricated Steel Sleeve
   a. A 36 steel.

E. Neoprene Gasket

1. ASTM D 1056 RE-41-E, soft, closed-cell, neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown.
2. Thickness: Minimum 1/4 inch.
3. Furnish without skin coat.

4. Furnish two spare gaskets for each location shown requiring neoprene gaskets, and furnish one roll of 4-inch wide by 50-foot long neoprene gasket material with 1 pint of manufacturer's recommended adhesive.
5. Manufacturers and Product:
    a. Rubatex Division of Great American Industries, Bedford, VA; Rubatex No. R-411-N.
    b. Garlock Manufacturing, San Francisco, CA.
    c. Or equal.

2.10 CHEMICAL ANCHORING SYSTEMS

A. Epoxy Anchors

1. Anchor Rod: Stainless steel threaded rod free of grease, oil or other deleterious material with a 45-degree chisel point.
2. Epoxy Adhesive:
    a. ASTM C 881, Type 1, Grade 3, Class A, B, or C.
    b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
    c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
3. Mixed Epoxy Adhesive: Nonsag paste consistency, with ability to remain in a 1-inch diameter overhead drilled hole without runout, having the following properties:
    a. Slant Shear Strength, ASTM C 881, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.
    b. Compressive Strength, ASTM D 695; 14,000 psi, minimum.
    c. Tensile Strength, ASTM D 695: 4,500 psi.
    d. Heat Deflection Temperature, ASTM D 648 E2: 135 degrees F, minimum.
4. Epoxy Adhesive Packaging:
    a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.
    b. Cartridge Markings: Include manufacturer's name, batch number, mix ratio by volume, product expiration data, ANSI hazard classification, and appropriate ANSI handling precautions.
5. Manufacturer's and Products:
    a. Adhesives Technology Corp.; Anchor-It Fastening Systems, HS 200 Epoxy Resin.
    b. ITW Ramse/Red Head; Epcon Ceramic 6 Epoxy Anchor System.
    c. Covert Operations; CIA Epoxy Anchors with viscosity to suit application.
    d. Rawplug Co., Inc.; Rawl/Sika Foil Fast Epoxy Injection Gel System.

B. Adhesive Anchors

1. Two-component vinyl ester adhesive, insensitive to moisture, designed to be installed in adverse freeze/thaw environments.

2.11 LIFTING HOOKS

A. Supported from concrete:

1. Fabricated of 3/4-inch diameter steel rod bent in U shape and threaded at ends to receive nuts.
2. Fasten hook to 1/2-inch by 4-inch by 11-inch steel anchor plate.
3. Provide hooks hot-dip galvanized after fabrication.

B. Supported from steel:

1. Fabricated of 3/4-inch diameter steel rod bent in U shape and threaded at both ends to receive nuts.
2. Provide hooks hot-dip galvanized after fabrication.

2.12 MISCELLANEOUS ITEMS

A. Provide hangers, supports, brackets, anchors, bolts and other miscellaneous metalwork not previously specified, of the shape, size, material and detail indicated on the Drawings for the purpose intended.

2.13 FABRICATION

A. General

1. Metals shall be sheared and punched cleanly and accurately. Burrs shall be removed.
2. Exposed edges shall be rounded to a radius of approximately 1/32 inch, unless otherwise indicated. Bent-metal corners shall be formed to the smallest radius possible without causing grain separation or otherwise impairing the work.
3. Corners and seams shall be welded continuously to comply with the following:
   a. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of the base metals.
   b. Fusion shall be obtained without undercut or overlap.
   c. Welding flux shall be removed immediately.
   d. At exposed connections, exposed welds and surfaces shall be finished smooth and blended so that no roughness is apparent and the contour of the welded surface matches that of the adjacent surface.
4. Joints that will be exposed to weather shall be fabricated in a manner to exclude water. Drain holes shall be provided where water may accumulate.
5. Fabrications exposed to view in the completed Work, shall be provided with smooth, flat surfaces without blemishes.
6. Fabrications with exposed pitting, seam marks, roller marks, rolled trade names, or roughness shall not be used.

B. Shop Assembly:

1. Items shall be preassembled in shop to greatest extent possible to minimize field splicing and assembly.

2. Units shall be disassembled only as necessary for shipping and handling limitations.
3. Connections shall maintain the structural value of joined pieces through the use of properly sized holes, proper spacing and gage distances, tolerances, and other requirements as determined in the applicable codes listed elsewhere in this specification.
4. Units shall be clearly marked for reassembly and coordinated installation.

2.14 FINISHES

A. Fabrications shall be finished after shop assembly.

B. Anodized aluminum finishes to be in accordance with the Aluminum Association's standards for Anodized Architectural Aluminum as published by the American Architectural Manufacturer's Association (AAMA).

C. Anodized finishes damaged in the field during installation or transit shall be repaired using brush anodizing to restore the coating to its specified Class and thickness.

D. Galvanizing

1. Items of miscellaneous ironwork and steel work indicated on the Drawings or specified to be galvanized shall be zinc-coated by the hot-dip process in accordance with ASTM Standard Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123; or ASTM Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Designation A153, as appropriate.

E. Aluminum Surfaces in Contact with Concrete

1. Paint-on coating suitable for embedment in, or surface mounting to, concrete to prevent adverse reaction between aluminum and concrete surfaces.
2. Apply one coat of the following;
   a. Coal Tar 46-465 H. B. Tnemecol, Tnemec Company, North Kansas City, MO.
   b. Bitumastic Super Service Black, KOP-COAT, Inc., Pittsburgh, PA.
   c. Tarmastic 100 Porter Coatings Division, Porter Paint Co., Louisville, KY.
   d. Or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Field Assembly:

1. Metal fabrications shall be cut, reinforced, drilled, and tapped cleanly and accurately to receive finish hardware, screws, and similar items.

2. Exposed work shall be formed true to line and level, with accurate angles and surfaces, and straight rounded edges.
3. Sharp or rough areas shall be removed on exposed traffic surfaces.
4. Exposed connections shall be formed with hairline joints, flush and smooth, using concealed fasteners where possible.
5. Exposed fasteners of type indicated on the Drawings shall be used; when not indicated, Phillips flat-head (countersunk) screws or bolts shall be used. Joints shall be located where least conspicuous.

B. Erection Tolerances

1. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.
2. Maximum Offset from True Alignment: 1/4 inch.

C. Anchorage:

1. Coordinated type of anchorage with supporting structure.
2. Anchoring devices shall be fabricated and spaced to secure metal fabrications in place and to support indicated loads.

D. Fastening to In-Place Construction:

1. Anchorage devices and fasteners shall be provided where necessary for securing metal fabrications to in-place construction.

E. Cutting, Fitting, and Placement:

1. Cutting, drilling, and fitting for the installation of metal fabrications shall be performed as required.
2. Metal fabrications shall be set accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

F. Temporary bracing or anchors shall be provided in formwork for items that are to be built into concrete.

G. Exposed connections shall fit together to form hairline joints. Welded connections that can not be made in the shop due to shipping limitations shall be made in the field. Do not weld, cut, or abrade surfaces of exterior units that have been anodized after fabrication and are for bolted or screwed field connections.

H. Field Welding: Comply with the following requirements:

1. Materials and methods shall be used that minimize distortion and develop strength and corrosion resistance of base metals.
2. Fusion shall be obtained without undercut or overlap.
3. Welding flux shall be removed immediately.
4. At exposed connections, welds and surfaces shall be finished smooth and blended so that no roughness shows after finishing and the contour of the welded surface matches that of adjacent surface.

3.02 SETTING BEARING AND LEVELING PLATES

A. Concrete bearing surfaces shall be cleaned of bond-reducing materials, and roughened to improve bond to surfaces. The bottom surface of plates shall be cleaned.

B. Bearing and leveling plates shall be set on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, anchor bolts shall be tightened. Wedges and shims shall not be removed but, if protruding, shall be cut off flush with the edge of bearing plate before packing with grout.

1. Provide grout in accordance with SECTION 03600.
2. Grout shall be solidly packed between bearing surfaces and plates to ensure that no voids remain.

3.03 ANCHOR BOLTS (CAST IN PLACE)

A. Accurately locate and hold anchor bolts in place with templates at the time concrete is placed.

B. Use sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt. Minimum bolt size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

C. All anchors and anchor bolts shall be properly located and shall be built into the connecting work when the work is built. Expansion bolts shall be inserted into drilled holes.

3.04 ANCHORING SYSTEMS (CURED CONCRETE)

A. Begin installation only after concrete or masonry receiving anchors have attained design strength.

B. Do not install an anchor closer than six times its diameter to either an edge of concrete or masonry, or to another anchor, unless specifically shown otherwise.

C. Install in accordance with manufacturer’s specific quality control submittal instructions. Hole diameters are critical to installation, use only drills recommended by anchor manufacturer. Follow manufacturer’s safe handling instructions.

D. Epoxy or Adhesive Anchors: Do not install when temperature of concrete is below 40 degrees F or above 100 degrees F, unless stated otherwise in manufacturer’s written instructions.

E. Follow specific manufacturer safe handling practices when handling and installing concrete anchors.

3.05 FASTENER SCHEDULE:

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases:		
Dry Areas	Stainless steel bolts, unless otherwise specified with equipment	
Submerged or Wet Areas	Stainless steel bolts with fusion bond coating unless otherwise specified with equipment	See Section 09900, Painting and Protection Coating
Anchor Bolts Cast Into Concrete for Metal Fabrications and Structural Components.		
Dry or Protected Areas Exterior, Wet, Washdown, and Chemical Handling Areas	Stainless steel bolts with fusion bond coating	See Section 09900, Painting
Anchors for Metal Components to Concrete: e.g. Electrical Panels and Equipment:		
Dry Areas	Stainless steel wedge or expansion anchors	
Wet and Damp Areas	Epoxy or adhesive stainless steel anchors	
Submerged or Buried in Earth	Epoxy or adhesive stainless steel anchors	
Connections for Structural Steel Components:		
Exterior and Interior	High-strength zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Steel Fabrications:		
Exterior and Interior	Zinc-coated steel bolts	See Section 05120, Structural Steel
Connections for Aluminum Components:		
Exterior and Interior	Stainless steel bolts	
All Others:		
Exterior and Interior	Stainless steel fasteners	

A. Do not use epoxy anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

3.06 ABRASIVE NOSINGS

A. Provide abrasive nosings on concrete steps not being supplied or coated with another type of nosing or nonskid material.

3.07 ACCESS COVERS AND HATCHES

A. Accurately position prior to placing concrete, such that covers and hatches are flush with floor surface.

B. Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of concrete spillage to obtain a clean, uniform appearance.

3.08 PIPE BOLLARDS

A. Anchored in place with concrete footings as detailed in the Contract Drawings. Bollards shall be supported and braced in position until their footings are cured.

B. Fill pipe solidly with 3,000 psi concrete, mounding the top surface.

C. Provide safety yellow HDPE bollard sleeve with reflective tape.

3.09 ANGLE PROTECTION

A. Provide galvanized structural steel angels and strap anchors as indicated and specified.

3.10 MISCELLANEOUS ITEMS

A. Metal Fabrication Subcontractor shall furnish items to be embedded in the Work to the Contractor for installation.

3.11 ALUMINUM WORK PROTECTION

A. Areas where the coating has been damaged by abrasion or other cause shall be cleaned and repainted as directed so that the aluminum will have a complete protective film when brought into contact with the material against which it is being protected. Before application of coating, the surface shall be cleaned of all dirt, heavy deposits of grease or oil, and other foreign substances, and shall be immersed in or swabbed with an acceptable solvent. Next, the surfaces shall be rinsed with clear water and thoroughly dried.

C. Protect against electrolysis where aluminum is to be used in conjunction with dissimilar metals.

D. Where a shop coating of methacrylate lacquer has been specified on aluminum work to protect the surface from stain, the protective coating of lacquer worn off due to handling or erection shall be replaced in the field by a new coating of lacquer of the same type.

E. During construction, care shall be taken to prevent damage to the aluminum work from splashing or by the accumulation of paint, concrete, mortar, or other similar materials.

3.12 CLEANING AND TOUCHUP

A. Painted Surfaces: Clean and touchup paint field welds, bolted connections, and abraded areas of shop paint as specified in SECTION 09900 or as approved by the Engineer.

B. Anodized Surfaces: Clean field welds, bolted connections, and abraded areas and repair anodizing to match the quality of the coating provided by the shop.

C. After aluminum has been erected, it shall be cleaned with mild soap and water, followed by a clear water rinse.

END OF SECTION

SECTION 05530

METAL GRATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section Includes

1. Requirements for the fabrication and installation of metal gratings and appurtenances.

B. Related Sections

1. Section 05500 - Metal Fabrications.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A36, Specification for Carbon Structural Steel.
2. A123, Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
3. A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. A167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
5. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
6. A568, Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold Rolled.
7. B221, Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
8. F593, Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
9. F594, Specification for Stainless Steel Nuts.
10. F844, Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

B. American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)

1. MBG 531, Metal Bar Grating Manual.
2. MBG 532, Heavy Duty Metal Bar Grating Manual.

1.03 SUBMITTALS

A. In accordance with Section 01300 submit the following:

1. Shop Drawings
   a. Grating: Show dimensions, weight, and size, and location of connections to adjacent grating, supports, and other work.
   b. Grating Anchorage: Show structural calculations and details of anchorage to supports to prevent displacement from traffic impact.
   c. Grating Supports: Show dimensions, weight, size, location, and anchorage to supporting structure.
   d. Catalog information and catalog cuts.
   e. Manufacturer’s specifications, to include coatings.

B. Samples:

1. Two samples of aluminum grating approximately 4 inches by 8 inches, showing at least four crossbars each and four bearing bars each.
2. One sample will be retained at the site to be used as a basis for acceptance or rejection of grating installed.

C. Quality Control Submittals:

1. Special handling and storage requirements.
2. Installation instructions.
3. Factory test reports.
4. Manufacturer's Certification of Compliance for specified products.
5. Written Test Report that swaged crossbars, if used on grating, meet the requirements of the specified test and additional requirements of these Specifications.

1.04 PREPARATION FOR SHIPMENT

A. Insofar as is practical, factory assemble items provided.

B. Package and clearly tag parts and assemblies that are of necessity shipped unassembled and protect the materials from damage, and facilitate identification and final assembly in the field.

PART 2 PRODUCTS

2.01 FOOT TRAFFIC GRATING

A. Design:

1. Uniform Service Load: 200 psf minimum uniform load and 300 pound minimum concentrated load, unless otherwise shown.
2. Maximum Deflection: 1/4 inch, unless otherwise shown.
3. Space bearing bars at 1-3/16-inch center-to-center.
4. Banding: 3/16-inch minimum.

B. Material:

1. Aluminum Bar Type Grating:
   a. Press-locked rectangular design, as manufactured by IKG/Borden, Clark, NJ; IKG/Borden Type B or Type F.
   b. Swage locked aluminum grating, rectangular bar type, as manufactured by:
      1) IKG/Borden, Clark, NJ; IKG/Borden Type BS or Type FS.
      2) Seidelhuber Metal Products, Inc., San Carlos, CA; Type A-2.
      3) Ohio Gratings, Inc., Canton, OH; Aluminum Flush Top, Type 19SGF2.

2.02 ACCESSORIES

A. Anchor Bolts and Nuts:

1. Carbon Steel: ASTM A307 or A36.
2. Stainless Steel: ASTM F593 and ASTM F594, Type 316.
3. Galvanized Steel Bolts and Nuts: ASTM A153, zinc coating for ASTM A307 or A36.

B. Flat Washers

1. Carbon Steel: (Unhardened): ASTM F844; use ASTM A153 for zinc coating.
2. Stainless Steel: see SECTION 05500.

C. Removable Fastener Clips and Bolts:

1. Removable from above grating walkway surface.
2. Hat Bracket: Type 304 stainless steel.
3. Bolt: type 316 stainless steel.
4. Cast iron, galvanized body.
5. Manufacturer and Product: Struct-Fast, Wellesley Hills, MA; Gratefast.

D. Partially Removable Anchor:

1. Bolt: Threaded stud, Type 316 stainless steel.
   a. Manufacturer: Nelson Stud Welding Co., Loraine, OH.
2. Hat Bracket: Type 304 stainless steel.
   a. Manufacturer:
      1) Struct-Fast, Wellesley Hills, MA.
      2) Or equal.

2.03 FABRICATION

A. General:

1. Exposed Surfaces: Smooth finish and sharp, well-defined lines.
2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in a neat, substantial manner.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Weld Connections: Not permitted on grating except at banding bars.

B. Design:

1. Field measure areas to receive grating, verify dimensions of new fabricated supports, and fabricate to dimension required for specified clearances.
2. Section Length: Sufficient to prevent its falling down through clear opening when oriented in the span direction when one end is touching either the concrete or the vertical leg of grating support.
3. Minimum Bearing: ANSI/NAAMM MBG 531.
4. Metal Crossbar Spacing: 4-inch maximum, unless otherwise shown or specified.
5. Crossbars: Flush with top of main bar and extend downward a minimum of 50 percent of the main bar depth.
   a. Swaged Crossbars:
      1) Within 1/4 inch of top of grating with 1/2-inch minimum vertical dimension after swaging, and minimum before swaging dimension of 5/16-inch square.
      2) Crossbar Dimension After Swaging: Minimum 1/8-inch wider than the opening at minimum of two corners at each side of each square opening in main bar.
      3) Crossbars may be a special extruded shape so that after swaging the top will be flat, 3/16 inches wide and will be flush with the top surface of the bearing bars for a minimum of 5/8 inches at center between bearing bars.
      4) Flush crossbar meeting all of the above except that after swaging shall overlap one corner by a minimum of 1/8 inch. A sample of one bearing bar and one crossbar shall be tested by holding the bearing bar and pulling on the crossbar. The crossbar to bearing bar shall sustain a minimum of 300 pounds without pullout of the bearing bar.
      5) Tightly fit main bars and crossbars allowing no differential movement.
6. Do not use weld type crossbars.
7. Banding: Same material as grating: ANSI/NAAMM MBG 531 and ANSI/NAAMM MBG 532.

8. Furnish stainless steel Type 316 threaded anchor studs, as fasteners for grating attachment to metal supports either not embedded or partially embedded in concrete, as manufactured by Nelson Studs Welding Co., Loraine, OH.

C. Supports:

1. Seat angles and beams where shown:
   a. Same material as rectangular bar grating.
   b. Extruded aluminum frame with slot for recessed grating clips, as manufactured by Thompson Fabricating Co., for aluminum I-Bar type grating.
2. Coordinate dimensions and fabrication with grating to be supported.
3. Coordinate dimensions with increased depth due to serrations.
4. Welded Frames With Anchors: Continuously welded.

D. Slip-Resistant Surface:

1. Rectangular Steel and Aluminum Bar Grating (as noted): As manufactured by:
   a. IKG/Borden, Clark NJ; EZ Weldslip-Resistant Coating.
   b. Seidelhuber Metal Products, Inc., Hayward, CA; Safety Grit Non-Slip System.
   c. Ohio Gratings, Inc., Canton, OH with “Slip-Not” Safety Surface manufactured by W.S. Molnar Co., Detroit, MI.
2. I-Bar grating aluminum shall incorporate a striated anti-skid walking surface produced during the extrusion process, as manufactured by:
   a. IKG/Borden, Clark, NJ.
   b. Seidelhuber Metal Products, Inc., Hayward, CA.
   c. Klemp Corp., Chicago, IL.

E. Aluminum:

1. ASTM B221 extruded shapes.
2. Fabricate as shown and in accordance with manufacturer’s recommendations.
3. Grind smooth sheared edges exposed in the finished work.
4. Swage crossbars, if used, with equipment strong enough to deform crossbars.
5. Eliminate any loose crossbar intersections on swaged grating.

F. Foot Traffic Grating: Any single grating section, individual plank, or plank assembly shall be not less than 1 foot 6 inches or greater than 3 feet 0 inch in width or weigh more than 150 pounds.

EXECUTION

2.04 PREPARATION

A. Electrolytic Protection:

1. Aluminum surfaces in contact with dissimilar metals, other than stainless steel, and embedded or in contact with masonry, grout, and concrete, to be protected by a coat of Bitumastic Super Service Black manufactured by KOP-COAT, Inc., Pittsburgh, PA; 46-465 Heavy Themecol manufactured by Tnemec Company, North Kansas City, MO; or an acceptable equivalent product.

2.05 INSTALLATION

A. Install supports such that grating sections have a solid bearing on both ends, and that rock and wobble grating movement does not occur under designed traffic loading.

B. Install plumb or level as applicable.

C. Install welded frames with anchors to straight plan without offsets.

D. Anchor grating securely to supports using minimum of four fasteners clips and bolts per grating section.

E. Use stainless steel anchors and accessories with aluminum gratings.

F. Completed installation shall be rigid and neat in appearance.

G. Commercially Manufactured Products:

1. Install in accordance with manufacturer’s recommendations.
2. Secure grating to support members with fasteners.
3. Welding is not permitted.
4. Fasteners: Field locate and install.
5. Permit each grating section or plank style grating assembly to be easily removed and replaced.

H. Protect painted surfaces during installation.

I. Should coating become marred, prepare and touch up surface in accordance with paint manufacturer’s instructions.

END OF SECTION

DIVISION 09

SECTION 09900

PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for preparation and finishing of surfaces to be painted.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM).

1. D16, Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products

B. Steel Structures Painting Council (SSPC).

1. SP-1, Solvent Cleaning.
2. SP-2, Hand Tool Cleaning.
3. SP-3, Power Tool Cleaning.
4. SP-5, White Metal Blast Cleaning.
5. SP-6, Commercial Blast Cleaning.
6. SP-7, Brush-Off Blast Cleaning.
7. SP-10, Near-White Blast Cleaning.

1.03 DEFINITIONS

A. In accordance with ASTM-D16.

B. Wherever the words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, or “blast cleaning”, or words of similar intent are used in these specifications, it shall be understood to refer to the applicable SSPC Specification.

C. The term “paint” or “coating” as used in this specification includes emulsions, enamels, paints, stains, varnishes, sealers, and other coatings, organic or inorganic, used as prime, intermediate or finish coats.

1.04 SUBMITTALS

A. Shop Drawings

1. Submit product data and manufacturers application instructions in accordance with SECTION 01300.

B. Samples

1. Colors as required.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer specializing in the production of paint and coatings for 10 years, minimum.
2. Applicator specializing in commercial, industrial and municipal painting for 5 years, minimum.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. In accordance with manufacturers recommendations.

B. Acceptance at Site

1. Products to be delivered to site in sealed, labeled and unopened containers.
2. Labels to include Name, type, code, coverage, surface preparation, drying time, color, clean up procedure, and mixing and reducing instructions.
3. Remove unacceptable products immediately.

C. Storage and Protection

1. Store materials between minimum ambient temperature of 45 degrees F. and a maximum of 90 degrees F.
2. Storage area to be well ventilated, or as required by manufacturer.

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements

1. Provide continuous ventilation and maintain ambient temperature above 45 degrees F., for 24 hours before, during, and 48 hours after application of finishes, unless otherwise required by coating manufacturer.
2. Do not apply coatings when exposed to rain or snow, or when relative humidity is above 50 percent.
3. Minimum application temperature for Latex paints:
   a. 45 degrees F. for interiors.
   b. 50 degrees F., for exteriors
4. Minimum application temperatures for other coatings:
   a. 65 degrees for interior and exterior.
5. Lighting levels to be 80 ft. candles, measured mid height at substrate surface.

1.08 MAINTENANCE

A. Extra Materials

1. Provide 1 gallon each color to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints by the Tnemec Company, Kansas City, Missouri have been used as the basis for the paint schedule, other manufactures considered equal:

1. Valspar Coatings,
2. Carboline.
3. or product deemed equivalent by the Engineer.

2.02 MATERIALS

A. Coatings

1. Ready Mixed, except field catalyzed coatings.
2. Process pigments to a soft paste like consistency, capable of being dispersed to a uniform coating.
3. Readily applied by spray or brush.
4. Dry free of streaks or sags.

B. Accessories

1. Linseed Oil, Shellac, Turpentine, Thinners to be of commercial quality, compatible to coatings used.

2.03 COLORS AND FINISHES

A. Colors selected by the Owner from color chips submitted by the Contractor for review. The selection shall be in the form of a color schedule indicating the colors to be used on the various surfaces. The colors used in the final Work shall match the selected color chips.

B. In general the finish coat shall be gloss or semi-gloss on metal work and flat finish on masonry, wood and drywall surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions

1. Verify surfaces are ready to receive work in accordance with manufacturers recommendations.
2. Report conditions which may affect proper application to Engineer.
3. Measure moisture content of substrates.
4. Do not apply coatings when moisture exceeds levels below:
   a. Plaster and Gypsum wallboards 12 percent.
   b. Masonry and Concrete 12 percent
   c. Wood 14 percent

3.02 PREPARATION

A. Protection

1. Protect elements surrounding the Work required by this section from damage or marking.
2. Repair damage to other surfaces caused by Work of this section.
3. Furnish drop cloths, shields, and protective methods to prevent spray or paint spatter from disfiguring other surfaces.

B. Preparation of surfaces to be coated

1. General
   a. Remove electrical plates, light fixtures, hardware, and fittings.
   b. Correct minor defects and clean surfaces.
   c. Seal marks which may bleed through surface finish.
2. Impervious Surfaces
   a. Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach.
   b. Rinse with clean water.
   c. Allow to dry.
3. Aluminum
   a. Remove surface contamination by steam or high pressure water.
   b. Remove oxidation by sanding and solvent washing.
4. Insulated coverings
   a. Remove dirt, grease, and oil from canvas and cotton.
5. Concrete
   a. Blast-trak or brush blast.
6. Wood
   a. Remove dirt, oil, and other soil with scrapers, mineral spirits, and sand paper.
   b. Sand surfaces exposed to view, and remove all sanding dust.
7. Gypsum board
   a. Fill minor defects with latex fill.
   b. Prime repaired areas.
8. Galvanized surfaces
   a. Remove contamination and oils with solvent wash.
   b. Sand and remove sanding dust.
9. Masonry and Concrete
   a. Allow 28 days curing prior to coating application.
   b. Remove dirt, loose mortar, scale, salt, alkali powder or other foreign matter.
   c. Remove oil and grease with solution of tri-sodium phosphate.
   d. Rinse with water.
   e. Allow to dry.
   f. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water.
   g. Allow to dry.
10. Uncoated steel and iron
    a. Remove grease, scale, dirt and rust.
    b. Remove heavy scale and rust with wire brushing or sandblasting.
    c. Clean by washing with solvent.
    d. Apply treatment of phosphoric acid solution.
    e. Clean welds, bolts and nuts in a similar fashion.
    f. Spot prime repaired areas.
11. Shop primed steel

a. Remove loose primer and rust by sanding or scraping.
b. Feather edges to make touch-up patches inconspicuous.
c. Clean surfaces with solvent.
d. Prime bare steel.

12. Stainless steel surfaces shall not be painted.

3.03 COATING APPLICATION

A. General

1. Apply in accordance with manufacturers recommendations.
2. Apply each coat to uniform finish.
3. Apply each coat slightly darker than preceding coat, unless instructed otherwise by the Engineer.
4. Sand lightly between coats.
5. Allow preceding coat to dry prior to application of next coat.
6. Prime back surfaces of all woodwork.

3.04 MECHANICAL AND ELECTRICAL EQUIPMENT

A. General

1. Paint shop primed equipment with compatible finish coat.
2. Remove or mask items not to be painted.
3. Prime and finish all associated pipes, and ducts, both insulated and exposed, all hangers, brackets, collars and supports, unless items are pre finished.
4. Do not paint identification markings or tags on equipment.
5. Paint exposed conduit and piping in finished areas.
6. Paint both sides and edges of plywood mounting boards.
7. Reinstall all trim, fittings, plates ect. After painting is complete.

B. Color Code

1. Piping and equipment in accordance with Article 3.06 of this specification.

C. Identification

1. Label piping by contents and arrows indicating direction of flow.
2. Labels to be twenty feet (20) apart maximum, and within each space through which pipe line passes.
3. Adjacent to each side of walls which pipeline penetrate.
4. Adjacent to valves, equipment, and pumps.
5. Locate labels where they are unobstructed from view and visible from valves.
6. Colors to be white or black as appropriate for the substrate.
7. Letters, numbers and flow arrows to be stenciled to pipeline and equipment or die cut from vinyl film as approved by the Engineer.
8. Lettering size as follows:

Pipe Diameter in Inches	Size of Letters in Inches
3/4 to 1-1/4	1/2
1-1/2 to 2	3/4
2-1/2 to 6	1-1/2
8 to 10	2-1/2
Over 10	3

D. Metal tags

1. Pipelines smaller than 3/4 inches in diameter and for valves, securely fasten brass tags, 2-1/2 inches x 1/2 inches, with etched lettering filled with enamel paint.

3.05 CLEANING

A. Promptly remove spilled, splashed and/or spattered paint.

B. Maintain premises free of clutter, tools, equipment and material.

C. Collect waste cloths and material which may constitute a fire hazard and and remove daily from site.

3.06 COLOR SCHEDULES

A. Architectural

1. Chosen by Owner.

B. Piping

1.	Water lines	Raw.....Olive Green
		Settled or Clarified.....Aqua
		Finished or Potable.....Dark Blue
2.	Chemical Lines Alum.....Orange	
		Caustic.....Yellow with Green Band
		Chlorine.....Yellow
		Fluoride.....Light Blue with Red Band
		Polymers.....Orange with Green Band
		Potassium Permanganate..Violet
3.	Waste Lines	Raw.....Gray
		Sludge.....Brown
4.	Miscellaneous	Compressed Air.....Dark Green
		Fuel Oil.....Red

3.07 EXTERIOR COATING SYSTEM SCHEDULE

A. Miscellaneous Ferrous Metal Items

1. Shop surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.5 mils.
2. 1st coat; (Shop applied)-Tnemec Hydro-Zinc 2000, DFT 2.5-3.0 mils.
3. 2nd coat (Field applied)-Tnemec Series 66 Epoxoline, DFT 4.0-6.0 mils.
4. 3rd coat (Field applied)-Tnemec Series 66 Epoxoline 66, DFT 4.0 to 6.0 mils.

B. Ferrous Metals Scheduled for Immersion Service

1. Shop surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec 66-1211 Red Primer, DFT 3.0 mils.
3. 2nd coat (Field applied)-Tnemec 104 H.S. Epoxy, DFT 6.0 to 10.0 mils. Scarify 1st coat prior to 2nd coat application.
4. 3rd coat (Field applied)- Tnemec 104 H.S. Epoxy, DFT 6.0 to 10.0 mils.

C. Ferrous Metals Scheduled for Immersion Service in Potable Water, NSF approved

1. Surface preparation: SSPC-SP-10, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec Hydro-Zinc 2000, DFT 2.5 to 3.5 mils.

3. 2nd coat (Field applied)-Tnemec Series 20-1255 Beige, DFT 3.0 to 5.0 mils.
4. 3rd coat (Field applied)- Tnemec Series 20-AA90 White, DFT 3.0 to 5.0 mils.

D. Galvanized Metal

1. Surface preparation: lightly scarify surface, solvent clean using Tnemec 41-4 solvent.
2. 1st coat: 66 Hi-Build Epoxyline, DFT 2.0 to 4.0 mils.
3. 2nd coat: 73 Endurashield, DFT 1.5 to 3.0 mils.

E. Concrete, and Concrete Block Masonry (New)

1. 1st coat: Tnemec Series 52 Tnemecrete, DFT 8.0 mils.
2. 2nd coat: Tnemec Series 52 Tnemecrete, DFT 8.0 mils.

F. Concrete, and Concrete Block Masonry (New), (Clear finish)

1. 1st coat: Tnemec Acrylic Sealer.
2. 2nd coat: Tnemec Acrylic Sealer.

G. Asphalt

1. 1 coat Traffic Marking Paint.

3.08 INTERIOR COATING SYSTEM SCHEDULE

A. Concrete Block

1. 1st coat: Tnemec 130-6602 Spray then back roll.
2. 2nd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.
3. 3rd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.

B. Concrete Walls and Ceilings

1. 1st coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.
2. 2nd coat: Tnemec 83 Ceramlon II Epoxy, DFT 6.0 mils.

C. Drywall

1. 1st coat: Tnemec 51-792 Sealer
2. 2nd coat: Tnemec Series 23 Enduratone.
3. 3rd coat: Tnemec Series 23 Enduratone.

D. Wood (to be painted)

1. 1st coat: Tnemec 36-603 Undercoat.
2. 2nd coat: Tnemec Series 23 Enduratone.
3. 3rd coat: Tnemec Series 23 Enduratone.

E. Metals, Structural Steel, Piping, Railways, Equipment, ect.

1. Shop surface preparation: SSPC-SP-6, Blast profile 1.5 - 2.0 mils.
2. 1st coat; (Shop applied)-Tnemec 66-1211 Red Primer, DFT 3.0 mils.
3. 2nd coat (Field applied)-Tnemec Series 66 Epoxoline, DFT 3.0 to 4.0 mils.
4. 3rd coat (Field applied)-Tnemec Series 73 Endura Shield, DFT 1.5 to 2.5 mils.

F. PVC Piping

1. Surface preparation: Scarify prior to coating.
2. 1st coat: Tnemec Series 66 Epoxoline, DFT 1.5 to 2.0 mils.
3. 2nd coat: Tnemec Series 66 Epoxoline, DFT 1.5 to 2.0 mils.

G. Non-ferrous Metals (Galvanized, Copper, ect.)

1. Surface preparation: Lightly scarify surface, solvent clean using Tnemec 41-4 solvent.
2. 1st coat: Tnemec 66 Epoxoline, DFT 1.5 to 3.0 mils.
3. 2nd coat: Tnemec 73 Endurashield, DFT 2.0 to 3.0 mils.

H. Canvas and Cotton Insulation Coverings.

1. 1st coat: Tnemec 51-792 Sealer.
2. 2nd coat: Tnemec Series 6 Tneme Cryl.
3. 3nd coat: Tnemec Series 6 or Series 7 Tneme Cryl.

I. Interior concrete tanks in contact with potable water.

1. Surface preparation: SSPC-SP-7 (Acid etching not allowed).
2. 1st coat: Fill large voids with Tnemec 63-1500 Filler/Surfacer.
3. 2nd coat: Tnemec Series 20-1255 Beige, DFT 3.0 to 5.0 mils.
4. 3rd coat: Tnemec Series 20-AA90 White, DFT 3.0 to 5.0 mils.

3.09 CHEMICAL MIXING, FEED AND STORAGE AREA

A. Concrete Containment walls, tank pads and floors.

1. Surface preparation: SSPC-SP-7 (Acid etching not allowed).
2. 1st coat: Fill large voids with Tnemec 120-5003 Filler/Surfacer.
3. 2nd coat: Prime all surfaces with Tnemec Series 120-5002 DFT 12.0 to 18.0.
3. 3nd coat: Tnemec Series 120-5001 Gray DFT 12.0 to 18.0.

3.10 PIPING COATING SYSTEM SCHEDULE

A. Ductile Iron

1. Surface preparation: Immersion Service-SSPC-SP-10
2. 1st coat: (Shop Applied) Tnemec Series 66-1211, DFT. 3.0 mils.
3. 2nd coat: (Field Applied) Tnemec 66, Color, DFT 4.0 mils.
4. 3rd coat (Field Applied) Tnemec Series 66 Color DFT 4.0 mils.

B. PVC

1. Surface preparation: Clean and dry.
2. 1st coat: Tnemec series 66, Hi-Build Epoxoline, DFT 4.0 to 6.0 mils.

C. Carbon Steel

1. Surface preparation: Immersion Service- SSPC-SP-10.
2. 1st coat: (Shop Applied) Tnemec Series 66-1211, DFT. 3.0 mils.
3. 2nd coat: (Field Applied) Tnemec 66, Color, DFT 4.0 mils.
4. 3rd coat (Field Applied) Tnemec Series 66 Color DFT 4.0 mils.

END OF SECTION

DIVISION 11

SECTION 11310

SUBMERSIBLE WET PIT SEWAGE PUMPS AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. Furnish, install, test and place into satisfactory operating condition wet pit submersible sewage pumps, guide rails, guide rails slide, straight through base connections, grab link assemblies, and control relays, each designed for pumping raw wastewater with minimum spherical diameter solids passage of 3”.

1.02 RELATED WORK

A. Division 1 – General Requirements
   1. Section 01665 – Services of Manufacturer’s Representatives
   2. Section 01710 – Startup
   3. Section 01730 – Operations and Maintenance Manual
   4. Section 01750 – Spare Parts
   5. Section 01751 – Lubricants
B. Division 13 – Instrumentation and Controls
C. Division 15 - Mechanical
D. Division 16 - Electrical Work

1.03 DESIGN REQUIREMENTS

A. The Work shall include all accessories, and appurtenances necessary to make a complete system. Work shall conform to requirements for installation, materials, and equipment approvals of state, local, Underwriters' Laboratories, Inc., or other applicable codes, whether or not called for in detail on the drawings or in these specifications.

B. All pump openings, internal passages, and internal recirculation ports shall be large enough to permit the passage of a sphere 3" in diameter, and any trash or stringy material which may pass through the average house collection system. Screens or any internal devices that create a maintenance nuisance or interfere with priming and performance of the pump shall not be permitted.

C. Pumps and motors shall be capable of operating in a continuous submerged condition in vertical position in a wet pit installation. Pumps shall be mounted on a single 2-inch guide rail with slide bracket for easy removal without having to enter the wet well.

D. Certified dimensional drawings indicating size and locations of the priming recirculation port or ports shall be submitted to the Engineer prior to shipment.

E. New pumps shall be capable of performing under the following operating conditions:

Parkside Pump Station
2-Pumps (Submersible)

Pumps	Capacity (gpm)	TDH (ft)	Maximum Motor Horsepower	Maximum Speed (RPM)	Min Hydraulic Efficiency	Shut-off Head (ft)	Pump Runout
Single Pump Operation	115	23	5.0[1]	1800	43%	28	500 gpm @ 9 ft

1: Motors rated 230 volts, 3 phase, Inverter duty rated, and XP rated.
2: Motor shall not overload over the entire length of the curve.
3: Information based on Sulzer XFP 80CB1 PE20/6 submersible pump
4: Provide 49-foot power cable.

Pinecrest Pump Station
2-Pumps (Submersible)

Pumps	Capacity (gpm)	TDH (ft)	Maximum Motor Horsepower	Maximum Speed (RPM)	Min Hydraulic Efficiency	Shut-off Head (ft)	Pump Runout
Single Pump Operation	115	44	7.5[1]	1800	36%	52	340 gpm @ 15 ft

1: Motors rated 208 volts, 3 phase, Inverter duty rated, and XP rated.
2: Motor shall not overload over the entire length of the curve.
3: Information based on Sulzer XFP 85C VX PE35/4 submersible pump
4: Provide 49-foot power cable.

F. The pumping units shall be designed to pump raw domestic sewage and discharge into a force main.

1.04 QUALITY ASSURANCE

A. Pumps shall be the product of a single manufacturer with a minimum of ten years experience with equipment of the size and type specified operating in a similar arrangement.

B. Equipment and accessories shall be the standard cataloged products of the manufacturer except as otherwise specified or indicated.

C. Pump manufacturer to provide the submersible pump, pump base, guide rail slide brackets, upper guide brackets, base elbow, rails and appurtenances regardless of the manufacturer, as a complete and integrated package to insure proper coordination and compatibility of equipment.

1.05 SHOP TESTS

A. Motor Tests

1. Motor factory shop tests shall be in accordance with IEEE Standard 112, Appendix A, plus the factory's standard routine tests for the specified motor horsepower.

B. Pump Tests

1. Certified Performance Tests: Conduct performance tests per HI Grade on each pump and motor unit to determine head, capacity, speed, and brake horsepower at not less than six points on the operating curve including rating point and best efficiency point. Test data shall be sufficiently comprehensive to produce guaranteed performance curves showing head versus capacity, efficiency, and brake horsepower for the rated speed. Engineer shall be supplied with the complete test procedure in advance of the testing. Test shall be witnessed and certified by a professional Engineer.

2. Hydrostatic Pressure Tests: Conduct hydrostatic pressure tests on each pump.

3. Demonstrate that all equipment is capable of continuous operation in satisfactory manner without mechanical or electrical defects or operational difficulties under suction and discharge conditions.

4. Repeat tests, if necessary, until results are obtained satisfactory to the Engineer.

5. Correct or replace all defects or defective equipment revealed by or noted during tests at no additional cost to the Owner.

6. Conduct all tests in accordance with the latest standards of the Hydraulic Institute.

7. If the specified tests indicate the pump or motor will not meet the specifications, the Engineer has the right to require complete tests for all pumps and motors at no additional cost to the Owner.

1.06 REFERENCES

A. ASTM A48 - Standard Specification for Gray Iron Castings.

B. ASTM A276 - Specification for Stainless and Heat-Resisting Steel Bars and Shapes.

C. AFBMA

D. Hydraulic Institute Standards.

E. National Electrical Manufacturer's Association.

1.07 SUBMITTALS

A. Submit to the Engineer for approval as provided in Section 01300, shop drawings showing details of construction and installation of all equipment furnished under this Section. The following shall be included:

1. Shop drawings and materials of construction and performance of electric motors, pumps, controls, pipes, valves and fittings, equipment, conduit, wiring, wiring devices, transformer and access manhole, rails and bracket.

2. Manufacturer’s rating curves showing pump characteristics of pressure, capacity, brake horsepower, and efficiency. This information shall be prepared specifically for the pump proposed. Catalog sheet showing a family of curves will not be acceptable.

3. Literature and drawings describing the equipment in sufficient detail, including materials of construction and parts list, to indicate full conformance with the detail specifications.

4. Complete parts list for equipment furnished.

5. Motor data such as HP, Volts, RPM, FLC, Efficiency, and p.f. as described herein.

6. Complete wiring diagrams and schematics of all controllers, control panels, control devices, and operators furnished under this Section.

6. Complete wiring diagrams and schematics of all power and control systems.

7. Drawings depicting the mechanical seal configuration.

8. Floor plans, sections and elevations showing a complete layout to scale of all equipment, piping, electrical conduits and wall sleeve installation locations and methods to provide watertight seals.

9. Motor wiring diagrams for power and high temperature switches.

10. Services of manufacturer’s representative and warranties.

11. Drawings and calculations indicating pipe support material, locations, and engineering data of support scheme.

B. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects for review and approval by the Engineer.

C. Submit under provisions of Section 01300.

D. Pump and Motor Characteristics and Performance Data:

1. Provide guaranteed certified performance curves based on actual shop tests of mechanically duplicate pumping units, showing they meet specified requirements for capacity, head, horsepower, efficiency, and NPSH. For units of same size and type, provide curves for a single unit.

2. Catalog performance curves at required speed showing maximum and minimum impeller diameters available.

E. Manufacturer's written warranty.

F. Shop Test Results: One (1) electronic copy of pump performance test data, pump performance curves, hydrostatic test results and motor test results.

G. Field Inspection Reports: Submit under provisions of Section 01700.

1.08 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Provide operation and maintenance instructions as specified in Section 01730. Note, both “Paper” and “Electronic” manuals are required.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Ship equipment, material, and spare parts complete except where partial disassembly is required by transportation regulations or for protection of equipment.

B. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.

C. Deliver spare parts at same time as pertaining equipment.

D. Inspect and inventory items upon delivery to site and provide Engineer with inventory list.

E. Store and safeguard equipment, material, and spare parts in accordance with manufacturer's instructions and deliver to Owner after completion of the work.

1.10 WARRANTY

A. The manufacturer shall guarantee the pumps free from defects in workmanship and materials for a period of 5 years (3 years 100% parts and labor, 2 years prorated at 75% year 4, 50% year 5) from date of startup, not to exceed 5 years 6 months from date of shipment.

PART 2 PRODUCTS

2.01 ACCEPTABLE PUMP MANUFACTURERS

A. Sulzer

B. Additional pump manufacturers may be considered acceptable alternatives. Documentation shall be submitted with Bids for review and approval by the Engineer that demonstrates compliance with project specifications, including dimensions, process mechanical, electrical, instrumentation and control.

C. Should equipment which differs from the first named in this Section 2.01.A be offered and determined to be the equal of that specified, such equipment shall be acceptable only on the basis that any revision in the design and/or construction of the structure, piping, appurtenant equipment, electrical work, etc. required to accommodate such a substitution shall be made at no additional cost to the Owner and be as approved by the Engineer.

2.02 PUMP CONSTRUCTION

A. Major pump components shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) with smooth surfaces devoid of porosity or other irregularities. All exposed fasteners shall be stainless steel 1.4401 (AISI type 316) construction. All metal surfaces coming into contact with the pumped media (other than the stainless steel components) shall be protected by a factory applied spray coating of zinc phosphate primer followed by a high solids two part epoxy paint finish on the exterior of the pump. The pump shall be equipped with an open lifting hoop suitable for attachment of standard chain fittings, or for hooking from the wet well surface. The hoop shall be stainless steel 1.4401 (AISI 316), and shall be rated to lift a minimum of four times the pump weight. Sealing design for the pump/motor assembly shall incorporate machined surfaces fitted with Nitrile (Buna-N) rubber O-rings. Sealing will be the result of controlled compression of rubber O-rings in two planes of the sealing interface. Housing interfaces shall meet with metal-to-metal contact between machined surfaces, and sealing shall be accomplished without requiring a specific torque on the securing fasteners. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered equal. No secondary sealing compounds shall be required or used.

B. Impeller:

Parkside: The ABS ContraBlock Plus impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the semi-open, non-clogging, single vane design, with a minimum spherical solids passage size of 3 inches. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt shall be effectively recessed within the impeller bore to prevent disruption of the flow stream and loss of hydraulic efficiency. Impellers that use wear rings and impellers that are enclosed channel design will not be accepted due to the nature of clogging.

Pinecrest: The Sulzer ABS Vortex impeller shall be of gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The impeller shall be of the vortex, non-clogging, four vane design, with a minimum spherical solids passage size of 3 inches. The impeller shall have a slip fit onto the motor shaft and drive key, and shall be securely fastened to the shaft by a stainless steel bolt which is mechanically prevented from loosening by a positively engaged ratcheting washer assembly. The head of the impeller bolt shall be effectively recessed within the impeller bore to prevent disruption of the flow stream and loss of hydraulic efficiency. Impellers that use wear rings and impellers that are enclosed channel design will not be accepted due to the nature of clogging.

C. Self-Cleaning Wear Plates:

Parkside: The ABS ContraBlock Plus wear plate shall be constructed from gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B). The wear plate shall be designed with an inlet incorporating strategically placed cutting grooves and an outward spiral V-shaped groove on the side facing the impeller, to shred and force stringy solids outward from the impeller and through the pump discharge. The wear plate shall be mounted to the volute with three stainless steel securing screws and three stainless steel adjusting screws to permit close tolerance adjustment between the wear plate and impeller for maximum pump efficiency. Adjustment to allow for wear and restore peak pumping performance shall be accomplished using standard tools, and without requiring disassembly of the pump. The use of fixed or non-adjustable wear plates or rings, or systems that require disassembly of the pump or shimming of the impeller to facilitate adjustment shall not be considered equal. The suction flange shall be integrated into the wear plate and its bolt holes shall be drilled and threaded to accept standard 4 inch ANSI class 125 flanged fittings.

D. Pump Volute:

Pinecrest: The pump volute shall be single piece gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B), non-concentric design with centerline discharge. Passages shall be smooth and large enough to pass any solids which may enter the impeller. The discharge size shall be 3 inches. The discharge flange design shall permit attachment to standard ANSI or metric flanges/appurtenances. The discharge flange shall be slotted to accept both 3 inch ANSI class 125/150 (rotated 22.5 degrees) and metric DN80 flanged fittings. Proprietary or nonstandard flange dimensions shall not be considered acceptable. The minimum working pressure of the volute and pump assembly shall be 16 bar (232 psi).

E. Premium Efficiency Motor: The Premium Efficiency motor shall meet efficiency standards in accordance with IEC 60034-30, level IE3 and NEMA Premium. Motor rating tests shall be conducted in accordance with IEC 60034-2-1 requirements and shall be certified accurate and correct by a third party certifying agency. A certificate shall be available upon request. Motors that are rated IE2 or IE1 will be rejected.

The Premium Efficiency motor shall be housed in a watertight gray cast iron, EN-GJL-250 (ASTM A-48, Class 35B) enclosure capable of continuous submerged operation underwater to a depth of 20 meters (65 feet), and shall have an IP68 protection rating. The motor shall be of the squirrel-cage induction design, NEMA type B, Premium Efficiency. The copper stator windings shall be insulated with moisture resistant Class H insulation materials, rated for 180oC (356oF). The stator shall be press fitted into the stator housing. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is unacceptable. The rotor bars and short circuit rings shall be made of cast aluminum.

The motor shall be designed for continuous duty. The maximum continuous temperature of the pumped liquid shall be 40^{o}C (104^{o}F), and intermittently up to 50oC (122oF). The motor shall be capable of handling up to 15 evenly spaced starts per hour without overheating. The service factor (as defined by the NEMA MG1 standard) shall be 1.3. The motor shall have a voltage tolerance of +/- 10% from nominal, and a phase-to-phase voltage imbalance tolerance of 1%. The motor shall be FM and CSA approved for use in NEC Class I, Division I, Groups C & D hazardous locations. The surface temperature rating shall be T3C. The motor shall meet the requirements of NEMA MG1 Part 30 and 31 for operation on PWM type Variable Frequency Drives.

The motor shall be capable of operating, completely submerged, partially submerged, or unsubmerged. For submerged (wet-pit) applications, the motor shall be self cooling via the process fluid surrounding the motor. For unsubmerged (dry-pit) or partially submerged applications, an integrated oil cooling system shall be utilized to enhance heat transfer, and allow the motor to operate at full rated power continuously without the need for de-rating or reduced duty cycle. No external coolant supply or external cooling jacket shall be required for dry-pit applications. The motor shall have a NEMA Class A temperature rise for submerged service, providing cool operation under all operating conditions.

F. Thermal Protection: Each phase of the motor shall contain a normally closed bi-metallic temperature monitor switch imbedded in the motor windings. These thermal switches shall be connected in series and set to open at 140°C +/- 5°C (284°F). They shall be connected to the control panel to provide a high stator temperature shutdown signal, and are used in conjunction with external motor overload protection.

G. Mechanical Seal: Each pump shall be equipped with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The mechanical seals shall be of non-proprietary design, and shall be manufactured by a major independent manufacturer specializing in the design and manufacture of mechanical seals. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary industrial duty silicon-carbide seal ring and one rotating industrial duty silicon-carbide seal ring. The stationary ring of the primary seal shall be installed in a seal holding plate of gray cast iron EN-GJL-250 (ASTM A-48, Class 35B). The seal holding plate shall be equipped with swirl disruption ribs to prevent abrasive material from prematurely wearing the seal plate. The upper, secondary seal unit, located between the lubricant chamber and motor housing, shall contain one stationary industrial duty silicon-carbide seal ring, and one rotating one rotating industrial duty silicon-carbide seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall not require routine maintenance, or adjustment, and shall not be dependent on the direction of rotation for proper sealing. Each pump shall be provided with a lubricant chamber for the shaft sealing system which shall provide superior heat transfer and maximum seal cooling. The lubricant chamber shall be designed to prevent overfilling, and to provide lubricant expansion capacity. The drain and inspection plug shall have a positive anti-leak seal, and shall be easily accessible from the outside of the pump. The seal system shall not rely upon the pumped media for lubrication and shall not be damaged when the pump is run dry. Lubricant in the chamber shall be environmentally safe non-toxic material. Tungsten Carbide seals will not be accepted.

H. Mechanical Seal Protection System: The primary mechanical seal shall be protected from interference by particles in the wastewater, including fibrous materials, by an active Seal Protection System integrated into the impeller. The back side of the impeller shall be equipped with a sinusoidal cutting ring, forming a close clearance cutting system with the lower submersible motor housing or seal plate. This sinusoidal cutting ring shall spin with the pump impeller providing a minimum of 75 shearing actions per pump revolution. Large particles or fibrous material which attempt to lodge behind the impeller, or wrap around the mechanical seal shall be effectively sheared by the active cutting system into particles small enough the prevent interference with the mechanical seal. The Seal Protection System shall operate whenever the pump operates, and shall not require adjustment or maintenance in order to function. Submersible pump designs that do not incorporate an active

cutting system to protect the primary mechanical seal shall not be considered acceptable for wastewater service.

I. Seal Failure Warning System: The integrity of the mechanical seal system shall be continuously monitored during pump operation and standby time. An electrical probe shall be provided in a sensing chamber positioned above the mechanical seals for detecting the presence of water contamination within the chamber. The sensing chamber shall be air filled, and shall have a drain / inspection plug with a positive anti-leak seal which is easily accessible from the outside of the pump. A solid-state relay mounted in the pump control panel or in a separate enclosure shall send a low voltage, low amperage signal to the probe, continuously monitoring the conductivity of the liquid in the sensing chamber. If sufficient water enters the sensing chamber through the mechanical seal system, the probe shall sense the increase in conductivity and signal the solid state relay in the control panel. Systems utilizing float switches or any other monitoring devices located in the stator housing rather than in a sensing chamber between the mechanical seals are not considered to be early warning systems, and shall not be considered equal or acceptable

J. Pump Shaft: The pump shaft and motor shaft shall be an integral, one piece unit adequately designed to meet the maximum torque required at any normal start-up condition or operating point in the system. The shaft shall have a full shutoff head design safety factor of 1.7, and the maximum shaft deflection shall not exceed .05 mm (.002 inch) at the lower seal during normal pump operation. Each shaft shall be stainless steel 1.4021 (AISI 420) material, and shall have a polished finish with accurately machined shoulders to accommodate bearings, seals and impeller. Carbon steel, chrome plated, or multi piece welded shafts shall not be considered adequate or equal.

K. Bearings: Each pump shaft shall rotate on high quality permanently lubricated, greased bearings. The upper bearing shall be a deep grooved ball bearing and the lower bearings shall be a heavy-duty double row angular contact ball bearing. Bearings shall be of sufficient size and properly spaced to transfer all radial and axial loads to the pump housing and minimize shaft deflection. L-10 bearing life shall be a minimum of 100,000 hours at flows ranging from ½ of BEP flow to 1½ times BEP flow (BEP is best efficiency point). The bearings shall be manufactured by a major internationally known manufacturer of high quality bearings, and shall be stamped with the manufacturer's name and size designation on the race. Generic or unbranded bearings from other than major bearing manufacturers shall not be considered acceptable.

L. Power Cable: The power cables shall be sized according to NEC and CSA standards and shall be of sufficient length to reach the junction box without requiring splices. The outer jacket of the cable shall be oil and water resistant, and shall be capable of continuous submerged operation underwater to a depth of 65 feet.

M. Cable Entry/Junction Chamber: The cable entry design shall not require a specific torque to insure a watertight seal. The cable entry shall consist of cylindrical elastomer grommets, flanked by stainless steel washers. A cable cap incorporating a strain relief and bend radius limiter shall mount to the cable entry boss, compressing the grommet ID to the cable while the grommet OD seals against the bore of the cable entry. Cable entry designs which utilize potting compounds to provide a watertight seal, or those which do not allow the cable to be easily changed in the field shall not be considered equal. The junction chamber shall be isolated and sealed from the motor by means of sealing glands. Electrical connections between the power cables and motor leads shall be made via a compression or post type terminal board, allowing for easy disconnection and maintenance.

2.03 Wet Well Guide Rail Base Assembly

A. The discharge base elbow (3-inch) shall be permanently installed in the wet well and connected to the discharge piping. In order to prevent binding or separation of the pump from the guide rail system, the pumps shall connect to the guide rail base automatically and firmly, guided by one 2-inch schedule 40 316 stainless steel guide rails extending from the straight through discharge to the top of the station. Systems using guide cable in lieu of rigid guide bars or pipes shall not be considered acceptable. The sliding guide bracket shall be a separate part of the pumping unit, capable of being attached to standard 3 inch ANSI class 125 or metric DN100 pump flanges, so that the pump mounting is non proprietary, and any pump with a standard discharge flange can be mounted on the base assembly. Base or bracket assemblies with proprietary or non-standard flange dimensions shall not be considered acceptable.

B. A field replaceable Nitrile (Buna-N) rubber profile gasket or O-ring shall accomplish positive sealing of the pump flange/guide rail bracket to the straight through discharge pipe. Base assemblies that rely solely on metal-to-metal contact between the pump flange and straight through discharge pipe as a means of sealing are inherently leak prone, and shall not be considered equal. No portion of the pump shall bear directly on the floor of the sump..

2.06 CONTROLS

A. Pumping System Control Panel shall be provided under Division 13 – Instrumentation and Controls.

B. Pump manufacturer shall provide and deliver stator winding thermal sensor and moisture detection relays for each pump to the Contractor for incorporation into the motor controllers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install items in accordance with manufacturer's instructions.

B. Install pumping units and pump base in the bottom wet well structure and provide supports as required.

C. After alignment is correct, grout as specified in Section 03300.

1. Fill entire base and leave no gaps or voids.

2. Do not embed leveling nuts in grout.

3.02 MANUFACTURER'S FIELD SERVICES

A. Provide services of factory trained service engineer with a minimum of five (5) years' experience to assist in location of anchor bolts; setting, leveling, field erection, etc.; and coordination of piping, electrical and miscellaneous utility connections. Provide in accordance with Section 01665.

B. Provide services of manufacturer's representative as specified in Section 01665.

C. Provide operation and maintenance training as specified in Section 01665.

3.03 FIELD TESTING

A. Refer to Drawing C-2.4 to coordinate bypass pumping system with installed new pumps during field testing and startup.

B. Certified Performance Tests: With the suction and discharge piping configured for the final operating conditions, conduct performance tests on each pump to determine pump shutoff head and full speed operating head and flow.

C. The Contractor shall conduct a running pump test for a minimum of 4 hours, in the presence of the Engineer. The test shall indicate that the pumps conform to the head and capacities specified.

D. Field vibration testing shall be performed by the manufacturer's factory representative in accordance with HI 11.6.

E. The Contractor shall provide both factory and field acceptance testing of the VFD Starters, I&C pumps control and alarm panels as specified in Division 13 and Division 16.

F. A 14-day operating period of the pumps will be required before acceptance. If pump performance does not meet the Specifications and shop drawing submittals, the Contractor shall take corrective measures or the pumps shall be removed and replaced with pumps that satisfy the conditions specified at no additional cost to the Owner. The decision of the Engineer shall be final.

G. The manufacturer shall furnish the services in the presence of the Engineer, of a qualified factory representative for a minimum of 8 hours to confirm the completed pump installation to be satisfactory. Compensation for such services shall be paid for by the Contractor.

H. The pump supplier, after successfully completing the pumps and I&C panels field testing, shall issue a letter of certification on the equipment's installation and operation with regards to its acceptability for its warranty.

I. Pump tests include all I & C testing. Test will include the testing of all associated controls.

3.04 SPECIAL TOOLS AND SPARE PARTS

A. Furnish one set of all special tools required for the proper servicing of all equipment supplied under these Specifications for each pump station, packed in a suitable steel tool chest with a lock. Special tools shall include any tools not available in ordinary hardware stores.

B. Furnish the manufacturer’s standard set of spare parts for each pump station including at least the following:

- Two (2) Repair Kits,
  - Upper and lower mechanical seals,
  - bearings,
  - O-ring kit, and
  - Cable seals.
- One (1) Impeller Kit
- One (1) wear plate

END OF SECTION

DIVISION 13

SECTION 13300

INSTRUMENTATION AND CONTROLS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Work of this Section shall include all labor, materials, and equipment required to provide a complete pump control systems and associated instrumentation. A single Instrumentation and Control System Contractor shall provide all labor, materials, equipment and services required to achieve this scope as specified herein and within the Contract Documents.

B. The work shall include providing equipment and instrumentation for the Parkside and Pinecrest Sewage Pumping Stations Upgrades located in Pawtucket, Rhode Island.

C. The work shall include an interface for equipment provided under other Sections of the Contract Documents. In order for the equipment furnished and installed within this Section to function as a complete system there shall be close coordination with other equipment furnished under other Sections of the Contract Documents.

D. Provide and configure a new pump control panel that shall include, but not be limited to, pump controller, power distribution equipment, motor starters, surge protection devices. Provide and configure all instrumentation and an alarm dialer.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals:

1. Manufacturer's data, order sheet or equivalent for each individual instrument or device being supplied. The information shall include but not be limited to model number, exact chart, scale or calibration range, type of enclosure and mounting, input/output and power data and the instrument tag number (or loop number for auxiliary equipment). Sales literature will not be accepted.

2. Manufacturer's outline and mounting dimensions for all field mounted devices, and scaled layout drawings for primary and supplemental control panels, including interfacing details for equipment to be supplied under DIVISION 11.

3. Manufacturer's panel color selection with color samples.

4. Complete master wiring diagrams including field wiring requirement, elementary or control schematics including coordination with other electrical devices operating in conjunction with the instrument control panels. Suitable outline drawings shall be furnished for approval before proceeding with manufacture and shall include number of conduits and wires, size, tubing and mounting. It shall be required that the Instrumentation and Controls Contractor also refer to all other interrelated specifications and drawings. Therefore it is imperative that the Instrumentation and Controls Contractor obtains a complete set of contract specifications and drawings as part of the work and requirements of this portion

of the system. Due to the complexity of the control functions, it is imperative the above drawings be clear and carefully prepared to facilitate interconnections with other equipment. Standard preprinted sheets or drawings simply marked to indicate applicability to this contract will not be acceptable.

5. The Instrumentation and Controls Contractor shall clearly identify any exception to the specification or drawings. Failure to do this will be grounds for rejection of the submittal.

6. The services of the instrumentation system vendor's factory engineer shall be included as part of the bid price to meet with the Engineer at his office for a minimum of two, 8-hour days to review shop drawings for this Section prior to approval by the Engineer.

B. For approval before release for manufacturing:

1. Instrument and control panel layout to scale or dimensioned with overall size mounting and field entries dimensioned.

2. Preliminary loop diagrams and logic diagrams in the I.S.A. & NEMA standard and shall include piping and wiring requirements for each loop.

3. All equipment to be furnished under this Section must be approved prior to any of this equipment being released for manufacturing unless otherwise noted by the Engineer.

C. Prior to final acceptance:

1. Final loop diagrams containing start-up data (to I.S.A. standard).

D. Shop drawings shall be submitted in accordance with Section 01300 - Submittals and include the following special conditions:

1. All material submitted for review shall be contained in one submission. The material shall be furnished in bound volumes as required for a complete submittal. Loose material submitted will not be reviewed. Partial submittals unless agreed to by the Engineer will not be reviewed. Sales bulletins or other general publications are not acceptable as submittals.

2. One set of reproducible drawings, size 2 feet x 3 feet. The Engineer reserves the right to accept or reject half size (11" x 17") reproducibles in lieu of 2 feet by 3 feet size. Half size copies shall be bound with each copy of the submittal.

3. If more than two submittals (initial submittal and one re-submittal) are required for approval, the Instrumentation and Controls Contractor shall be liable for back charges for the Engineer's services to review additional submittals.

4. The instrumentation manufacturer shall furnish a complete set of the final approved wiring diagrams to the Electrical Contractor.

E. Shop drawing review period for this section shall extend beyond the specified period as defined in Section 01300 - Submittals. Due to the complexity of the system the review period allowed shall be a minimum of forty-five (45) days unless otherwise agreed to by the Engineer.

F. Operation and Maintenance Manuals shall be submitted in accordance with the requirements of Section 01730 - Submittals.

1.03 RESPONSIBILITY FOR EQUIPMENT

A. The Contractor shall be responsible for providing and placing in satisfactory operation all instruments and equipment necessary for a complete system. This shall include all piping, electrical connections, and system engineering as provided by a qualified Instrumentation and Controls Contractor, and accessories required by the Work of this Section or other related Work included under other Sections in the Contract Documents.

B. The supply of the pump control panel and instrumentation shall be by a single Instrumentation and Controls Contractor. The Instrumentation and Controls Contractor shall be responsible to the Contractor for: (1) satisfactory detailed design of a complete and coordinated system (2), start-up and testing services, (3) training, and (4) services to assure satisfactory operation.

C. The Contractor shall not purchase separate equipment and attempt to assemble a system. This Work is to be performed by a qualified Instrumentation and Controls Contractor as approved by the Engineer.

D. The Contractor shall furnish record drawings for each entire system. This shall include drawings for all locations with point to point wiring for the equipment. The drawings shall be complete and shall require on site verification and acceptance by the Engineer.

E. The Instrumentation and Controls Contractor shall be required to furnish equipment that is installed under other Sections in the Contract Documents. The Contractor shall be responsible for coordinating this Section with the necessary equipment in order to provide for a complete installation. It shall be coordinated such that there is proper installation of this equipment between suppliers in order to avoid delays in completion due to availability of this equipment. The Instrumentation and Controls Contractor shall provide a separate submittal on this specific equipment for early approval in order to avoid delays.

1.04 DESIGN CRITERIA

A. The Contractor shall provide a complete and operational system. This equipment shall be provided as described in this Section. It shall be the Contractor's responsibility to coordinate the installation of this equipment with all other associated equipment and to provide for a complete and operational system.

B. The Work of this Section shall require field equipment interconnections. This Section shall describe the field equipment for interconnections but does not detail each specific point-to-point connection. It shall be the Contractor’s responsibility to verify and coordinate final connections to all equipment.

C. Control panel enclosures and components shall be Underwriters Laboratories (UL) recognized or listed, where such components are available. The complete control panel assembly shall be constructed by an accredited UL-508 fabrication and wiring assembly shop in accordance with UL-508 and related UL standards.

D. The Work of this Section shall adhere to the requirements of the standards listed below as applicable. The latest edition in effect at the time of bid opening shall apply.

1. American Petroleum Institute (API)

2. The Instrumentation, Systems and Automation Society (ISA)

   a. ISA S5.4, Instrument Loop Diagrams.
   b. ISA S20, Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
   c. ISA RP60.3, Human Engineering for Control Centers
   d. ISA RP60.6, Nameplates, Labels, and Tags for Control Centers

3. National Electrical Manufacturers Association (NEMA)

4. National Fire Protection Agency (NFPA)

   a. NFPA 70, National Electrical Code (NEC).
   b. NFPA 79, Standard for Industrial Machinery.

5. Underwriters Laboratories, Inc. (UL)

   a. UL 508, Standard for Industrial Control Equipment.
   b. UL 698A, Industrial Control Panels Relating to Hazardous (Classified) Locations.

6. American Society for Testing and Materials (ASTM)

   a. ASTM A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.05 INSTRUMENTATION AND CONTROL CONTRACTOR

A. The Instrumentation and Controls Contractor shall be one of the following the pre-qualified contractors listed in alphabetical order.

1. Electrical Installations, Inc.
   Moultonboro, New Hampshire
   603-253-4525

2. Harbor Controls
   North Kingstown, RI
   401-667-0930

3. R. E. Erickson Co., Inc.
Walpole, Massachusetts
508-668-9330

B. Only pre-qualified Instrumentation and Controls Contractor shall be allowed to provide the Contractor with a price for inclusion in the General Bid.

1.06 OPERATION CRITERIA

A. WETWELL LEVEL MONITORING

1. Wetwell level shall be measured by a submersible level transducer mounted in the wetwell and shall be wired through an intrinsically safe isolator into the pump controller. The level shall be indicated on the pump controller. A High level, High-High level, and Low level float switches shall be installed in the wetwell also. The float switches shall provide backup alarm and direct hardwired control of the pumps in case of a pump controller failure.

2. The level transmitter shall provide a 4-20 mA DC output signal proportional to wetwell level to the pump controller. This signal shall be the primary means for wet well level alarm and control. High and low wetwell alarms shall be triggered by the input level analog signal via the pump controller

3. The float switches shall be wired through an intrinsically safe relay. The intrinsically safe relay shall be located within an isolated area in the pump control panel. A contact from the intrinsically the safe relays shall be wired via interposing relays to a the Pump Control Panel LED high-high level indication light and for pump back-up control.

B. PUMP OPERATION

1. The pump operation shall be automatically controlled by the pump controller.

2. Pump #1 and Pump #2, shall be capable of being manually or automatically assigned Lead, Lag status at the pump controller. A pump will retain it's assigned status unless manually changed by an operator or if automatic pump alteration is enabled. If automatic pump alteration is enabled, pump selection shall cycle through the next assigned status on the stop/start of the assigned lead pump.

3. Hand-Off-Auto (H-O-A) selector switches will be located on the pump control panel door. An auxiliary contact block on the H-O-A switch will be wired to the pump controller for the indication that the H-O-A switch is in the "Off" position. When the switch is in the "Auto" position the associated pump shall be controlled as described below.

4. The lead pump shall be controlled by the pump controller based on the wet well level transmitter. The lead pump shall come on when level in the wet well

exceeds the controller high level setpoint and shall run until the level drops below the controller low level setpoint.

5. The lag pump shall be controlled by the pump controller based on the wet well level transmitter. The lag pump shall come on when level in the wet well exceeds the controller high high level setpoint and shall run until the level drops below the controller low level setpoint.

6. Back Up Level Control

   a. Back-up hardwired pump control logic utilizing three level switches and shall be provided.

   b. If the wetwell level reaches the high level float switch level it is assumed that there has been a failure of the level transmitter and/or the pump controller and therefore the high level float switches and hardwired pump control logic shall be used for automatic pump control.

   c. When wet well level activates the high level float switch, Pump #1 shall automatically start and run until wet well level drops below the low level float switch.

   d. When wet well level activates the high-high level float switch, Pump #2 shall automatically start and run until wet well level drops below the low level float switch.

7. The pumps shall have a staggered delay start between them upon restoration of power so that they both do not start at the same time.

D. PANEL POWER FAILURE

1. Loss of 120 VAC power to the panel shall be indicated by door mounted LED light via a interposing relay powered by the 120VAC cabinet power.

E. ALARM DIALER INTERFACE

1. The following station alarms shall be wired to inputs of a new alarm dialer via interposing relay dry contacts

   a. Panel power failure.

   b. Wet well level high.

   c. Wet well level low.

   d. Pump #1 Alarm, including VFD Fault.

   e. Pump #2 Alarm, including VFD Fault.

PART 2 – PRODUCTS

2.01 GENERAL

A. All equipment shall be of the latest proven design. First generation equipment with less than three years general use shall have documentation on construction operation, field test and user list.

B. All equipment shall be suitable for operation in the environment of the Project.

C. Transmission to and from analog devices shall be 4-20 mA DC. Analog signals run from an instrument located outside than the signal destination shall be isolated at the panel end and shall have surge/lightning protection at both ends.

D. All signal converters, power regulators, or power converters shall be the responsibility of the Instrumentation and Controls Contractor. The operation criteria descriptions herein do not specify all hardware required for complete system operation. It is the responsibility of the Instrumentation and Controls Contractor to provide all necessary equipment for complete systems.

E. All equipment necessary to complete the functional requirements of this Section shall be supplied by the Instrumentation and Controls Contractor and be of the same manufacturer to the maximum practical extent unless otherwise specified.

F. All necessary fuses or switches required by the Instrumentation and Controls Contractor for their equipment shall be provided with the equipment. All instruments requiring an external power supply shall have an internal ON-OFF switch.

G. All receiving devices, when operating in a loop, shall be of a design such that a failure of an individual device shall not affect the operation and integrity of the remaining loop functions. All devices, either remote or panel mounted, shall have an individual internal ON-OFF switch.

H. Electronic transmitting equipment shall provide loop power. A true two-wire transmitter may have its loop power supplied in the receiving instrument, if available, or by a DIN-rail mounted power supply mounted in the receiving control panel. Provide an isolated redundant loop power supply configuration such that if a fault occurs in the output of the primary power supply then the backup power supply takes over without interruption.

I. The panel shall have terminal blocks with 20 percent spares in addition to terminals for all wires including spare wires. Special care shall be exercised to carry grounding lines through such junction boxes with the least possible resistance.

J. All shielded cable shall be grounded at the control panel end only. Shields shall be carried through junction boxes with the least possible resistance and kept isolated from ground at these points. The field end of the shield shall be insulated to prevent grounding.

K. All field electronics and outdoor control panel equipment shall be suitable for operation in ambient temperatures of -40 degrees Fahrenheit to 140 degrees Fahrenheit. All indoor

control panel located electronics shall be suitable for operation in ambient temperatures of 40 degrees Fahrenheit to 120 degrees Fahrenheit.

L. All external connection points shall be made at terminal blocks with No. 6-32 or larger screws.

2.02 PUMP CONTROL PANEL (PCP)

A. Provide a custom PCP pump control panel for the Parkside Pump Station capable of controlling two separate 2.7 HP, 3-phase, 230 volt submersible sewage pumps. The panel shall contain but be not limited to a main power circuit breaker with through panel disconnect, distribution pump circuit breakers, variable frequency drives, relays, selector switches, indicating lights, pump controller, etc.

B. Provide a custom PCP pump control panel for the Pinecrest Pump Staation capable of controlling two separate 4.7 HP, 3-phase, 208 volt submersible sewage pumps. The panel shall contain but be not limited to a main power circuit breaker with through panel disconnect, distribution pump circuit breakers, motor starters, relays, selector switches, indicating lights, pump controller, etc.

C. A 120/240V volt, 1-phase, 3-wire, 60 amp power feed shall be provided to the Parkside Pump Station PCP control panel and a 120/208 volt, 3-phase, 4-wire, 60 amp power feed shall be provided to the Pinecrest Pump Station PCP control panel. Provide a lug for grounding connection of up to a No. 1/0 AWG conductor.

D. Panel Enclosures

1. Control panel shall be NEMA 12 constructed from 10 gauge steel. All seams shall be continuously welded and smooth. Doors shall have three point latching mechanism with vault type operating handle, continuous heavy duty hinges and provisions for pad locking. Door gaskets shall be neoprene attached with oil resistant adhesive. Panel dimensions shall not exceed 36” wide x 60” in height.

2. The panels shall be free of dents or other defects.

3. The panels shall have an angle frame. The frame and shell shall be welded construction.

4. Data storage pockets shall be provided on the inside of each panel and shall be of sufficient size to hold all of the prints required to service the equipment.

5. Each panel shall be provided with a key lockable front handle. Provide gaskets as required to maintain the panel NEMA rating as specified herein.

6. Provide a door stop kit for the panel to secure the door in the 90-degree open position.

E. All wiring within the panel shall be grouped together in harnesses and secured to the structure. Terminal blocks shall be provided for all external connections to the control panel and for all connections between the component mounting plate and enclosure

mounted components to allow for easy removal of the component mounting plate if required for service. Terminal blocks shall consist of individual snap together contact sections mounted on a common mounting channel. Terminal block sections shall have tubular screw contacts mounted in a nylon housing to resist breakage; phenolic or other rigid, brittle materials shall not be considered equal. Plan screw contacts requiring lugs to be installed on wires shall not be considered equal.

F. A complete master wiring diagram and elementary or control schematic shall be furnished and submitted for approval prior to manufacturing. Diagram shall indicate at a minimum the power distribution circuit, pump power/control circuits, terminal and wire numbers, control devices, and pilot lights.

G. The pump controller shall be a door mounted microprocessor based pump controller designed to perform level control and monitoring in a wide range of lift station applications. The pump controller shall operate the pumps based on the selected level setpoint value and the wet well level signal that shall both be displayed on the controller. The level input source shall be a 4- 20 mA pressure transducer. The pump controller shall alternate the pumps, perform lag pump delays, and provide high and low level alarms. The pump controller shall have non-volatile memory requiring no batteries. The pump controller shall be the Mercoid MPC JR, or approved equal. The town has selected on this pump controller for all existing pump station.

H. Circuit breakers shall be molded case, three pole with voltage and ampere ratings as required. A through door handle distribution circuit breakers for each pump shall be provided. The interrupting capacity shall be not less than 20KA, RMS symmetrical.

I. Provide a variable frequency drive for each of the Parkside Pump Station's pumps.

J. Provide an in line motor starter for each of the Pinecrest Pump Station's pumps. Motor starters shall be three phase, 60 Hertz, 208 Volt, open style, UL listed full voltage non-reversing type with electronic overload protection and rated for motor horsepower size for the new submersible pumps. Each motor starter shall have auxiliary run and overload status dry contact.

K. A hand-off-automatic selector switch for each pump and pump lead and alternate selector switch shall be provided. Selector switches shall be three position maintained type of heavy duty oil-tight construction. Toggle switch types shall not be considered equal. Selector switch contacts shall be heavy duty, double-break, silver. Switches shall be mounted through the control panel enclosure.

L. Pump running indicating, VFD Fault, wet well high, wet well low indicating lights shall be provided and be heavy duty, oil tight, push to test LED.

M. Provide Elapsed Time Meters shall be non-reset meter for each pump to indicate elapsed time of operation of the pump from 0 to 99,000.9 hours. The meters shall be mounted through the pump control panel enclosure.

N. Provide all controls and accessories as shown on the equipment motor wiring diagrams in the contract drawings. Specialized interface relays supplied by the equipment manufacture shall be installed in the Pump Control Panel at the assembly factory shop.

Coordinate with the equipment manufacture for space requirements and delivery of the relays.

O. The Instrumentation and Controls Contractor shall provide all instrument devices necessary for proper pump operation. This shall include all signal conditioning, signal isolation, surge/lightning protection and operational equipment for the system.

P. Control panel(s), except as noted, shall be completely assembled and wired at the Instrumentation and Controls Contractor's factory. All panels shall be UL listed and labeled. Refer to the Contract Documents for exact location and layout of each of the panels.

Q. All control and alarm circuity for shall be complete, including all necessary auxiliary relays, contactors, and isolation so as to require only wiring and connections to the equipment control circuit. All contacts for control of motor-operated or electrically operated equipment shall be rated not less than 1200 VA (10 ampere at 120 volts) unless otherwise specified herein.

R. Nameplates and Nametags

1. Nameplates shall be provided for all front mounted equipment. The nameplates shall be approximately 1 inch by 3 inch and shall be constructed of black and white laminated, phenolic material having engraved letters approximately 1/4 inch high extending through the black face into the white layer. Nameplates shall be attached to panels by self-tapping stainless steel screws or rivets. Nameplates shall be provided for each panel identifying the panel and shall be located at the top center of the panel. Size of the nameplate shall be as required for proper visual identification.

2. Nametags shall be provided for all equipment located within the control panel. Each and every device shall be tagged with permanently attached nametags with identification reference that shall correspond to all drawings and wiring diagrams for the system. The nametags shall be neatly installed and shall be clearly visible for service and maintenance of the equipment.

S. All panel equipment shall be pre-piped and/or pre-wired on or within the cabinet. All wiring shall comply with local and National Electrical Code requirements and shall be in open bundles wired to numbered terminals. Each cabinet shall have at least 25 percent spare additional terminals. A plug-in header with convenience outlets and flexible plug-in leads shall be supplied for each instrument power supply. An overhead, internal, gasketed fluorescent light shall be provided. Cabinet layouts shall be submitted to the Engineer for approval. Materials and equipment used shall be UL approved wherever such approved equipment and materials are available.

T. All equipment shall be designed and constructed so that, in the event of a power interruption, the equipment provided under this Section shall resume normal operation without manual resetting of alarms or power source when power is restored. Therefore, no alarm points shall be activated upon restoration of power after a normal power outage unless it is a true alarm condition. Provide all devices or programming required to maintain this requirement.

U. Terminal strips shall be provided for the purpose of connecting all control, power, and signal wiring. Provide separate terminal strips for each in order to isolate the different wiring types (power, control, and signal). All terminal strips shall be completely labeled and numbered throughout for each and every unit. Direct inter-wiring between equipment will not be allowed.

V. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 3 inches of the side panel or 6 inches of adjacent terminal. Wiring troughs shall not be filled to more than 60 percent visible fill. Wiring trough covers shall be match marked to identify placement. If component identification is shown on covers for visibility, the identification mark shall also appear on the mounting sub-panel. All wiring shall be kept to the upper 3/4 quarters of the control panel.

W. All miscellaneous components shall be heavy-duty industrial type, or equal. Mounting hardware shall be stainless steel or cadmium plated. All cutouts shall be made true and square with no ragged cuts. The finished cutout shall be deburred, with no sharp edges. All welds shall be ground smooth and be deburred with no sharp edges. Welding on the panel face should be minimized. Adequate stiffness and supports shall be provided to insure a rigid stable structure.

X. The finished enclosure shall be properly degreased, prime painted (2 coats) and finish painted (2 coats) in accordance with the paint manufacturer's instructions, prior to the installation of equipment. The final finish shall be smooth, free of runs, and uniform in tone and thickness. Two, one-pint containers of each color used shall be supplied with the panel for field touch up.

Y. Provide air circulating equipment to dissipate heat from control panel components and maintain interior temperatures of out of doors control panels within an acceptable range for proper operation of control panel components.

Z. Provide a LED lighting fixture inside at top of panel with light switch and one duplex receptacle for convenience of 120 volt power during service and maintenance of equipment.

AA. Provide ground lug.

AB. Provide a high-intensity LED push-to-test pilot lights for indication of control panel power on. Control panel power on pilot light (white) shall be illuminated when there is AC utility or generator power provided to the control panel.

2.03 VARIABLE FREQUENCY DRIVES

A. Variable Frequency (Speed) Adjustable Drive shall be UL Listed solid state type in a NEMA 12 filtered open enclosure that is fan cooled with the filter element of the removable and replaceable type. Front access shall be provided. Top, rear and side access shall not be required. The enclosure shall be coated with an epoxy resin base and acrylic resin enamel. The drive shall be arranged for 240 Volts plus 10 percent to minus 5 percent, single phase, 57 to 63 Hertz input converted into adjustable frequency/Voltage (208V-240V), 3-phase output in an ambient temperature of -10 to 40 degrees C. The

VFD shall be capable of sustaining operation with a line voltage dip of 15 percent of normal operating voltage on a constant torque or variable torque load. During line dip the VFD shall automatically provide a speed drop allowing maximum capable speed for the duration of the input voltage dip. The drive efficiency shall be 97 percent or better at full speed and full load. Fundamental power factor shall be 0.98 at all speeds and loads.

B. The control method shall be sinusoidal Pulse Width Modulation. Output Voltage shall be three phase, 208-240 Volts and output frequency shall be 0.1 to 66 Hz when shipped. Frequency shall be selectable by a digital keypad. The frequency resolution shall be 0.1 Hz and the accuracy shall be within 1.0 percent of the maximum frequency at 25 degrees plus or minus 10 degrees C. Voltage/frequency (V/f) characteristics shall be characterized by selectable patterns. Up to 82 control functions shall be programmed. The overload capacity shall be 110 percent continuous and a minimum two minute rating of 150 percent of rated current. The frequency setting signal shall be 4 to 20 mA. The VFD shall employ a full wave rectifier to prevent input line notching, DC bus choke, DC bus capacitors, and Insulated Gate Biplar Transistors (IGBT's) as the output switching device. SCRs, GTOs and Darlington transistors are not acceptable.

C. The adjustable parameters consisting of: accelerating time, decelerating time, upper and lower limit of output frequency, and 4 to 20 mA reference bias and reference gain shall be indicated on a digital display. Braking shall be achieved through capacitor charging and starting shall be achieved by external contact. The VFD shall be software configurable to automatically restart following power outage, overcurrent and overvoltage detection. Soft stall shall occur when motor runs continuously at overload.

D. The drive shall be protected from stalling, overcurrent, overload, short circuit, overvoltage, undervoltage, loss of one (1) phase of input power, instantaneous power failure (approximately 30 msec), overheating, fuse burnout protection and earth (ground) fault detection. The fault cause shall be displayed (flickering) for overcurrent, short circuit, overload, overvoltage, overheating and earth (ground) fault. There shall be a main capacitor charging indicator for internal circuit. Fault shall be reset by a reset push button on the printed circuit board and an external reset contact.

E. A digital display shall be a 2 line, 40 character unit with readout in plain English. The display shall be located on the door of the pump control panel enclosure.

F. Internally mounted set point control shall be provided to receive either a 4 to 20 mAdc or 0 to 10 vdc analog input control signal from a process panel to control the speed of the motor. The drive shall be capable of receiving a dry contact input to override the analog input control signal and control the flow rate to 95%.

G. Each drive shall be provided with the following accessories:

1. "Local-Off-Remote" keypad switch for local/remote speed control. In the "Remote" mode, the motor speed shall be adjusted in response to the related remote 4 to 20 mA pacing signal. In "Local" mode the motor speed shall be adjusted in response to keypad entry speed and the VFD shall run when the "Hand-Off-Auto" selector switch is in "HAND". . In "Off" mode the VFD shall not run.

2. 4-20 mA speed feedback output signal.

3. Dry contact for remote indication of motor running status.

4. Dry contact at for remote indication of VFD fault conditions.

H. Under normal operating conditions, the line harmonics introduced into the power system from the AC VFD unit(s) shall be within the distortion limits as defined in IEEE 519 and less than %10 Ithd. The point of common coupling shall be the main distribution panel. The VFD assembly shall utilize harmonic filtering (line reactors and capacitors) on the input to the VFD and DC bus reactors to minimize the harmonic effects to the utility and the generator sources.

I. The Variable Speed Adjustable Drives shall rated for a minimum 10HP, 3-phase input derated for a single phase input.

2.04 LEVEL ELEMENT/TRANSMITTER (SUBMERSIBLE PRESSURE TRANSMITTER)

A. Type: Submersible pressure transmitter for waste water applications with vented cable, two-wire, piezoresistive pressure sensing technology with welded 316 stainless steel diaphragm.

B. Operation Purpose: To sense pressure and produce a standard 4-20 mA DC output signal linear with level; sensing element -piezoresistive pressure sensor.

C. Functional: Pressure ranges - 0 to 5 through 0 to 300 psig; proof pressure limit1.5 times full scale; burst pressure limit - 2.0 times full scale; power supply - DC (loop powered); output - 4-20 mA DC.

D. Physical: Wetted parts - 316 stainless steel, fluorocarbon; operating temperature range - minus 10° to plus 60°C; compensated temperature range - 0° to 50°C; cable - polyurethane jacketed, shielded with polyurethane vent tube and vent filter/vapor trap; mounting - suitable for mounting in a 4-in stilling well, suspended from cable.

E. Provide aneroid bellows venting accessories with connection to transducer, din-rail mounted terminal blocks for termination of transducer signal wire and control panel signal wire, and din-rail mounted surge protection devices; Accessories - vent-hole or breather element to maintain atmospheric pressure within enclosure.

F. Performance: Static accuracy - ±0.50 percent of best fit straight line (BFSL), including the combined errors due to nonlinearity, hysteresis, and non-repeatability at 25°C; thermal error - ±0.05 percent full scale output per degree Celsius (maximum deviation from a BFSL).

G. Provide and mount a perforated PVC stilling well for each transducer to minimize interference with rags and solids.

2.05 LEVEL SWITCH - FLOAT TYPE

1. Float switches shall be of non-mercury type, 3½-in diameter hermetically sealed, molded polypropylene construction and include a Form C, tilt-type, switch rated for switching 10 ampere resistive loads at 120 VAC. Switches shall include 40 feet of nitrile PVC

jacketed, Type SO, 3-conductor, No. 14 AWG cable suitable for underwater service. Switches shall be rated for the NEMA area in which installed. Switches shall also include Type 316 stainless steel mounting hardware and weighted cord collar. Switches shall be installed per the manufacturer's requirements.

2. Level switches shall be manufactured by Consolidated Electric Co., Flygt, Magnetrol, or equal.

2.06 MISCELLANEOUS EQUIPMENT

A. ELECTRICAL RELAYS

1. Electrical relays for handling power circuits shall be general purpose equal to IDEC, Omron, Allen-Bradley, Potter & Brumfield, or approved equal. Relays handling control, telemetering or alarm functions shall be general-duty, plug-in type, complete with dust and moisture proof enclosure equal to IDEC, Omron, Allen-Bradley, Phoenix Contact, Potter & Brumfield, or approved equal. Units shall be provided with integral indicating light to indicate if relay is energized. Units shall have DPDT relay contacts and be rated for 10 A at 120 VAC, 10 A at 24 VDC

2. Time delay relays shall have DPDT relay contacts and be suitable for on-delay or off-delay operation. Rated load shall be 10 A at 120 VAC, 10 A at 24 VDC. Units shall be provided with integral time-delay adjustment knob. Relays shall be provided with dust and moisture resistant covers. Relays shall be suitable for operating in a temperature range from -30° to 55° C. Units shall be adjustable and available in a single range or multiple ranges from 0.1 second to 10 hours. Time delay relays shall be UL listed. Mounting sockets matched to relay and mounting rails/holders shall be provided as required. Time delay relays shall be as manufactured by IDEC, Allen Bradley, or Engineer-approved equal.

B. INTRINSICALLY SAFE PANEL

1. Provide a panel to house intrinsically safe current isolators and intrinsically safe relays. The panel shall have din-rail mounting terminal strips for all wiring and shall receive power from the RTU control panel.

2. Intrinsically Safe Current Isolators

   a. Din rail mounted intrinsically safe current isolators shall be furnished for interconnection of each wetwell level transmitters.

   b. Operating voltage shall be 115 VAC, 60 Hz.

   c. The intrinsically safe control circuit shall be approved by Factory Mutual and the Canadian Standards Association for Class 1, 119 111; Division 1; Groups A, B, C, D, E, F, G hazardous locations.

3. Intrinsically Safe Relays (IS Relays)

a. Din rail mounted intrinsically safe relays shall be furnished for interconnection of each float switch located in the wet well.

b. Operating voltage shall be 115 or 230 VAC, 50/60 Hz.

c. Load contacts shall be double pole, double throw and shall be rated for 10 amperes resistive load or 3 amperes inductive load at 120 VAC.

d. The intrinsically safe control circuit shall be approved by Factory Mutual and the Canadian Standards Association for Class 1, 119 111; Division 1; Groups A, B, C, D, E, F, G hazardous locations.

2.07 ALARM DIALER

A. The alarm dialer shall be a solid state radio type capable of monitoring eight dry contact inputs. The alarm dialer shall be located within the electrical enclosure panel.

B. The alarm dialer shall be provided with all necessary hardware for a standard installation including a radio, enclosure, backup battery, transformer, Omni directional antenna with cable, and mounting hardware.

C. The radio shall communicate to a manufacturer managed mesh radio system.

D. The enclosure shall be NEMA 12 and accept a 120VAC power input with an integral 12VAC transformer with battery back and charging system.

E. Provide all required programming, hardware, and start-up.

F. The alarm dialer shall supplied by AES, no equal allowed as the City has standardized on AES for the remote monitoring of their Sewage Collection System.

G. The following station alarms shall be programmed into the alarm dialer

1. Panel power failure (from PCP).

2. Wet well level high high (from PCP).

3. Wet well level low (from PCP).

4. Pump #1 Alarm (from PCP).

5. Pump #2 Alarm (from PCP).

2.08 SPARE PARTS

A. Spare parts shall be provided as a part of the start-up services during the initial start-up and phase-in period. These items shall include accessories such as fuses, circuit breakers, power supplies, lights, etc. required to start-up and operate the system for a period of 60 days. These items shall be packaged in separate containers and shipped to the job site with the instruments and shall be tagged "INSTRUMENT START-UP EQUIPMENT".

B. Spare parts above and beyond those being provided for start-up services shall be provided under this Section. All spare parts shall be packaged and shipped at one time. Separate shipment of spare parts shall not be acceptable.

C. Furnish one box of spare fuses of each type supplied. A box shall consist of a minimum of 12 fuses.

E. Furnish six spare pilot light lenses and six spare LEDs of each color and type supplied.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the best field and shop practices.

B. The workmanship shall be in accordance with the best field and shop practices for instrumentation and control systems.

C. All workmen shall be skilled in the work to which they are assigned and all work shall be performed under the direct supervision of an experienced and competent Instrumentation and Controls Contractor's foreman.

D. All internal wiring of the control panel(s) shall be done by the Instrumentation and Controls Contractor in accordance with the drawings and instrument manufacturer's instructions and UL requirements.

E. The Contract Documents indicate the extent of the interconnections between and the type of individual instrument. The proposed equipment shall be supplied complete with all mounting hardware and accessories to satisfy the functional requirements.

F. All work shall be executed in full accordance with UL requirements and codes and local rulings. Should any work be performed contrary to said rulings, ordinances and regulations, the Instrumentation and Controls Contractor and ultimately the Contractor shall bear full responsibility for such violations and assume all costs arising there from this situation.

G. Interfacing devices shall be compatible with the equipment to which they are attached and shall comply with the applicable specifications.

H. Coordination with the process and equipment, in addition to standard quoted devices required to conform the instrumentation to the process, shall be the responsibility of the Contractor. The Instrumentation and Controls Contractor shall provide detailed information on the devices being supplied and the extent of the field installation required.

I. Brackets and hangers required for mounting of equipment shall be provided as noted in the Contract Documents or as required. They shall be done in a workmanlike manner and not interfere with any other equipment. These devices shall be manufactured from non-

corroding stainless steel, suitable to the installed environment.

J. The Contractor shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the equipment manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

K. The shield on each process instrumentation cable shall be grounded as directed by the manufacturer of the instrumentation equipment or as noted in this Section, but in no case shall more than one ground be employed for each shield. Only one end of shielded cable shall be grounded.

L. Maximum practical separation shall be maintained between signal (analog, alarm, and status) conduits and power feeders and AC systems.

M. All field conductors shall terminate at the control panel terminal board. Millivolt signal wires (i.e., thermocouple) may be connected directly to the input terminals of the receiving instrument if so specified.

N. All wire ends shall be identified at both ends with wire markers.

O. Lifting rings from cabinets/assemblies shall be removed. Hole plugs shall be provided for the holes of the same color as the cabinet.

3.02 START-UP

A. Prior to final connection to the pump control panel, the Instrumentation and Controls Contractor shall thoroughly clean all work completed including the interior of all panelboards; and remove all dirt, trash, and foreign material. The outside of all instrument panelboards are to be cleaned and damaged painted surfaces touched up as required to leave the equipment in an acceptable condition. This shall include all nameplates, tags, and identification of equipment and devices within or on the front of the panels.

B. It shall be the responsibility of the vendor to provide a factory trained and qualified serviceman from the manufacturer's of the equipment to TEST AND CALIBRATE ALL EQUIPMENT and to INSTRUCT the Contractor on EQUIPMENT INSTALLATION and the ENGINEER on operation of the equipment.

C. No other instrumentation system manufacturer's personnel other than those persons directly from the service department of the manufacturer of the equipment shall be acceptable to perform this work.

D. The start-up services shall be performed by qualified personnel from the service department of the equipment manufacturer with a minimum of five years experience on the equipment being provided by this contract, or equal.

E. During the start-up, the Instrumentation shall provide sufficient personnel to aid with the start-up of the instrument and control equipment to be provided and installed by this Section and by this Contract. This shall include services to correct any faults and to

make the necessary adjustments for the proper operation of the equipment and installation.

3.03 TESTING AND CALIBRATING

A. Testing and calibration of equipment shall be done in the presence of the Engineer.

B. Prior to electrical check out all breakers, switches and similar disconnect devices shall be placed in the off position.

C. The panel and other equipment grounding shall be verified.

D. Visual inspection and continuity testing shall be made to verify that no damaging wiring errors occur between power and signal wiring.

E. The systems shall be checked for improper or accidental grounding.

F. Each system and component shall be energized and their inputs simulated. The output shall be checked to verify the proper calibration and interaction with associated hardware.

G. Hypotting shall not be permitted on instrument systems unless specific instructions are given to safeguard electronic equipment from damage.

H. Prior to actuating a final control element (valve, level actuator, or variable frequency drive) the Instrumentation Contractor shall obtain the permission of the General Contractor and any other involved contractors to prevent damage to associated equipment.

I. The factory serviceman shall verify the calibration and direction of the final control element in accordance with the requirements for each portion of the system.

J. Instrument and control calibration and control loop checkout shall be the responsibility of the manufacturer of the equipment.

K. The Instrumentation Contractor shall arrange for and obtain the services of a factory trained service qualified engineer from the manufacturer's of the equipment to perform the calibration and commissioning of the entire system.

L. Each instrument shall be calibrated at 10 percent, 50 percent, and 90 percent using test instruments that are rated to an accuracy of at least five times greater than the instrument being checked. The test instrument shall have its accuracy traceable to the National Bureau of Standard as applicable.

M. Upon completion of the work, the Instrumentation Contractor shall demonstrate to the Owner the proper operation of all equipment and systems.

N. The Instrumentation Contractor submit to the Engineer all test data, inspection test certificates, manufacturers' warranties certified calibration data, certified prints, manufacturers' installation, operation and maintenance manuals, electrical wiring and control diagrams with all noted field modification for an as-built record for the system, and required and suggested spare parts lists.

O. A factory test shall be scheduled by the instrumentation system manufacturer for the entire system. A simulated system layout which shall include all equipment and interconnections shall be arranged to perform all system functions. The testing shall be performed in the presence of the Engineer. A two week written notification shall be provided to the Engineer to allow for scheduling the testing.

P. Upon completion and satisfactory performance an approval notification shall be provided for this portion of the work for this Section. No equipment shall be allowed to be shipped from the factory without approval for this portion of the work.

3.04 FACTORY-TRAINED SERVICES

A. The supervisory service of a factory-trained service engineer specifically trained on the type of equipment specified herein shall be provided during construction to assist the Contractor in equipment installation, the location of sleeves, methods of installing conduit and special cable, mounting, piping and wiring of one of each type of device, and the methods of protecting all of the equipment prior to placing it into service.

B. Upon completion of the installation, the service engineer's services shall be provided for calibration, testing and start-up of the equipment.

3.05 PRODUCT HANDLING

A. Upon completion of shop assembly and testing, all control panels shall be enclosed in heavy-duty polyethylene envelopes or secured sheeting to provide complete protection from dust and moisture. Dehumidifiers shall be placed inside the polyethylene coverings. The equipment shall then be skid-mounted for final transport. Lifting rings shall be provided for moving the equipment without removing protective covering. Boxed weights shall be shown on shipping tags together with instructions for unloading, transporting, storing and handling at the job site.

B. Special instructions for proper field handling and installation required by the manufacturer for proper protection shall be securely attached to each piece of equipment prior to shipment.

C. Each package shall be tagged to identify its location, tag number and function in the system. Identification shall be prominently displayed on the outside of the package.

D. A permanent stainless steel or other noncorrosive material tag firmly attached and permanently and indelibly marked with the instrument tag number as given in the tabulation shall be provided on each piece of equipment supplied under this section.

E. Equipment shall not be stored out-of-doors. Equipment shall be stored in dry permanent shelters and, including in-line equipment, shall be adequately protected against mechanical injury. If any apparatus has been damaged, such damage shall be repaired or the damaged equipment replaced by the Instrumentation Contractor at his own cost and expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such tests as directed by the Engineer. This shall be at the cost and expense of the Instrumentation Contractor or the apparatus shall be

replaced by the Instrumentation Contractor at his own expense.

3.06 GUARANTEE

A. For guarantee, refer to General Conditions.

CONTROL PANEL AND OPERATOR STATION LIST										
Designation	**Description**	**Location**	**NEMA Rating**	**Material**	**Min. Height**	**Min. Width**	**Min. Depth**	**Mounting**	**UPS**	**OIT**
PCP-1	Parkside Ave. Pump Station Pump Control Panel	Parkside Ave. Pump Station	12	Galvanized Steel	60-in	36-in	12-in	Wall	NO	NO
PCP-2	Pinecrest Pump Station Pump Control Panel	Pinecrest Pump Station	12	Galvanized Steel	60-in	36-in	12-in	Wall	NO	NO

INSTRUMENTATION LIST								
TAG #	**FACILITY**	**FUNCTION**	**INSTRUMENT**	**TYPE**	**LOCATION**	**RANGE**	**UNITS**	**REMARKS**
LT-01	Parkside Ave. Pump Station	Wet Well Level	Level Transmitter	Submersible Pressure	Wet Well	0-30	FT	Provide Intrinsically Safe Current Barrier
LSH-01A	Parkside Ave. Pump Station	Wet Well High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSH-01B	Parkside Ave. Pump Station	Wet Well High High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSL-01	Parkside Ave. Pump Station	Wet Well Low Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LT-02	Pinecrest Pump Station	Wet Well Level	Level Transmitter	Submersible Pressure	Wet Well	0-30	FT	Provide Intrinsically Safe Current Barrier
LSH-02A	Pinecrest Pump Station	Wet Well High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSH-02B	Pinecrest Pump Station	Wet Well High High Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier
LSL-02	Pinecrest Pump Station	Wet Well Low Level	Level Switch	Float Switch	Wet Well	N/A	N/A	Provide Intrinsically Safe Relay Barrier

DIVISION 14

SECTION 14600

HOISTING EQUIPMENT

PART 1 GENERAL

1.1 WORK INCLUDED

A. Furnish, install, test and place in satisfactory operation the hoisting equipment, complete with all supports, fastenings, and other appurtenances, as indicated on the Drawings and as herein specified.

B. The Specifications and Drawings direct attention to certain required features of the equipment but do not purport to cover all details entering into its design and construction. Nevertheless, the Contractor shall furnish, shop test, deliver, install and field test all materials, equipment and appurtenances for the hoisting equipment complete in all details and ready for operation as specified herein, whether specifically mentioned in these Specifications or not.

1.2 RELATED WORK

A. Division 1 – General Requirements

B. Division 2 – Precast Concrete

C. Division 5 - Metals

D. Division 9 - Finishes

E. Division 11 - Equipment

F. Division 15 – Mechanical

G. Division 16 – Electrical

1.3 QUALITY ASSURANCE

A. The hoisting systems shall conform to the location, capacity, critical dimensions and other pertinent data listed in the “Equipment Schedule” included herein.

B. All structural steel members of the handling system shall be designed in accordance with the specifications of American Institute of Steel

Construction, current edition, and any welded construction shall be in accordance with the standards of the American Welding Society.

C. Castings, forgings, stampings, etc., shall have a safety factor of at least 5.

D. Provide service of factory train service technician with training specific to the hoisting equipment provided.
   1. Provide service of manufacturer's representative as specified in Section 01665

E. The precast concrete top slab shall be designed to include the pedestal connection for the davit crane.

1.4 Submittals

A. Product Data: For each type of product indicated.

B. Maintenance Data: For each product to include in maintenance manuals.

C. Warranties: Ad specified in the General Conditions.

PART 2 PRODUCTS

2.1 GENERAL

A. All hoisting equipment shall conform to the current standards set forth by the following:

   1. Hoist Manufacturers Institute - HMI 100, HMI 200 and HMI 400.
   2. American National Standard Institute ANSI B30.11, ANSI B30.16 and ANSI C1.
   3. American Institute of Steel Construction
   4. American Welding Society
   5. Crane Manufacturers Association of American Inc., (C.M.A.A.).
   6. Occupational Safety and Health Administration (O.S.H.A.)

B. All hoisting equipment parts shall be proportioned so that all stresses and vertical or lateral deflections will be within conservative limits with minimum vibration. Rated load safety factors of at least five, based upon ultimate strength of the materials used, shall be employed.

C. The Contractor shall verify all dimensions and clearances in the field prior to erection of the hoisting equipment and shall be responsible for the proper fitting and operation of the equipment.

D. The capacity of each hoist shall be permanently marked in a conspicuous manner.

E. Safety Devices: Comply with applicable safety codes, as directed by local authority having jurisdiction, and as follows.

1 All hooks shall be safety type.

F. Align structural beam with the monorail; determine hanger locations according to loading requirements.

2.2 ACCEPTABLE MANUFACTURERS

A. Davit Crane: Davit shall be manufactured by Thern Incorporated, or be an acceptable equivalent product.

2.3 EQUIPMENT

A. Davit Crane

1. The hoisting equipment shall be the First Mate 5PT10 Davit Crane, as manufactured by Thern Incorporated of Winona Minnesota, or approved equal
2. Capacity of davit crane shall be 550 pounds at position "A4" and shall have the following properties.
3. Crane shall have lift capabilities of 25 feet.
4. Hooks shall be of high grade, forged steel, and shall have swivel, antifriction bearings.
5. Fasteners
    a. Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment
6. Cable
    a. Cable shall be 1/4" x 45 feet 304 stainless steel wire rope.
7. Crane
    a. Crane shall have an internal mechanical brake that works instantly when operation is stopped and holds the load.
    b. Galvanized Finish Crane.
    c. Pedestal Base with cap.
    d. Adjustable Boom with ratchet jack

B. EQUIPMENT SCHEDULE

Hoist Location	Parkside	Pinecrest
Number Required	1	1
Rate Use	Outdoor	Outdoor
Suspension Type	Safety Hook	Safety Hook
Capacity	550 pounds at position A4	550 pounds at position A4
Hoist Type	Manual	Manual
Cable Length	45	45

C. Fasteners

1. Studs, nuts, washers, and fasteners shall be Type 304 stainless steel and shall be furnished with the hoisting equipment.

2.4 Finish

A. Finish: All steelwork and machinery except bearing surfaces, shafts, chain, cable, and stainless steel shall have factory applied galvanized coating. Surfaces to be galvanized shall be thoroughly dry and free from rust, grease or dirt prior to application.

B. Field painting as specified in Section 09900 - Painting.

PART 3 EXECUTION

3.1 INSTALLATION

A. All equipment shall be installed in accordance with the manufacturer's written instructions, as approved, and all equipment and materials required for proper installation shall be provided.

B. It shall be the responsibility of the Contractor to coordinate the work included under this section of the specifications with other related work specified herein to insure that all the equipment shall operate to perform the designated functions in a proper and acceptable manner.

C. Anchor bolts, expansion bolts, studs, nuts, washers and fasteners shall be set as per manufacturer's recommendations.

3.2 ADJUSTING

A. Adjust hoists to operate smoothly under all load conditions, without malfunction.

3.3 FIELD ACCEPTANCE TESTS

A. Test hoists, at the rated load, in the presence of the Engineer.

3.4 TOOLS AND LUBRICANTS

A. Furnish a complete set of any special tools required for the maintenance and operation of this equipment, as designated by the equipment manufacturer.

B. A one-year supply of each type of lubricant required for each piece of equipment and one grease gun for each type of lubricant required shall be furnished under this Section.

END OF SECTION

DIVISION 15

SECTION 15050

PIPE PENETRATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing and installing pipe penetration assemblies. This Section covers materials for various pipe penetration configurations. Refer to the Contract Drawings for details of assembly and for location.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A53, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. American National Std. Institute (ANSI)/American Water Works Assoc. (AWWA)

1. ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds for Water or Other Liquids

1.03 SUBMITTALS

A. Submit to in accordance with SECTION 01300, manufacturers' literature on all items to be furnished, installation instructions, and where applicable, fire rating and certified test results of the various components.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Unless otherwise shown all pipe sleeves shall be Schedule 40 galvanized steel pipe conforming to ASTM A53. Provide a 2-in minimum circumferential water stop welded to exterior of sleeve at its midpoint. Ends of sleeves shall be cut, ground smooth, and shall be flush with the wall or ceiling and extend 2-in above finished floors. Sleeves required to be sealed by caulking shall be sized as required. Sleeves required to be sealed with mechanical seals shall be sized in accordance with the seal manufacturer's recommendations, and shall be a single seal for wall thicknesses up to and including 12-in; two mechanical seals shall be provided for wall thicknesses greater than 12-in. Sleeves for insulated piping shall be sized to accommodate the approved insulation.

2.02 WALL CASTINGS

A. Unless otherwise shown, wall castings shall be ductile iron conforming to ANSI/AWWA C151/A21.51, thickness Class 53, diameter as required. Flanges and/or mechanical joint bells shall be drilled and tapped for studs where flush with the wall. Castings shall be

provided with an intermediate ½-in thick by 2-in minimum circumferential flange/waterstop, integrally cast with or welded to the casting, located such that it falls within the middle third of the wall.

2.03 SEALING MATERIALS

A. Mechanical seals shall be modular, adjustable, bolted, mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and sleeve. The seal shall be rated by the manufacturer for 40 feet of head or 20 psig. Mechanical seals shall be Link-Seal, manufactured by Thunderline Corp., Wayne, MI., or equal.

B. Caulking for iron, steel and copper piping shall consist of braided oakum packing followed by poured molten soft virgin lead. Minimum length of lead segment shall be one half of pipe diameter, or six inches, whichever is less. Lead shall be flush with end of sleeve. Cooled lead shall be expanded with a caulking iron to form a water seal.

C. Sealant shall be a two part foamed silicone elastomer as manufactured by Dow Corning Co., product No. 3-6548 silicone R.T.V.; 3M brand fire barrier products caulk C.P. 25 and 3M brand putty 303; or Flame-Safe fire stop systems Fig. No. FS-500 by Thomas & Betts Corporation. Packing shall be a fire retardant pliable material, Fig. 310 by Sealtite Co., White Oakum W.S.-600 by American Manufacturing Co., or equal. Sealant bead configuration, depth and width shall be in accordance with manufacturer's recommendations.

2.04 MISCELLANEOUS MATERIALS

A. Bonding compound shall be Sikadur Hi-Mod epoxy by Sika Corporation, equal by Euclid Chemical Corporation; Master Buildings Company or equal.

B. Non-shrink grout shall be Masterflow 713 by Master Builders Company, Euco N-S by Euclid Chemical Co.; Five Star Grout by U.S. Grout Corp. or equal.

C. Galvanized escutcheon plates shall be provided for all exterior sleeved wall penetrations above finished grade.

PART 3 EXECUTION

3.01 INSTALLATION

A. Assemble and install components of pipe penetration assemblies as detailed in the Contract Documents.

END OF SECTION

SECTION 15060

PROCESS PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements to furnish, install, joint and test miscellaneous pipe, fittings, and appurtenances, (including special castings), indicated on the Drawings and specified in this Section.

B. Related Sections

1. Section 02200 - Earth Excavation, Backfill, Fill and Grading
2. Section 09900 - Painting
3. Section 15050 - Pipe Penetrations
4. Section 15140 - Hangers and Supports

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A47, Specification for Ferric Malleable Iron Castings.
2. A53, Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. A182, Specification for Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.
4. A183, Specification for Carbon Steel Track Bolts and Nuts.
5. A193, Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
6. A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service.
7. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
8. A312, Specification for Seamless and Welded Austenitic Stainless Steel Pipes.
9. A320, Specification for Alloy/Steel Bolting Materials for Low Temperature Service.
10. A403, Specification for Wrought Austenitic Stainless Steel Piping Fittings.
11. A536, Specification for Ductile Iron Castings.
12. A563, Specification for Carbon and Alloy Steel Nuts.
13. B88, Specification for Seamless Copper Water Tube.
14. B135, Specification for Seamless Brass Tube.
15. C552, Specification for Cellular Glass Thermal Insulation.
16. D1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
17. D2513, Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
18. D2992, Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe and Fittings.
19. D2996, Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.

B. American Water Works Association (AWWA)

1. C606, Standard for Grooved and Shouldered Joints.
2. C651, Standard for Disinfecting Water Mains.

C. American National Standards Institute (ANSI)

1. A21.4, Standard for Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water.
2. A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
3. A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
4. A21.15, Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges
5. A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
6. A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.
7. A21.53, Ductile Iron Compact Fittings for Water and Other Liquids.
8. B16.1, Standard for Ductile Iron Pipe Flanges and Flanged Fittings.
9. B 16.3, Malleable Iron Threaded Fittings, Class 150 and 300.
10. B16.5, Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
11. B 16.9, Factory-Made Wrought Steel Butt Weld Fittings.

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

B. Shop Drawings

1. Piping layouts in full detail.
2. Location of pipe hangers and supports.
3. Location and type of backup block or device to prevent separation.
4. Large scale details of all wall penetrations and special castings.
5. Schedules showing the material and thickness or class of all pipe, fittings, special castings, couplings, expansion joints, and other appurtenances.
6. Details of pipe lining, coating, wrapping, insulation and painting of all pipe lines.
7. Points of location of piping identification signs.
8. Other piping appurtenances and data pertinent to the layout of pipe lines whether specifically mentioned in the Specifications or shown on the Drawings.

C. Certificates

1. Sworn certificates in duplicate of shop tests showing compliance with appropriate standard.
2. Design Computations shall be included in the submittal, for the purpose of record only, and certified by piping manufacturer.

D. Submit manufacturer’s certificates of conformance.

E. Submit certified copies of test reports.

1.04 QUALITY ASSURANCE

A. Ductile Iron Pipe

1. Inspect and test at foundry according to ANSI Standards.

2. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.
3. Owner reserves right to perform visual inspection and hammer test before installation.

PART 2 PRODUCTS

2.01 PIPE SCHEDULE

A. General

1. Unless otherwise called for by the Contract Drawings or elsewhere in these specifications, the following is a guide as to types of materials and jointing required for piping under this contract.
2. The lack of mention of any specific pipe shall not relieve the Contractor from the responsibility of furnishing and installing all piping required for completion of the Work.
3. Piping listed is exposed unless stated otherwise.

B. Potable Water

1. Three inches and smaller
   a. Type L (medium wall) hard temper copper with soldered fittings. Red brass pipe required around equipment, and in other locations were vibration may occur.
   b. Buried service - Type K, soft temper.
2. Greater than three inches
   a. Ductile-Iron pipe and fittings, flanged joint, cement lined.
   b. Buried service – use restrained mechanical joint.

C. Process Wastewater, Vent,

1. Three inches and smaller – na.
2. Greater than three inches
   a. Ductile-Iron pipe and fittings, flanged joint, cement lined.
   b. Buried service – use restrained mechanical joint.

D. Compressed Air

1. All compressed air piping - (except as noted below) copper Type K heavy wall, hard temper with soldered fittings.

E. Wet Well Mixing (Compressed Air)

1. Stainless Steel,
   a. 2 inches and smaller, Schedule 40S, Butt welded, Socket weld or flanged as indicated.

F. Sump Pump Piping

1. Schedule 80 PVC. All fittings shall be of the same material and classification and shall be of the solvent-socket weld type unless noted otherwise on the Contract Drawings.
2. Tubing as recommended by the pump manufacturer, as detailed on the Contract Drawings or as specified.

2.02 DUCTILE-IRON PIPE AND FITTINGS

A. In accordance with Specification Section 15070.

2.03 EXTERIOR DUCTILE IRON PIPE FOR BURIED SERVICE

A. In accordance with Specification Section 02618

2.04 COPPER PIPE AND FITTINGS

A. Pipe

1. In accordance with ASTM B 88.

B. Fittings

1. Cast bronze or wrought copper and bronze solder-joint pressure fittings.
2. Manufactured by Mueller Company, NIBCO, Inc.; or equal.

C. Unions

1. Solder type, with brass-to-brass seats. Gasketed unions are not acceptable.

D. Solder

1. Silver solder shall be used for making all buried joints.
2. For air piping, solder shall be 95 percent tin and 5 percent antimony.

E. Insulating Union, where copper piping is connected to steel pipe.

1. Manufactured by EPCO Sales, Incorporated, or Capital Manufacturing Co., or equal.

F. Tapped Cap, where copper pipe is connected to ductile iron pipe, furnish and install a tapped cap, Flow F-1402, or ACIPCO Type A-338 or equal, and a brass corporation stop, Type H15025 by Mueller Co., or equal.

G. Where more rigidity is required in erecting and supporting copper pipe, the Contractor may, at his option or when so directed by the Engineer, substitute brass pipe.

2.05 BRASS PIPE AND FITTINGS

A. Pipe in accordance with ASTM B 135, drawn temper. Fittings shall be brass.

2.06 STEEL PIPE AND FITTINGS

A. Pipe

1. Black steel and Steel pipe to be in accordance with ASTM A53. Steel pipe shall be Schedule 40 and Schedule 80 as specified and shown in the Contract Drawings.

B. Fittings

1. Fittings used on black steel pipe lines two and one-half (2-1/2) inches or less in diameter, unless otherwise specifically called for, shall be standard weight, one hundred fifty (150) pound, beaded, malleable iron.
2. Fittings used on black steel pipe lines three (3) inches and larger shall be of the long radius design of standard weights in accordance with ANSI B16.9.
3. Fittings for compressed air shall be 300 lb. black malleable iron screwed fittings.
4. Malleable iron screwed fittings to be in accordance with ANSI B16.3.
5. Hot-dipped galvanized malleable iron fittings shall be used on all galvanized steel pipe lines. Malleable iron grooved end fittings to be in accordance with ASTM A47 and be hot-dipped galvanized.

C. Couplings

1. Couplings, used on black steel pipe lines three (3) inches and larger in diameter, shall be,
   a. Exposed pipe: Style 38 steel compression couplings as manufactured by Dresser Industries.
   b. Buried pipe: Type 411 cast compression couplings as manufactured by Smith-Blair, Inc.,
   c. or equal.

D. Protective Coatings

1. All natural gas, and vent pipes shall be wrapped with a protective coal tar tape or heavily coated with Koppers Bitumastic No. 50 or equal. After testing, all joints shall be wrapped or heavily coated with Bitumastic No. 50 or equal.
2. All ungalvanized (black) steel piping for interior use, that is not covered by insulation, shall be primed and painted as specified under painting schedule of SECTION 09900.

2.07 SEAMLESS CARBON STEEL PIPE AND FITTINGS

A. Pipe and Fittings

1. In accordance with ASTM A53, Grade A.
2. Wall thickness 0.134 inches, minimum.

B. Fittings

1. Malleable Iron, 150 lb. service rating with threaded joints
2. Reducers and Increases to be concentric style.

2.08 STAINLESS STEEL PIPE AND FITTINGS

A. Pipe

1. In accordance with ASTM A312, Type 304 or Type 316 as specified, seamless annealed, pickled and passivated.
2. Type 304L or Type 316L for welded joints.

B. Fittings

1. Threaded Forged, in accordance with ASTM A182, Grade F304 or F316, 3,000 pound WOG.
2. Socket Weld Forger, in accordance with ASTM A182 Grade F304L of F316L, 2,000 pound WOG.
3. Butt Welded in accordance with ASTM A403 Grade WP304L or WP316L conforming to ANSI B16.9, fitting wall thickness to match adjoining pipe.
4. Long radius elbows unless indicated otherwise.

C. Flanges

1. Forged in accordance with ASTM A182 Grade F304L or F316L, Class 150 or 300, slip on welding neck, 1/16 inch raised face conforming to ANSI B16.5.

D. Gaskets

1. 1/16 inch, of material to suit intended use, and appropriate configuration for raised face or flat face flanges.

E. Bolting

1. General conditions, Type 316 in accordance with ASTM A193 Grade B8M hex head bolts and ASTM A194 Grade 8M hex head nuts.
2. Corrosive conditions, Type 304 stainless steel bolts in accordance with ASTM A320 Grade B8 with Copper silicon hex head nuts in accordance with ASTM B98 Grade A.
3. Mating to cast iron, and flat gasket, provide ASTM A307 Grade B hex head bolts and ASTM A563 Grade A heavy hex nuts.

F. Thread Lubricant

1. Teflon tape or Anti seize type.

2.09 STAINLESS STEEL TUBING AND FITTINGS

A. Tubing

1. In accordance with ASTM A312, Type 316 seamless, soft annealed, 0.083 inch, minimum wall thickness.

B. Fittings

1. Flareless Compression Forged in accordance with ASTM A182 Grade F304 or F316.
2. Socket Welded in accordance with ASTM A182 Grade F304L or F316L.

2.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Pipe

1. Rigid, unplasticized, and in accordance with ASTM D1785, Type 1, Class 1220.
2. Suitable for field cutting, welding, bending and couplings, and shall be Scheduled 80 unless otherwise shown on the Drawings.
3. Sizes shall be as shown on the Drawings.
4. Bundled or packaged in such a manner as to provide adequate protection for the ends, or plain, during transportation from the manufacturer to the Contractor.

B. Fittings and Appurtenances

1. Fittings to be solvent-socket weld type, or flanged as shown on the Contract Drawings.
2. Union connections and connection to pipe of other material shall be made with pipe flanges and 1/16 inch rubber gaskets.
3. Gaskets shall be resistant for the type of service intended.

2.11 AIR SERVICE HOSE

A. 3/8-inch inside diameter synthetic rubber hose with inner and outer tubes of oil resistant synthetic rubber with two braids of rayon rated for 300 psi.

B. Hose end shall have saflowmatic adapter with male thread and a reusable fitting between hose and adapter.

C. Each air station shall have a pistol grip blow gun made of die cast aluminum with hang up hook and standard brass nozzle.

D. Provide at each air station a prep-air full size 3/8-inch T-bar lub-air-ator with transparent bowls and bowl guards.

E. Air station pipe end shall have quick connect couplings saflowmatic with female thread or approved equal.

2.12 ADAPTERS

A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.13 FLEXIBLE PIPE COUPLINGS

A. Where flexible connections in the piping are indicated on the drawings, they shall be obtained by the use of sleeve-type couplings, split couplings or non metallic couplings.

B. Non-metallic coupling

1. Suitable for 200 psi working pressure.
2. Coupling body to be EDPM construction.
3. Retaining rings to be 316 stainless steel.
4. Minimum of 4 tie rods connecting flanges of the coupling.
5. Type J-1W, Wide Arch Expansion Joint manufactured by RedFlex or equal.

C. Sleeve-Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
   a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
   a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be **stainless steel,** unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

D. Split Couplings

1. Split couplings may be used for connecting ductile-iron pipe. If split couplings are used with grooved pipe, the minimum pipe wall thickness shall be as specified under AWWA C606.
2. Split couplings shall be made of malleable iron and shall be NAPPCO couplings made by North American Pipe Products Co.; or acceptable equivalent products.
3. Where split couplings are furnished in lieu of flanged joints the joint shall be of the rigid type with pipe grooves cut to bring the ends of the pipe solidly together. The beam strength of the joint shall be equal to or greater than that of a flanged joint.
4. Where split couplings are indicated to provide for expansion or flexibility, the pipe grooves shall be cut to provide the necessary expansion or flexibility.

2.14 FILLING RINGS

A. Provide suitable filling rings where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing, and drilling, such rings shall conform to ANSI Class 125 standard.

B. Filling rings shall be of suitable length with nonparallel faces and corresponding drilling, if necessary, to ensure correct assembly of the adjoining piping or equipment.

2.15 WALL CASTINGS

A. Wall castings shall be of the sizes and types indicated on the drawings. Flanges, facing and drilling shall conform to ANS A21.10 except that where required, as where a flange if substantially flush with the face of a masonry wall, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard fittings. A central fin not less than ½-inch. thick and 1-1/2-inch to 2-inch high shall be cast on the barrel at a point that will locate it midway through the wall to form a water stop.

2.16 RESTRAINTS

A. General

1. All valves and fittings shall be restrained, so that all thrusts shall be supported independent of the piping system.
2. All restraints shall conform to pipe manufacturer's recommendation.

B. For interior piping, restraints shall be located as follows:

1. Anchors shall be placed so all forces will be balanced.
2. Tie downs shall be used to hold the pipe in position where velocity and surge forces will cause pipe movement. They shall control stress due to thermal expansion at wall pipes, sleeves and equipment.
3. Guides shall be used to prevent transverse motion at flexible couplings used as expansion joints.

C. Tie Rods

1. On piping, where flexible couplings are located near fittings or valves, stainless steel tie rods shall span the coupling from the two adjacent flanges.
2. Where the Engineer intends to have flexible couplings used as expansion couplings, tie rods may be omitted.
3. All tie rods shall be sized, spaced and installed according to the manufacturer's recommended procedure, or as directed by the Engineer.

D. Thrust Blocks

1. Constructed at all exterior pipe fittings 22-1/2° and over, and valves, unless specifically ordered otherwise by the Engineer.
2. The blocks shall be placed against undisturbed soil or against soil which has been compacted as specified in Division 2 for structures and pipes.
3. Concrete used for thrust blocks shall be 3000 psi strength.

2.17 HANGERS AND SUPPORTS

A. In accordance with SECTION 15140.

B. In addition to the hangers and supports spaced as specified elsewhere in this specification, furnish and install additional hangers and supports at all valves, fittings and pipe line equipment. Holding devices for valves and other pipe line appurtenances shall be designed and constructed to hold each unit securely.

C. Where indicated on the Drawings or otherwise required, piping supports shall consist of concrete piers or fabricated steel supports. In these instances, materials and workmanship shall be in full compliance with Division 3 of these specifications.

D. Furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner (as determined and/or directed by the Engineer) at the lines and grades indicated on the drawings or specified. The design and fabrication of such supports shall be the responsibility of the Contractor as part of the work.

E. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification from the manufacturer stating that such requirements have been complied with.

2.18 PIPE PENETRATIONS

A. In accordance with SECTION 15050.

2.19 PIPE INSULATION (FOR EXPOSED WATER AND FORCE MAINS)

A. Buried or exposed Service

1. Cellular glass type made specifically for thermal insulation of underground piping and is compatible with the piping material.
2. Insulation composed of all glass sealed cells having no binders or fillers.
3. The completed product shall be rigid and impermeable with ultimate compressive strength shall be at least 100 psi.
4. Thermal conductivity of the cellular glass shall be no higher than 0.40 BTU/sq ft/F°/in.
5. Cellular glass thickness shall be 2-inches thick and comply with all requirements of federal specification HH-1-551 and ASTM C552.
6. Bands for securing the insulation to the pipe shall be 0.5 inches wide by 0.020 inches thick and shall be made of stainless steel.
7. Jacketing for buried insulation
    a. Flexible laminate consisting of asphalt and glass fabric.
    b. Fabricated so that it can be wrapped around the insulation and easily secured in place.
    c. Flexible and tough enough to be wrapped tightly around the insulation and secured without tearing or cracking.
8. Jacketing for above ground insulation
    a. Standard gauge aluminum jacketing with stainless steel bands.

2.20 PAINTING AND IDENTIFICATION

A. In accordance with SECTION 09900.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. Coordinate work with the other trades, so that interferences between piping, duct, equipment, architectural and structural features, and other work will be avoided.
2. Anchors, bolts, inserts, supports, wall fittings, sleeves and all other appurtenances required to be built in to the work prior to the installation of pipe work shall be furnished and installed accurately and maintained in position during placement of the surrounding concrete and or masonry.
3. Drawing are diagrammatic and do not attempt to show all offsets or fittings. Install piping to conform to structures, equipment, approved shop drawings and fit work of other trades as approved by the Engineer at no additional expense to the Owner.
4. Install piping as closely as possible to walls, ceilings, columns, and other structural parts (consistent with proper space for covering, removal of pipe and access to equipment) so as to occupy the minimum of space, and all offsets and fittings required to accomplish this must be furnished by the Contractor without additional expense to the Owner.
5. In case interference develops, the Engineer will decide which work is to be relocated regardless of which was first installed.

B. Protection Against Settling

1. Where a cast pipe passes through a concrete structure into fill, whether shown or otherwise, there shall be a flexible pipe coupling at or within 12-inches of the concrete face. A second flexible joint (flexible pipe coupling or bell and spigot) shall be provided within 3 feet of the first, whether shown or not.

C. Ductile-Iron Pipe

1. Care shall be taken in handling and installing pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is installed so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches form the visible limits of the crack.
4. Cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.
5. Castings to be encased in masonry shall be thoroughly cleaned of all rust, scale and other foreign material. Then accurately set with the bolt holes, if any, carefully aligned.
6. Appurtenances shall be set and jointed as indicated on the drawings.
7. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
8. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.
9. Flanged joints shall be made up tight, care being taken to prevent undue strain upon pump nozzles, valves, and other pieces of equipment.

D. Tapped Connections in Ductile Iron Pipe

1. Tapped connections shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses, shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.

2. Where the size of the connections exceeds that given above for the pipe in question, the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or permitted by the Engineer.
3. All drilling and tapping shall be done normal to the longitudinal axis of the pipe; fitting shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

E. Copper Pipe

1. Joints for piping except where buried shall be made up with 95-5 solder.
2. Joints for supply piping buried or installed below slab shall be made up with at least 1000 degree silver solder, and installed with minimum amount of buried joints.

F. Brass Pipe

1. Install in place of copper pipe when more rigidity is required as stated in article 2.02, B, 7.

G. Black Steel Pipe

1. All threads to be clean, machine cut, and all pipe to be reamed before erection. Each length of pipe as erected shall be up-ended and rapped to dislodge dirt and scale.
2. Screwed joints to be made up with good quality thread compound and applied to the male thread only. After having been set up, a joint must not be backed off unless the joint is completely broken, the threads cleaned, and the new compound applied. All joints shall be airtight.
3. All interior steel piping to have a sufficient number of unions to allow convenient removal of piping. Install rigid joint and flexible couplings as required.

H. Seamless Carbon Steel

1. Maximum length of pipe to be twenty feet.
2. Joint broken after thread compound has set will be cleaned and new compound applied.
3. Joints to be air tight.
4. Install a sufficient number of unions to allow convenient removal of piping.

I. Stainless Steel Pipe

1. Install in accordance with the manufacturer's technical data and printed instructions.
2. Weld joints except flanged where required or screwed where shown on the Drawing.

J. Polyvinyl Chloride (PVC) Pipe

1. Install in accordance with the manufacturer's technical data and printed instructions.
2. Solvent weld joints except flanged where required or screwed where shown on the Drawing. In making solvent welded connections, clean dirt and moisture from pipe and fittings, bevel pipe ends slightly with emery cloth if necessary, and apply solvent cement of the proper grade.
3. Install expansion joints every 50 feet on straight runs in accordance with the manufacturer's recommendations and Engineers approval. Expansion joints shall be used outside adjacent to the structures. Exterior expansion joints shall be installed within an approved sleeve to keep joint free from dirt.
4. Install valves and fittings in accordance with the manufacturer's instructions. Particular care shall be taken not to overstress threaded connections at sleeves. In making solvent weld connections, the solvent should not be spilled on valves or allowed to run from joints.

5. All compete pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints after which they shall be tested as specified.
6. Where PVC passes through wall sleeves, joints shall be caulked with a sealing element or link type seal as shown on the Contract drawings.
7. Install flexible couplings in accordance with the manufacturer's instructions.

K. Fiberglass Reinforced Plastic (FRP) Pipe

1. Cut, fabricate and install in accordance with the manufacturers written instructions.
2. Provide manufacturer’s representative for instructing workers with proper jointing procedures.

3.02 SLEEVE-TYPE COUPLINGS

A. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches.

B. Soapy water may be used as a gasket lubricant.

C. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.

D. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.

E. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.

F. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.

G. The correct torque as indicated by a torque wrench shall not exceed the values indicated in the tabulation titled TORQUE.

TORQUE

Nominal pipe size, in.	Bolt diameter, in.	Maximum torque, ft.-lb.
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65
30-36 (3/8 in. mid. ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

3.03 HANGERS AND SUPPORTS

A. In accordance with SECTION 15140.

3.04 TRENCHING AND BACKFILL FOR BURIED PIPELINES

A. In accordance with SECTION 02200.

3.05 CLEANING

A. Prior to the pressure and leakage tests, the piping shall be thoroughly cleaned of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.06 TESTING

A. General

1. All piping and piping systems are to be pressure or leak tested by the Contractor in the presence of the Engineer.
2. Leak testing (exfiltration test) shall be performed on all lines designated for gravity service.
3. Pressure testing shall be performed on all lines designed to transfer product under pressure.
4. No leakage will be permitted.
5. Piping not passing pressure or leak testing shall be repaired or replaced by the Contractor and retested to the satisfaction of the Engineer at no additional expense to the Owner and without extension of time for completion of the Work.
6. Furnish and install suitable temporary testing plugs or caps; pressure pumps, pipe connections, meters, gages, relief valves, blow offs and other necessary equipment; and all labor required, to test the pipe specified in this Section.
7. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires with the following exceptions:
   a. Pipelines embedded in concrete shall be tested prior to placing of the concrete.
   b. Exposed piping shall be tested prior to field painting.

B. Ductile Iron Pipe

1. Section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary taps at such points and shall plug said holes after completion of the test.
2. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.
3. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Care shall be taken not to apply this pressure to items of equipment known to be incapable of withstanding such pressure.
4. If the specified pressure cannot be achieved and maintain it for a period of **one (1) hour with no additional pumping**, the section shall be considered as having failed to pass the test.
5. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirements.

C. Copper Pipe and Carbon Steel Pipe

1. After installation, the piping shall be tested for **one (1) hour at 1.5 times the designed operating pressure.**

D. PVC Pipe

1. Pipe lines shall be subject to a hydrostatic pressure test for **one (1) hour at 1.5 times the designed operating pressure** or as required by the Engineer.

3.07 DISINFECTING AND FLUSHING

A. Pipe lines carrying potable water shall be disinfected

1. Furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651, except as otherwise specified herein.
2. The dosage shall be such as to produce not less than 10 PPM after a contact period of not less than 24 hours.
3. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM.
4. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.
5. Dispose of the water used in disinfecting and flushing in an approved manner.
6. If, in the opinion of the Engineer and/or owner of the above method of disinfection is deemed impractical, the lines carrying potable water shall be disinfected by the method outlined in AWWA Standard C651, Section 9.

END OF SECTION

SECTION 15070

DUCTILE-IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish, install, joint, and test ductile-iron pressure pipe, fittings (including special castings), and appurtenant materials and equipment indicated on the Drawings and specified in this Section.

B. This Section covers Ductile-Iron Piping not buried in earth.

1.02 REFERENCES

A. American National Standards Institute (ANSI)

1. A21.4, Standard for Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water.
2. A21.10, Standard for Gray-Iron and Ductile-Iron Fittings, 3-inch. through 48-inch., for Water and Other Liquids.
3. A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.
4. A21.15, Standard for Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges
5. A21.50, Standard for Thickness Design of Ductile-Iron Pipe.
6. A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds, or Sand-Lined Molds, for Water or Other Liquids.
7. B16.1, Standard for Ductile Iron Pipe Flanges and Flanged Fittings.

C. American Water Works Association (AWWA)

1 C606, Standard for Grooved and Shouldered Joints.
2 C651, Standard for Disinfecting Water Mains.

D. American Society for Testing Materials (ASTM)

1. A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

1.03 SUBMITTALS

A. In accordance with SECTION 01300 submit the following:

B. Shop Drawings

1. Piping layouts in full detail.
2. Location of pipe hangers and supports.
3. Location and type of backup block or device to prevent separation.
4. Large scale details of all wall penetrations and special castings.
5. Schedules of all pipe, fittings, special castings, couplings, expansion joints, and other appurtenances.

C. Certificates

1. Sworn certificates in duplicate of shop tests showing compliance with appropriate standard.

D. Manufacturer's Literature

1. Catalog cuts of joints, couplings, harnesses, expansion joints, gaskets, fasteners and other accessories.
2. Brochures and technical data of coatings and lining's and proposed method of application.

1.04 QUALITY ASSURANCE

A. Inspect and test at foundry according to ANSI Standards.

B. Owner reserves right to inspect and/or test by independent service at manufacturer's plant or elsewhere at his own expense.

C. Owner reserves right to perform visual inspection and hammer test before installation.

PART 2 PRODUCTS

2.01 PIPE

A. Ductile-Iron Pipe

1. Designed in accordance with ANS A21.50.
2. Manufactured in accordance with ANS A21.15 or ANS A21.51.
3. Ductile-iron pipe shall be at least thickness **Class 52** for pipe 4-inch.and smaller and at least thickness **Class 53** for pipe 6-inch.and larger, unless stated otherwise.
4. Ductile-iron pipe for use with split couplings shall have a thickness as specified in this Section.

B. Pipe For Use With Couplings

1. Pipe for use with sleeve-type couplings shall be as specified above except that the ends shall be plain (without bells or beads). The end shall be cast or machined at right angles to the axis.
2. Pipe for use with split couplings shall be as specified above except that the ends shall not have bells or beads but shall have cast or machined shoulders or grooves conforming to AWWA C606.

2.02 FITTINGS

A. Flanged Fittings

1. Provide with working pressure of 250 psi.
2. Faced and drilled in accordance with ANS A21.10 except that special drilling or tapping shall be provided as necessary to ensure correct alignment and bolting.
3. Flanged fittings which are not available under ANS A21.10 (e.g. laterals or reducing ells) shall be furnished to conform to the requirements of ANS B16.1, class 125.

B. Base Elbows

1. Fittings shall be provided with standard bases in accordance with ANSI/AWWA C110/A21.10 where so indicated.

C. Grooved Fittings

1. In accordance with ANS A21.10 in all respects except minimum wall thickness as follows:

Nominal Pipe size, in.	Minimum wall thickness, in.
3	0.40
4	0.40
6	0.45
8	0.53
10	0.55
12	0.60

D. Nonstandard Fittings

1. Fittings having nonstandard dimensions and cast especially for this project shall be of acceptable design. They shall be manufactured to meet the requirements of the same specifications and shall have the same diameter and thickness as standard fittings, but their laying lengths and types of ends shall be determined by their positions in the pipelines and by the particular piping to which they connect.

2.03 ADAPTERS

A. Where it is necessary to joint pipes of different type, furnish and install the necessary adapters unless solid sleeves are indicated on the Drawings or permitted. Adapters shall have ends, conforming to the above specifications for the appropriate type of joint, to receive the adjoining pipe. Adapters joining two classes of pipe may be of the lighter class provided that the annular space in bell-and-spigot type joints will be sufficient for proper jointing.

2.04 JOINTS

A. Gaskets

1. Gaskets shall be of a composition suitable for exposure to the product which the pipe is intended.

B. Flanges

1. Flanges for flanged pipe shall conform to ANS A21.15 except that special drilling or tapping shall be done as necessary to ensure correct alignment and bolting.

2.05 COUPLINGS

A. Flexible Connections

1. Where flexible connections in the piping are specified or indicated on the drawings, they shall be obtained by the use of sleeve-type couplings or split couplings.

B. Sleeve Type Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.

2. For sizes 2 1/2 to 16-inch diameter, up to 250 psi working pressure:
   a. Provide style 442 Long Sleeve, Cast Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
3. For sizes greater than 16-inch diameter, up to 150 psi working pressure:
   a. Provide style 411, with 10-inch long sleeve minimum, Steel Coupling by Smith Blair, Inc., Texarkana, Texas, or be acceptable equivalent products.
4. Nuts and Bolts to be high strength, low alloy steel, unless noted otherwise.
5. Provided with gaskets of a composition suitable for exposure to the liquid within the pipe.
6. Provide with fusion bonded epoxy finish.
7. Conform to requirements of AWWA C219.

C. Split Couplings

1. Split couplings may be used for connecting ductile-iron pipe. If split couplings are used with grooved pipe, the minimum pipe wall thickness shall be as specified under AWWA C606.
2. Split couplings shall be made of malleable iron and shall be NAPPCO couplings made by North American Pipe Products Co.; or acceptable equivalent products.
3. Where split couplings are furnished in lieu of flanged joints the joint shall be of the rigid type with pipe grooves cut to bring the ends of the pipe solidly together. The beam strength of the joint shall be equal to or greater than that of a flanged joint.
4. Where split couplings are indicated to provide for expansion or flexibility, the pipe grooves shall be cut to provide the necessary expansion or flexibility.

D. Dismantling Couplings

1. Pressure rating at least equal to that of the pipeline in which they are to be installed.
2. For sizes 14 to 72 inch diameter, up to 150 psi working pressure:
   a. Provide DJ400 Dismantling Joint 14 to 72 inch with tie rods by Romac Industries, inc. Bothell, Washington, or acceptable equivalent products.
3. Coupling shall meet the specifications set forth in the AWWA Standard C219.
4. Flanged spool shall be AWWA Class D Steel Ring Flanges, compatible with ANSI Class 125 bolt circles.
5. The end ring body shall be made from ASTM A36 Steel.
6. Gaskets shall be compounded for water and sewer service. Meeting the requirements of ASTM D 2000.
7. Bolts shall be stainless steel Type 316.
8. Tie rods shall be stainless steel Type 316.
9. Provide with fusion bonded epoxy, NSF 61 certified.

2.06 Accessories

A. Filling Rings

1. Provide suitable filling rings where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing, and drilling, such rings shall conform to ANSI Class 125 standard.
2. Filling rings shall be of suitable length with nonparallel faces and corresponding drilling, if necessary, to ensure correct assembly of the adjoining piping or equipment.

B. Gaskets, Bolts, And Nuts

1. For flanged joints, gaskets shall be ring gaskets of rubber with cloth insertion. Gaskets 12-inch diameter and smaller shall be 1/16-inch thick; larger than 12-inch, to be 1/8-inch thick.
2. Flanged joints shall be made with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall conform to the same American National Standard as the flanges.
3. Bolts and nuts shall, except as otherwise specified or noted on the drawings, be Grade B conforming to ASTM, A307.
4. Bolt studs and studs shall be of the same quality as machine bolts.
5. Submerged flanged joints shall be made up with Type 316 stainless steel stud bolts and nuts.

C. Tapped Connections

1. Tapped connections in pipe and fittings shall be made in such manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in pipe or fittings without bosses, shall not exceed the listed size in the appropriate table of the Appendix to the above-mentioned ANS A21.51 based on 3 full threads for cast iron and 2 full threads for ductile iron.
2. Where the size of the connections exceeds that given above for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, all as indicated or permitted by the Engineer.
3. All drilling and tapping of cast-iron pipe shall be done normal to the longitudinal axis of the pipe; fitting shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

D. Wall Castings

1. Wall castings shall be of the sizes and types indicated on the drawings. Flanges, facing and drilling shall conform to ANS A21.10 except that where required, as where a flange if substantially flush with the face of a masonry wall, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard fittings. A central fin not less than ½-inch. thick and 1-1/2-inch to 2-inch high shall be cast on the barrel at a point that will locate it midway through the wall to form a water stop.

2.07 FINISHES

A. Lining

1. Inside of pipe and fittings shall be coated with double thickness cement lining and bituminous seal coat conforming to AN A21.4. The standard bituminous coating is specified under the appropriate AN Standard for the pipe and fittings.

B. Coating

1. The outside of pipe and fittings within structures shall not be coated with the bituminous coating, but shall be thoroughly cleaned and given one shop coat of Intertol Rustinhibitive Primer 621 made by Koppers Co., Inc., Pittsburgh, Pa.; Multiprime made by PPG Industries, Inc., Pittsburgh, Pa.; Chromox 13R50 Primer made by Mobil Chemical Co., Edison, NJ; or an acceptable equivalent

product.
2. Outside surfaces of castings to be encased in concrete shall not be coated.
3. Machined surfaces shall be cleaned and coated with a suitable rust-preventative coating at the shop immediately after being machined.

PART 3 EXECUTION

3.01 HANDLING

A. Pipe and Fittings

1 Care shall be taken in handling and installing pipe and fittings to avoid damaging the pipe, scratching or marring machined surfaces, and abrasion of the pipe coatings.
2. Any fitting showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the Work.
3. In any pipe showing a distinct crack and in which it is believed there is no incipient fracture beyond the limits of the visible crack, the cracked portions, if so approved, may be cut off by and at the expense of the Contractor before the pipe is installed so that the pipe used is perfectly sound. The cut shall be made in the sound barrel at a point at least 12-inches form the visible limits of the crack.

3.02 CUTTING

A. Pipe

1. Except as otherwise approved, all cutting shall be done with a machine having rolling wheel cutters, knives, or saws adapted to the purpose. Hammer and chisel or so-called wheel span cutters shall not be used to cut pipe. All cut ends shall be examined for possible cracks caused by cutting.

3.03 INSTALLATION

A Pipe and Fittings

1. No defective pipe or fittings shall be installed or placed in the Work, and any piece discovered to be defective after having been installed or placed shall be removed and replaced by a sound and satisfactory piece.
2. Each pipe and fitting shall be cleared of all debris, dirt, etc., before being installed and shall be kept clean until accepted in the complete work.
3. Pipe and fittings shall be installed accurately to the lines and elevations indicated on the drawings or required. Care shall be taken to ensure a good alignment both horizontally and vertically.

B Castings

1. Castings to be encased in masonry shall be accurately set with the bolt holes, if any, carefully aligned.
2. Immediately prior to being set, castings shall be thoroughly cleaned of all rust, scale and other foreign material.

C. Appurtenances

1. All valves, fittings and appurtenances shall be set and jointed as indicated on the drawings.

3.04 ASSEMBLING

A. Bolted Joints

1. Before the pieces are assembled, rust-preventive coatings shall be removed from machined surfaces.
2. Pipe ends, sockets, sleeves, housings, and gaskets shall be thoroughly cleaned and all burrs and other defects shall be carefully smoothed.

B. Flanged Joints

1. Flanged joints shall be made up tight, care being taken to prevent undue strain upon pump nozzles, valves, and other pieces of equipment.

C. Sleeve-Type Couplings

1 Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8-inches.
2. Soapy water may be used as a gasket lubricant.
3. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6-inches from the end, and the middle ring shall be placed on the already laid pipe end until it is properly centered over the joint.
4. The other pipe end shall be inserted into the middle ring and brought to proper position in relation to the pipe already laid.
5. The gaskets and followers shall then be pressed evenly and firmly into the middle ring flares.
6. After the bolts have been inserted and all nuts have been made up finger tight, diametrically opposite nuts shall be progressively and uniformly tightened all around the joint, preferably by use of a torque wrench of the appropriate size and torque for the bolts.
7. The correct torque as indicated by a torque wrench shall not exceed the values indicated in the tabulation titled TORQUE.

TORQUE

Nominal pipe size, in.	Bolt diameter, in.	Maximum torque, ft.-lb.
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65
30-36 (3/8 in. mid. ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

3.06 PIPING SUPPORT

A. The Contractor shall furnish and install all supports necessary to hold the piping and appurtenances in a firm, substantial manner (as determined and/or directed by the Engineer) at the lines and grades indicated on the drawings or specified. The design and fabrication of such supports shall be the responsibility of the Contractor as part of the work.

B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor

shall submit a certification from the manufacturer stating that such requirements have been complied with.

C. Piping within buildings and structures shall be adequately supported from floors, walls, ceilings and beams. Supports from the floor shall be by approved saddle stands or suitable concrete or brick piers as indicated or approved by the Engineer. Pipe saddles shall be shaped to fit the pipe with which they will be used and shall be capable of screw adjustment. Concrete piers shall conform accurately to the bottom one-third to one-half of the pipe. Piping along walls shall be supported by approved wall brackets with attached pipe rolls or saddles or by wall brackets with adjustable hanger rods. For piping supported from the ceiling, approved rod hangers of a type capable of screw adjustment after erection of the piping and with suitable adjustable concrete inserts or beam clamps shall be used.

3.07 CLEANING

A. Prior to the pressure and leakage tests, the piping shall be thoroughly cleaned of all dirt, dust, oil, grease and other foreign material. This work shall be done with care to avoid damage to linings and coatings.

3.08 PRESSURE AND LEAKAGE TESTS

A. Except as otherwise directed, all pipelines shall be given combined pressure and leakage tests in sections of approved length.

B. The Contractor shall furnish and install suitable temporary testing plugs or caps; all necessary pressure pumps, pipe connections, meters, gages, relief valves, and other necessary equipment; and all labor required, to test the pipe specified in this Section.

C. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires.

D. However, pipelines embedded in concrete shall be tested prior to placing of the concrete and exposed piping shall be tested prior to field painting.

E. Unless it has already been done, the section of pipe to be tested shall be filled with water of approved quality, and all air shall be expelled from the pipe. If hydrants or blow offs are not available at high points for releasing air the Contractor shall make the necessary taps at such points and shall plug said holes after completion of the test.

F. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.

G. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test and corrected to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe but not to exceed 200 psi. Care shall be taken not to apply this pressure to items of equipment known to be incapable of withstanding such pressure.

H. If the Contractor cannot achieve the specified pressure and maintain it for a period of one hour with no additional pumping, the section shall be considered as having failed to pass the test.

I. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test and is considered acceptable by the Engineer.

J. If, in the judgment of the Engineer, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure may be made as required and approved by the Engineer, but in any event the Contractor shall be fully responsible for the ultimate tightness of the line within the above leakage and pressure requirements.

3.09 DISINFECTING AND FLUSHING

A. The Contractor shall disinfect the lines carrying potable water.

B. The Contractor shall furnish all equipment and materials necessary to do the work of disinfecting, and shall perform the work in accordance with the procedure outlined in AWWA C651, except as otherwise specified herein.

C. The dosage shall be such as to produce not less than 10 PPM. after a contact period of not less than 24 hours.

D. After treatment, the main shall be flushed with clean water until the residual chlorine content does not exceed 0.2 PPM.

E. During the disinfection period, care shall be exercised to prevent contamination of water in existing mains.

F. The Contractor shall dispose of the water used in disinfecting and flushing in an approved manner.

G. If, in the opinion of the Engineer and/or owner of the above method of disinfection is deemed impractical, the lines carrying potable water shall be disinfected by the method outlined in AWWA Standard C651, Section 9.

3.10 PAINTING

A. The shop coats to be given pipe and fittings are specified under article 2.06 FINISHES.

B. Field painting is Specified in SECTION 09900 - FIELD PAINTING.

END OF SECTION

SECTION 15100

VALVES, GATES, HYDRANTS AND APPURTENANCES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Requirements for furnishing and installing valves, gates, hydrants, and miscellaneous piping appurtenances, as indicated on the Drawings and as specified.
2. The Drawings and Specifications direct attention to certain features of the equipment, but may not cover all the details of their design. The equipment furnished shall be designed and constructed equal to the high quality equipment manufactured by such firms as mentioned, or as permitted by the Engineer. The Contractor shall furnish and install the equipment complete in all details and ready for operation.

B. Related Work

1. Section 09900 - Painting

1.02 DESIGN REQUIREMENTS

A. Enclosures shall be suitable for the atmosphere in which they are installed.

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
2. A536, Standard Specification for Ductile Iron Castings
3. B62, Standard Specification for Composition Bronze or Ounce Metal Castings

B. American Water Works Association (AWWA)/American National Standards Institute (ANSI)

1. ANSI/AWWA C110/A21.10, Standard for Ductile Iron & Gray-Iron Fittings 3 in through 48 in for Water and Other Liquids
2. ANSI/AWWA C111/C21.11, Standard for Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings
3. ANSI/AWWA C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
4. ANSI/AWWA C504, Rubber-Sealed Butterfly Valves
5. ANSI/AWWA C509, Resilient-Seated Gate Valves for Water-Supply Service
6. ANSI/AWWA C515, Reduced-Wall, Resilient-Seated Gate Valves for Water-Supply Service
7. ANSI/AWWA C517, Resilient-Seated Cast-Iron Eccentric Plug Valves
8. ASME/ANSI B16.1/B16.5, Cast Iron Pipe Flanges and Flanged Fittings/ Pipe Flanges and Flanged Fittings
9. AWWA C550, Protective Epoxy Interior Coatings for Valves and Hydrants
10. AWWA C606, Grooved and Shouldered Joints

1.04 SUBMITTALS

A. Submit in accordance with Section 01300 – Submittals

1. Manufacturer's specifications, catalog data, descriptive matter, illustrations, diagrams etc.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. All gate, globe, angle, and check valves shall be the product of one manufacturer.

2.02 GATE VALVES

A. Valves smaller than 2-inches.

1. 200 lb. WOG minimum bronze valves with screwed ends to suit the piping in which they are installed.
2. Body material shall conform to ASTM B62.
3. Valves shall have union bonnet, rising stem, inside screw, and solid wedge gate.

B. Valves 2-inches and larger.

1. Iron-body, resilient-wedge or double disk as specified.
2. Mechanical joint or flanged ends as indicated on the Drawings or herein specified.
3. All valves shall be designed for a minimum of 250 psi working pressure.
4. Face-to-face dimensions of flanged valves shall conform to the ANS B16.10.
5. Stem material shall be silicon bronze or an acceptable equivalent having high resistance to dezincification.
6. All exposed nuts, bolts and washers shall be stainless steel.
7. Valves shall be capable of being repacked under line pressure.
8. Sewer Valves shall be turned to the **left (counterclockwise)** to open
9. Water Valves shall be turned to the **right (clockwise)]** to open.
10. Coatings
    a. Exterior and interior surfaces of all valves shall be coated by the valve manufacturer prior to shipment.
    b. The coating shall be applied and cured in strict conformance with the coating manufacturer’s cautions and instructions.
    c. The coating shall be applied by the valve manufacturer under controlled factory conditions, and field application is strictly prohibited.
    d. The coating shall be a fusion bonded epoxy-protective coating system which meet all requirements of AWWA C550.

C. Process Valves

1. In accordance with AWWA Specification C-500.
2. Iron body, bronze trim, **solid wedge with tapered seat** construction.
3. If of the parallel seat type, the discs and wedges shall be free of pockets and rib.

D. Potable Water Valves 4-inches through 12-inches

1. Gate valves shall be resilient seated wedge type in accordance with AWWA **C515.**
2. Valve bodies to be of ductile iron.

3. All valves shall be allowed replacement of upper “O” rings while the valve is under pressure in a fully-opened position.
4. Valves shall have a two-inch operating nut or hand-wheel as required for the particular application and as shown on the Drawings.
5. Coating
    a. The AWWA C550 epoxy coating shall not impart taste or odors to the water. The coating shall be a product acceptable to the NSF for use in potable water and shall be so listed in the most current NSF summary of approved products (ANSI/NSF Standard 61).

E. Valves greater than 12-inches.

1. Shall meet the requirements of AWWA **C515** as indicated on the Drawings and meet requirements of the applicable sections of this specification.

F. Buried/Exterior Valves

1. O-ring seals at stuffing box and bonnet to body flanges
2. Mechanical joint ends.
3. Non rising stem, inside-screw, two (2) inch operating nut and suitable coupling to connect to valve stem.
4. Suitable for buried service.
5. Operating wrench.

G. Interior Valves

1. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.
2. O.S. & Y. except where N.R.S. is called for, and have a packing seal.
3. Flanged unless otherwise shown on the Drawings.
4. Flanges shall be drilled to the ANSI 125/150 pound standard.

H. Actuators

1. Means of actuation by wheel, lever, tee wrench, gear actuator or motorized actuator, as specified or as indicated on the Drawings.
2. Interior Gate Valves
    a. Hand-wheel operated.
    b. Hand wheels shall be of ample size for ease of operation and shall have an arrow and the work OPEN cast thereon to indicate the direction of opening.
    c. Chain operator for valves with operating stem height six (6) feet above finished floor.
    d. Supply actuators to operate valve as required.
3. Buried/Exterior Valves
    a. Provide extension stem with two-inch operating nut, to terminate 18 inches below finish grade.
    b. Provide valve boxes.
    c. All buried valves shall be equipped with the specified actuator and shall be suitable for buried service.
4. Valves 12 inches and larger
    a. Equip with gear actuators.
    b. Actuator gear box shall be of totally enclosed oil or grease bath lubricated type, suitable for operation at any angle and provided with the appropriate filling and drain plugs.
    c. Shaft bearings furnished with permanently lubricated bronze bearing bushings.
    d. Actuator shall clearly indicate valve position and an adjustable stop shall be provided.

e. Construction of actuator housing shall be semi-steel with exposed nuts, bolts, and washers to be zinc plated.
f. All valve actuators shall be as recommended by the valve manufacturer.

5. Valves shall be manufactured by American Flow Control, Birmingham, AL; Kennedy Valve, Elmira, N.Y. or acceptable equivalent.

2.03 CHECK VALVES

A. Check valves 3 inches and larger

1. Iron-body, bronze-mounted, full-opening, swing-type check valves with bolted covers and flanged ends.
2. Flanges shall be faced and drilled in accordance with the 125-lb. AN Standard.
3. Valves shall have bronze faced cast iron disc plate suspended at the top from a stainless steel shaft.
4. Valve shaft shall be supported by bronze bushings and bearings and shall be packed through externally accessible stuffing box.
5. Disc shall seat against resilient seat installed in the valve body.
6. Valve closure shall be assured by means of outside lever and weight.
7. Shop primed on the outside with a rust inhibitive priming system.

B. Check valves smaller than 3-inches

1. 300 pounds bronze curving design with screwed-in bonnet, regrinding bronze disc, and screwed ends.
2. Disc shall be suspended at the top with a stainless steel shaft.
3. All check valves shall be horizontally mounted.

2.04 PLUG VALVES

A. General

1. Valves shall be in full conformance to AWWA C517.
2. Nonlubricated eccentric type with resilient faced plugs for service in sewage and sludge piping.
3. Valves shall provide bi-directional sealing at 175 psi differential in sizes up to 12 inches and 150 psi differential for sizes 14 inches and larger.
4. Valve seating shall provide a consistent opening/closing torque that is not dependent on adjustment of stop. Resilient seating shall be field replaceable on the existing plug.
5. Valves shall be of the bolted bonnet, top entry design, capable of repacking without removing the bonnet or valve from the pipe line.
6. All exposed nuts, bolts and washers shall be stainless steel.
7. Valves shall be DeZurik Model PEF Eccentric Plug Valves, or approved equal. All valves furnished shall be by the same manufacturer.
8. Valves shall open Left

B. End Connections

1. Flanged ends to be in full compliance with ANSI B16.1-125 lb. /ANSI B16.5 - 150 lb standards including facing, drilling and thickness.
2. Mechanical Joint ends to be in accordance with AWWA C111.
3. Grooved ends to be in accordance with AWWA C606.
4. Screwed ends to be NPT Standard.

C. Port areas

1. Unobstructed when open and have smoothly shaped waterways of not less than 100 percent of full pipe area.

D. Valve body

1. Cast iron conforming to ASTM A-126 Class B.

E. Plug

1. ASTM A536, shall be solid, one piece ductile iron with cylindrical seating surface eccentrically offset from the center of the shaft. The plug shall be resilient faced with neoprene, or other resilient material suitable for use with sewage.
2. Bearing to be sleeve type, stainless steel and be isolated from solid particulates.

F. Coatings

1. All surfaces are to be protected, both internally and externally, with a factory coated heat fused thermoset epoxy or thermoplastic nylon complying fully with AWWA Standard C-550.
2. Epoxy coatings are also acceptable.

G. Actuators

1. Valves larger than eight inches.
   a. Provided with manual gear operators having a maximum rim pull of 80 pounds as per AWWA C-504.
      1) Gear operators shall be enclosed and provided with seals on all shafts to prevent entry of water, allow submerging of the operator and suitable for running the gears in oil.
      2) All shaft bearings shall be furnished with permanently lubricated bronze bearing bushings. Adjustable stops shall be provided.
   b. Provide with hand wheels.
2. Valves above six feet from the finish floor or in inaccessible locations.
      1) Operated by a chain operator and chain wheel provided by the valve manufacturer to operate that particular valve.
3. Valves eight inches and smaller located within six feet six inches of the finished floor in accessible locations.
      1) Operated by a portable lever.
      2) One portable level shall be provided for 50 percent of the valves or 15 portable levers whichever is less.
4. Valves in inaccessible locations shall be operated by extension stem, stem guides, 2-inch operating nut with mounting bracket or floor box, or floor stand, and lever or hand wheel as appropriate.
5. The plug valve manufacturer shall provide all operator accessories as required to make each operator system completely operational.
6. Extension stem, stem guides and 2-inch operating nut as manufactured by Penn-Troy Manufacturing of Troy, PA, Kennedy Valve, Elmira, N.Y. or acceptable equivalent.
7. Buried or submerged service valves
      1) Seals on all shafts and gaskets on the valve and actuator covers shall prevent the entry of water.
      2) Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.

3) All exposed nuts, bolts, springs and washers used in buried service shall be stainless steel.

8. Actuator shall clearly indicate valve position.

2.05 BALL VALVES

A. General

1. Straight-through passageway, and shall be of the full-port design.
2. Rated for 150-psi service.

B. Construction

1. Type 316 stainless steel, except for those valves specified PVC construction or installed in PVC piping.
2. Body shall be of rigid construction and symmetrically cast.
3. The shaft and ball shall be integrally cast.
4. Seats and seals shall be Teflon and shall be recessed in a machined groove.
5. Shaft packing
   a. Braided band.
   b. Tightened by means of a gland bearing strip.
   c. Replacement of the packing shall be accomplished without removing the actuator.

C. Valves shall be by Apollo or equal.

2.06 PVC VALVES

A. General

1. Polyvinyl Chloride (PVC) valves shall be manufactured of the same PVC Type 1 Grade 1 molding compound used for the fittings to assure proper compatibility of system components.

B. Ball valves and ball check valves

1. True union PVC valves.
2. Design to allow for entire valve body removal by turning back the union nut at both ends of the valve.
3. Teflon seats and packing.
4. Pressure rating of 150 psi at 75 degrees F water.

C. Diaphragm Valves

1. Constructed of PVC, except diaphragm, including bonnet and hand wheel.
2. Diaphragm shall be replaceable and fully supported in any position.
3. Non-rising stem with a diaphragm position indicator.
4. Diaphragm constructed of Teflon and be replaceable without removing valve from the line.
5. Valve shall be socket ends.
6. Valves shall be by Nibco or equal.

D. The valves shall be pneumatically or manually operated as shown on the drawings. Valve operators shall be supplied as specified under the valve operation Section 2.10.

2.07 VALVE OPERATORS

A. Valve operators shall be designed in accordance with the requirements of AWWA Specifications, C504-80 and shall furnish sufficient torque to open and close at 125 percent of the rated working pressure for the valve.

B. Valves 6 inches and larger shall be gear operated with hand wheels and valves smaller than 6-inches shall be wrench operated, except as hereinafter specified or indicated on the Drawings.

C. Where there is a lack of space for the valve wrench to operate gear-operators, hand wheels shall be provided in lieu of the wrench.

D. Chain operators, consisting of sprocket wheels, chain guides and operating chains shall be provided for all valves with operator centerlines located more than 6 feet - 6 inches above the operating level. Operating chain shall be galvanized and shall extend within 3 feet of the operating level. Operators shall develop their maximum capacity with not greater than a 40-lb. pull on the wheel.

E. Gear operators shall be totally enclosed, worm-gear type, permanently lubricated, and shall be watertight and dust tight.

F. Gear operators shall be provided with adjustable stops for the open and closed position to prevent over travel, and shall have a valve disk position indicator.

G. A suitable lever or wrench shall be provided for each six wrench-operated valves and at least one wrench for each operating station. Wrenches or wheels and chains shall be of suitable size and sufficient length for easy operation of the valves at their rated working pressure.

H. The valve assembly including valve and operator shall be tested to requirements specified herein at the valve manufacturer's factory.

2.08 CHAIN OPERATORS

A. Valve hand wheel centerlines located more than 6 feet above the floor or operating platforms shall be considered as being inaccessible and shall be provided with chain operators.

B. Chain wheels and chains shall be provided by the valve manufacturer to operate the particular valve.

C. Where indicated on the drawings or inaccessible due to size or location, valves shall be provided with chain operators and, where required, angle drives with chains extending to within 3 feet of the floor or operating platform.

D. Chains shall be galvanized.

E. Sprocket wheels shall be provided with chain guides.

2.09 TELESCOPING VALVE ASSEMBLIES

A. General

1. Sized to fit riser pipe and penetrate the riser pipe a minimum of 9" in the up position.

2. Unit shall be guaranteed against defects in material and workmanship for a period of three (3) years.

B. Construction

1. The unit shall have a floor stand of 4" square stainless steel tube with 1/8" wall and mounted to 1/2" thick stainless steel base plate.
2. The hand wheel shall be 16" diameter cast aluminum and work in conjunction with a 1 inch square stainless steel rack, 2 inch stainless steel spur gear and oil-impregnated sintered bronze bushings, requiring a maximum of 2 turns for one foot of travel.
3. The sliptube shall be a minimum of 16 ga. stainless steel and incorporate a 150 lbs. stainless steel companion flange and 1/4" thick Neoprene wipe gasket.

C. Provide Series V4R manufactured by Halliday Products, Inc. of Orlando, Florida

2.10 VALVE EXTENSION STEMS

A. General

1. Furnish as required and as shown on the Drawings.
2. Shaft lengths shall suit the particular installation.
3. All exterior valves shall be provided with valve extension stems and valve boxes.
4. Stems shall have a two-inch operating nut and a two-inch coupling for connection of the valves.
5. All operating nuts shall be located 18 inches below finished grade.

2.11 T-HANDLE OPERATING WRENCH

A. Provide in the number and lengths to operate buried valves by workers of average height working in normal position.

2.12 AIR RELEASE VALVES

A. General

1. Allow for the admission or release of large quantities of air during the fill up or drainage of pipelines and shall be specially designed for use with raw sewage.
2. The valve shall open when the operating pressure falls below atmospheric pressure, and shall close and remain closed when the operating pressure is above atmospheric pressure.

B. Construction

1. Valves shall consist of a compact tubular all stainless steel fabricated body.
2. HDPE hollow direct acting float.
3. HDPE solid large orifice float.
4. Stainless steel nozzle and woven dirt inhibitor screen.
5. Nitrile rubber seals and natural rubber seat.
6. Integral anti-surge orifice mechanism which shall operate automatically to limit surge pressures rise or shock induced by closure to less than 2 times the valve rated working pressure.
7. The intake orifice area shall be equal to the nominal size of the valve i.e., a 6" valve shall have a 6" intake orifice.

8. Large orifice sealing shall be by the flat face of the control float seating against a nitrile rubber O-ring housed in a dovetail groove circumferentially surrounding the orifice.
9. The seating & unseating of a small orifice nozzle on a natural rubber seal affixed into the control float shall control discharge of pressurized air. The nozzle shall have a flat seating land surrounding the orifice so that damage to the rubber seal is prevented.
10. The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.

C. Connections

1. Flanged ends conforming ANSI B16.1 Class 125.
2. Flanged ends shall be supplied with type 316 stainless steel screwed studs inserted for alignment to the specified standard.
3. Provide type 316 stainless steel nuts and washers.

D. Air and vacuum valves shall be Series RGX by Vent-O-Mat© and sized as indicated on the Drawings.

2.13 PRESSURE REDUCING VALVES (LARGER THAN TWO INCH)

A. General

1. Flanged glove body, bronze mounted, external pilot operated with a free floating piston and shall operate without springs, diaphragms or levers.
2. Single seat with the seat bore equal to the size of the valve.
3. Piston travel shall be a minimum of 25 percent of the seat diameter. The piston shall be guided above and below the seat no less than a length equal to 75 percent of the seat diameter. The piston shall be cushioned and designed to insure positive closure.
4. The valve shall be suitable for 150 pound flanged service and shall conform to AWWA standards for flange thickness, drilling and the wall thickness of the body and caps. The valve body shall be constructed of gray iron, free from cold shuts and defects and having a minimum tensile strength of 35,000 psi.
5. The valve shall be hydrostatical tested at a minimum of two times the rated service pressure. All iron castings shall be coated on all surfaces with two coats of asphaltic base metal paint.

B. Construction

1. Packed with leather and shall be furnished with an indicator rod to show the piston position.
2. Gauge petcocks shall be furnished on the valve body.
3. The pilot valve
   a. Easily accessible and shall be removable from the main valve under pressure.
   b. Adjustable without special tools or the removal of springs or weights.
4. The main valve shall be designed to facilitate repairs internally without removing the valve from the line.
5. The valve shall be designed to maintain a preadjusted downstream pressure for varying rates of flow by piston positioning without water hammer.

2.14 PRESSURE REDUCING VALVES (TWO INCHES AND SMALLER)

A. General

1. Single seated balanced design type globe body with threaded inlet and outlet ports.
2. Valves shall be diaphragm operated, spring loaded, and permitting convenient adjustment.

B. Construction

1. The body shall be of bronze construction with stainless steel stem.
2. Furnished with a replaceable rubber seat.

C. Valves shall be G-A Industries Figure 43-D, Watts No. 223, or equal.

2.15 PRESSURE RELIEF VALVE

A. Construction

1. Cast iron frame and cover with a bronze body ring and rubber flap ring.
2. Hinge pin shall be bronze and secured with cotter pins.
3. Valve shall have two pivot points and shall have a flanged end.

B. No leakage shall occur on a valve with at least 18 inches of water cover above the installed valve.

2.16 VALVE BOXES

A. General

1. Each buried stop and valve shall be provided with a suitable valve box.

B. Construction

1. Adjustable, telescoping, heavy-pattern type with the lower and the upper part of cast iron.
2. Designed and constructed as to prevent the direct transmission of traffic loads to the pipe or valve.
3. The upper or sliding section of the box shall be provided with a flange having sufficient bearing area to prevent undue settlement.
4. The lower section of the box shall be designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.
5. Adjustable through at least 6 inches vertically without reduction of the lap between sections to less than 4 inches.
6. The inside diameter of boxes for valves shall be at least 4-1/2 inches, and the lengths shall be as necessary for the depths of the valves or stops with which the boxes are to be used.
7. Covers
   a. Cast iron close fitting and substantially dirt-tight.
   b. The top of the cover shall be flush with the top of the box rim.
   c. An arrow and the word OPEN to indicate the direction of turning to open the valve shall be cast in the top of the valve covers.

   or

   d. Letters to indicate the service similar to “WATER” or “SEWER” shall be cast in the top of the valve covers as appropriate.

C. Boxes for curb stops shall be threaded internally to fit the threads on the bonnet of the curb stop.

2.17 FIRE HYDRANTS

A. General

1. Designed for 175 psi working pressure.
2. Conform to the latest specifications for hydrants by the AWWA.
3. Listed by Underwriters Laboratories, Inc. and Factory Mutual Research.

B. Construction

1. Provide with **two 2 ½ inch hose nozzles and one 4 ½ inch pumper nozzle**, unless required otherwise by the Owner.
2. Inlet connections to be mechanical joint.
3. Provide one operating wrench with each hydrant.
4. Drainage wells of 1/2 cubic yard capacity of two-inch crushed stone shall be placed in the excavation below the hydrant bottom.
5. Concrete thrust block shall be used to back up the hydrant and in no way shall block the hydrant drains.
6. Painting shall be in accordance with Specification Section 09900 – Painting, colors to match Owners standard.

C. Provide model Modern Centurion® as manufactured by Mueller Company, Decatur, Il or equal.

2.18 HOSE BIBS

A. General

1. 3/4 inch bronze gate valve with a 3/4 inch NPT discharge connection.
2. A cap and chain shall be supplied for the outlet.
3. Provide Model 372 as made by Jenkins or similar models from Lunkenheimer or Crane or equal.

2.19 QUICK DISCONNECT COUPLINGS

A. General

1. Couplings and adapters shall be furnished in the quantities, types and sizes as shown on the Drawings or specified herein.
2. The couplings and adapters shall be designed for a working pressure of 200 psig.
3. Couplings and adapters shall be of **[aluminum] [stainless steel]** and shall utilize a cam-type mechanism for connecting the coupler and adapter pieces to provide a leak proof connection.
4. No springs, ball bearings or snaps shall be used to make the connection.
5. The couplings shall be fitted with Buna-N gaskets recessed into the coupling to prevent the gasket from falling out.
6. The disengagement handle pins shall be of stainless steel and stainless steel rings shall be furnished on the handles.

2.20 POLYVINYL CHLORIDE TUBING (FLEXIBLE PVC)

A. Construction

1. Nylon braiding incorporated within the walls of the tubing.

2. The nylon braiding shall be completely protected by a smooth outside covering of PVC, thus shielding the mesh from conditions detrimental to exterior mesh tubing.
3. The tubing shall have a working temperature of minus five degrees F to 175 degrees F.

2.21 VALVE TAGS

A. General

1. 1 ½ inch, square, brass.
2. Stamped ½ inch characters to be black filled.
3. Numbered to owners identification system, if no system is required then number sequentially.
4. Provide each tag with No. 16 brass jack chain in suitable length to attach tag to valve.

2.22 TAPPING SLEEVE AND VALVE

A. General

1. Tapping sleeves, including outlet flanges shall be as dimensioned and thicknesses shall be as required by ANSI/AWWA C110/A21.10.
2. Designed to withstand working pressure of at least 200 PSI.
3. Furnish with tee head bolts and gaskets conforming with ANSI/AWWA C111/A21.11
4. Conform to the latest specifications adopted by the AWWA and be of the specific size to suit the existing conditions.

B. Construction

1. Mechanical joint, two part castings flanged on the vertical centerline, and come complete with all joint accessories.
2. The surface area of each flange shall be thoroughly machined, and the tapping sleeve flanges shall be fitted with gaskets.
3. Each gasket shall cover the entire surface area of each joint for the full length of the tapping sleeve.
4. Bolts used to assemble the tapping sleeves shall pass directly through each flange and through each gasket and be properly spaced to insure uniform gasket pressure and compression.
5. Tapping sleeve outlets shall have counter bored flange to insure proper centering of the tapping valve.
6. Tapping sleeve and valve assembly to satisfactorily pass air test prior to coring main.
7. All tapping valves shall be flanged by mechanical joint.
8. Tapping valves shall conform to the specifications for gate valves (Potable Water Valves).

PART 3 EXECUTION

3.01 GENERAL

A. Valves shall be installed as nearly as possible in the positions indicated on the drawings consistent with conveniences of operating the hand wheel or wrench. All valves shall be carefully erected and supported in their respective position free from all distortion and strain in appurtenances during handling and installation. All material shall be carefully inspected for defects in workmanship and material, all debris and foreign material cleaned out of valve

openings and seats, all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced at the Contractor's expense.

B. Valves shall not be installed with stems below the horizontal.

C. Valves shall be set plumb and supported adequately in conformance with the instructions of the manufacturer. Valves mounted on the face of concrete shall be shimmed vertically and grouted in place. Valves in the control piping shall be installed so as to be easily accessible.

D. Where chain wheels are provided for remote operation of valves two S-shaped hooks shall be provided for each valve to enable the chains to be hooked so as not to interfere with personnel traffic.

E. Valves shall be provided with extension stems where required for convenience of operation. Extension stems shall be provided for valves installed underground so that operating nuts are located 18 inches below finished grade and elsewhere so that the operating wrench does not exceed 8 feet in length.

F. A permanent type gasket of uniform thickness shall be provided between flanges of valves and sluice gates and their wall thimble.

G. Wall thimbles shall be accurately set in the concrete walls so that the gates can be mounted in their respective positions without distortion or strain.

3.02 PLUG VALVES

A. Plug valves in horizontal sewage and sludge piping shall be installed with the shaft horizontal such that when in the open position, the plug is located in the upper part of the valve body. Valves shall be oriented so that in the closed position, the plug is at the upstream end of the valve.

3.03 VALVE TAGS

A. Tag valve in visible location, free from interference with operating device, other equipment and personnel.

B. Develop and provide to Owner, valve chart indicating all valves with corresponding identification number.

3.04 SUPPORTS FOR TERMINAL CLEAN-OUT PIPING

A. Support to maintain required pitch, prevent vibration, and provide for expansion and contraction.

3.05 FIRE HYDRANTS

A. Fire hydrants and appurtenances shall be installed in accordance with the local municipal fire codes.

3.06 PAINTING

A. Shop and Field Painting shall be as specified under SECTION 09900.

END OF SECTION

SECTION 15130

GAUGES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements to furnish and install gauges at locations indicated on the Drawings and as specified.

PART 2 PRODUCTS

2.01 GENERAL

A. Gauges include pressure, vacuum and compound gauges of the dial indicating Bourdon tube-type.

B. Gauges shall be Helicoid Gauges as manufactured by the American Chain and Cable Co., Ashcroft Duragauges by Manning, Maxwell and Moore, Inc., or approved equal.

C. Pressure gauges shall be designed to indicate pressures above atmospheric pressure only.

D. Vacuum gauges shall be designed to indicate pressures below atmospheric pressure only.

E. Compound gauges shall be designed to indicate pressures above and below atmospheric pressure.

2.02 LOCATION

A. Gauges shall be provided where shown on the Drawings, specified in the Specifications or required for a complete installation. Indicating pressure gauges shall be provided downstream of each pressure regulating valve where shown, specified or required; in the seal water piping of each pump; and on both the suction and discharge piping of each pump except where otherwise specified.

2.03 ACCURACY

A. Grades of accuracy shall conform to the requirements of American Standard A.S.A. B40.1. The Contractor shall submit manufacturer's certifications indicating that the gauges provided have met the accuracy requirements specified.

B. Pressure, vacuum and compound gauges shall be Grade AA gauges with an error not exceeding ½ of 1 percent of full-scale range.

C. Gauges with a flexible seal between the Bourdon tube and the medium to be measured shall have an overall accuracy of Grade A with an error not exceeding one percent of scale range for the middle half and 1-1/2 percent for the remainder of the scale.

2.04 GAUGE CONSTRUCTION

A. Gauges shall be weatherproof, designed and constructed to meet all requirements for satisfactory operation.

B. Pressure, vacuum and compound gauges shall be constructed of sound, durable material, free from all defects and imperfections that in any way may affect the accuracy and serviceability of the gauges.

C. Gauge cases shall be of aluminum, phenolic or polypropylene. Dial shall be 4 1/2 inches nominal diameter with black lettering and scales on a white background, and shall bear a legend showing service and units of graduation. Gauge dial shall be clear and blemish free and sealed to prevent entrance of moist air. Bourdon tube shall be phosphor bronze with forged brass socket. Set point shall be of stainless steel. Socket stem shall extend at least 1-1/4 inches below the gauge case and shall have a large wrench flat.

D. Pressure gauges shall be graduated in psi unless otherwise specified. Vacuum gauges shall be graduated in inches of mercury; compound gauges shall be graduated in inches of mercury, psi or feet of water as specified.

E. Maximum scale reading for pressure and compound gauges shall be approximately twice the maximum operating pressure of the fluid to be measured. Vacuum and compound gauges shall have minimum scale readings at 30 inches of mercury unless otherwise shown or specified.

F. Unless otherwise shown or specified, all pressure, vacuum and compound gauges shall have bottom 1/2-inch NPT male connections.

2.05 DIAPHRAGM PROTECTED GAUGES

A. The Contractor shall provide diaphragm seals on sludge gauges to prevent the fluid to be measured from clogging or corroding the Bourdon tube of pressure, vacuum and compound gauges.

B. Diaphragm seals shall be suitable for the gauge furnished; gauges to be used with diaphragm seals shall be Grade AA gauges conforming to the requirements specified herein. Chemical gauges shall have the diaphragm seal as an integral part. Overall accuracy for diaphragm protected units shall be Grade A.

C. Diaphragms shall have an overall diameter of not less than 2-1/2 inches and shall be made of a material that is corrosion resistant and compatible with the process fluid. Diaphragm protected gauges shall be factory filled with Glycerin oil or approved equal and calibrated by the gauge manufacturer. Unless specified otherwise, diaphragm protected gauges shall be provided with sintered metal snubbers or pulsation dampers.

D. Diaphragm housing assembly shall be of durable stainless or cadmium plated with a ¾ inch NPT process connection. The lower housing shall have a 1/4 inch NPT flushing connection and 1/4 inch NPT plug, to allow venting or the introduction of cleaning fluid on the process side of the diaphragm seal. The bottom housing shall be made of a material that is corrosion resistant and compatible with the process fluid. A clean out ring shall be provided to hold the diaphragm captive in the upper housing so that the assembly may be removed for

recalibration or cleaning of the process side without loss of instrument fluid. Diaphragm protected gauges and seals shall be ACCO Helicoid Diaphragm Seal Type 100 HACF, Ashcroft Diaphragm Seal Type 101, or equal.

2.06 GAUGE PROTECTION AND ACCESSORIES

A. Unless otherwise shown or specified, pressure gauges shall have under pressure protection and vacuum gauges shall have overpressure protection. For helical roller type pressure gauges, the gauge shall have a left hand movement for under pressure protection; for all other gauges, under pressure protection stops shall be provided. For vacuum gauges with helical roller movement, gauges shall have right hand movement for overpressure protection; all other gauges shall have suitable overpressure protection stops.

B. Unless otherwise shown or specified, all pressure, vacuum and compound gauges shall be provided with stainless steel sintered metal snubbers of porosity suitable for this service. Snubbers shall be ACCO Helicoid No. S-2 or S-4, Ashcroft Chemquip No. 1112S or equal.

C. Diaphragm protected gauges for normal service shall be provided with rough plumbing 3/4 inch stop valves for shut-off cocks, and ¾ inch red brass pipe. Valves shall have a bronze body, stainless steel ball, and teflon seats, valves shall have a spring-closing handle.

D. Gauges other than diaphragm protected gauges shall be installed complete with incidental shut-off cock and tees with test cock with a female outlet. All pipe and fittings shall be brass. The gauge shall be mounted directly in the outlet of the tee-bearing test cock.

END OF SECTION

SECTION 15140

PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Furnish all labor, materials, equipment and incidentals required to install, and make completely ready for operation, pipe hangers, supports, concrete inserts, and anchor bolts including, metallic hanging and supporting devices as specified herein and as shown on the Drawings.

B. Related work

1. Section 03300 – Cast-In-Place Concrete
2. Section 09900 – Painting

1.02 REFERENCES

A. American Society of Mechanical Engineers (ASME)

1. ASME B31.1, Power Piping

B. Manufacturers Standardization Society Standard Practice (MSS-SP)

1. MSS-SP-58, Pipe Hangers and Supports, Materials, Design and Manufacture.
2. MSS-SP-69, Pipe Hangers and Supports, Selection and Application.

1.03 REQUIREMENTS

A. Design Requirements

1. The equipment specified herein is intended to support the various types of pipe and piping systems required for the Work.
2. The details shown on the Drawings are intended to indicate the generally desired methods of support under normal conditions.
3. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact through 360 degrees in all three dimensions.
4. It shall be the responsibility of the Contractor to provide a Professional Mechanical Engineer licensed in the **State of Rhode Island**, with a minimum of 5 years of demonstrated experience in the design of supports and connections, to design the supports and connections for all equipment for all weights and applied pressures as indicated on the Drawings.
5. In the design of hangers, supports and anchors, pipe pressures shall be taken as the maximum rated pressure specified for pipe lines carrying gases and air and twice the maximum rated pressure specified for pipe lines carrying liquids.
6. Payment for such design services shall be included in the Prices bid for furnishing and installing pipe lines.

7. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions.
8. All supporting equipment, with the exception of springs, shall be designed with a minimum working factor of safety of five based on the ultimate tensile strength of the material.
9. Where additional structural members are required, they shall be designed for the specific loads they are to support in accordance with the requirements of Rhode Island Building Code.

B. Performance Requirements

1. All hangers, supports and appurtenances shall conform to the latest requirements of the following listed references except as supplemented or modified by the requirements of this Specification.
   a. ANSI B 31.1.
   b. MSS-SP-58.
   c. MSS-SP-69.

1.04 SUBMITTALS

A. In accordance with SECTION 01300.

1. Representative catalog cut for each different type of pipe hanger or support indicating the materials of construction, important dimensions and range of pipe sizes for which that hanger is suitable. Where standard hangers are not suitable, submit detailed drawings showing materials and details of construction for each type.
2. Complete piping drawings indicating type of hanger, location, and magnitude of load transmitted to the structure. Submittals shall use detail numbers as shown on the Drawings to indicate type of support proposed wherever possible.

B. Design computations shall not be submitted for review. Any design computations submitted shall be returned without comment. A design certificate shall be submitted prior to installation of any piping.

1.05 DELIVERY, STORAGE AND HANDLING

A. All supports and hangers shall be crated, delivered and uncrated so as to protect against any damage.

B. All parts shall be properly protected so that no damage or deterioration shall occur during a prolonged delay from the time of shipment until installation is completed.

C. Finished iron or steel surfaces not galvanized or painted shall be properly protected to prevent rust and corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by the following:

1. Grinnell Corp., Providence, Rhode Island.
2. Carpenter & Patterson, Inc., Woburn, Massachusetts.
3. F&S Central, Brooklyn, New York.
4. Elcen Metal Products Co., Franklin Park, Illinois.
5. Unistrut Northeast, Woburn, Massachusetts

B. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance shall be considered as equal.

C. The Drawings and Specifications indicate general and specific methods and details of supporting the various piping systems. Any changes to the support details shown shall be submitted to the Engineer for review.

D. All uninsulated non-metallic piping such as PVC, fiberglass, etc. shall be protected from local stress concentrations, at each support point by galvanized steel protection shields or other method as approved by the Engineer where pipes are bottom supported 180 degree arc shields shall be furnished. Where 360 degree arc support is required, such as U Bolts, protection shields shall have a 50 mils minimum thickness, not be less than 12 inches in length and be securely fastened to pipe with stainless steel or galvanized metal straps not less than 1/2 inch wide.

E. All insulated pipe shall be furnished with a rigid foam insulating saddle at each pipe support location as specified under insulation. Provide galvanized protection shields as specified in Paragraph 2.01D above at each location.

F. Where pipe hangers and supports come in contact with copper piping provide protection from galvanic corrosion by the following:

1. Wrap pipe with 60 mils thick neoprene sheet material and galvanized protection shield.
2. Provide isolators similar to Elcen figure number 228.
3. Provide copper plated or PVC coated hangers and supports.

G. Pipe supports shall be provided as follows:

1. Cast iron soil pipe: maximum support spacing of 5.0 feet with a minimum of one support per pipe section at the joints.
2. Steel pipe: maximum support spacing of 10 feet with a minimum of one support per pipe section at the joints.
3. Fiberglass pipe: as recommended by the manufacturer except that support spacing shall not exceed 5 feet.
4. PVC pipe: as recommended by the manufacturer except that support spacing shall not exceed 3 feet. For pipe equal to or less than I inch in diameter and 5 feet for all other pipe sizes.
5. Support spacing for steel pipe 2 inches and smaller and copper tubing shall not exceed 5 feet.
6. Ductile iron pipe: maximum support spacing of 10 feet with a minimum of one support per pipe section at the joints.
7. All vertical pipe shall be supported at each floor or at intervals of not more than 12 feet by approved pipe collars, clamps, brackets, or wall rests, and at all points necessary to insure rigid construction.
8. Pipe supports shall not induce point loadings but shall distribute pipe loads evenly along the pipe circumference.

9. Effects of thermal expansion and contraction of the pipe shall be accounted for in the pipe support selection and installation.

2.02 SINGLE PIPE HANGERS

A. Single pipes shall be supported by hangers suspended by galvanized steel rods from structural steel members, concrete ceilings and beams, bottom of trapeze hangers and wall mounted steel angle brackets.

B. Hanger rods shall be hot rolled steel, machine threaded and galvanized after fabrication. The strength of the rod shall be based on its root diameter.

C. Except as otherwise specified herein, pipe hangers shall be adjustable clevis type similar to Grinnell Figure Numbers 65, 260, and 590 as required. Hangers shall be carbon steel with a galvanized finish.

D. Hanger rods shall be attached to concrete structures using concrete inserts similar to F&S Figures 180, 571 or 150. Inserts shall be malleable iron, or steel with galvanized finish. Beam damps, C clamps or welded beam attachments shall be used for attaching hanger rods to structural steel members. Where necessary and approved by the Engineer double expansion shields shall be used for attaching to concrete structures.

E. Where pipes are near walls, beams, columns, etc. and located an excessive distance from ceilings or underside of beams, welded steel wall brackets similar to Carpenter and Patterson Figure numbers 69-68, 84 or 139 shall be used for hanging pipe. Brackets shall be galvanized. Where single pipes rest on top of bracket pipe supports, attachments shall meet requirements as specified under multiple pipe hangers.

2.03 MULTIPLE PIPE HANGERS

A. Suspended multiple pipes, running parallel in the same horizontal plane, which are adjacent to each other shall be suspended by trapeze type hangers or wall brackets. Trapeze hangers shall consist of galvanized structural steel channel supported from galvanized threaded rod or attached to concrete walls, columns or structural steel support members as required to meet the intent of this specification. Channel shall be similar to F&S Figure 710, rods, concrete inserts, "C" Clamps, beam clamps, welded beam attachments, and expansion shields shall be as specified in 2.02 Single Pipe Hangers.

B. Except as otherwise specified herein pipe anchors used for attaching pipe to trapeze or multiple pipe wall brackets shall be anchor or pipe chair similar to F&S Figures 158, 419, 160A, 160B as required. Materials of construction shall be galvanized steel. Chair "U" bolts shall be tightened to allow freedom of movement for normal expansion and contraction except when pipe must be anchored to control direction of movement or act as a thrust anchor.

2.04 SINGLE AND MULTIPLE PIPE SUPPORTS

A. Single pipes located in a horizontal plane close to the floor shall be supported by one of the methods specified herein or as shown on the Drawings.

B. Pipes 3-inch diameter and larger shall be supported by adjustable stanchions similar to F&S Figure 427, constructed of galvanized steel. Stanchions shall provide at least 4-inch adjustment and be flange mounted to floor,

C. Pipes less than 3-inches in diameter shall be held in position by supports fabricated from steel "C" channel, welded post base similar to Unistrut Figure P2072A and pipe clamps similar to Unistrut Figures Pl109 thru Pl126. Where required to assure adequate support, fabricate supports using two vertical members and post bases connected together by horizontal member of sufficient load capacity to support pipe. Wherever possible supports shall be fastened to nearby walls or other structural member to provide horizontal rigidity. More than one pipe may be supported from a common fabricated support. All supports unless specified elsewhere shall be galvanized.

D. Where required, pipe shall be supported using concrete anchor posts constructed in accordance with SECTION 03300. Pipe shall be securely fastened to concrete anchor posts using suitable metal straps as required and approved by the Engineer.

2.05 WALL SUPPORTED PIPES

A. Single or multiple pipes located adjacent to walls, columns or other structural members shall whenever deemed necessary shall be supported using welded steel wall brackets similar to Carpenter and Patterson Figure numbers 69-78, 84, or 134; or "C" Channel with steel brackets similar to Unistrut pipe clamps. All members shall be securely fastened to wall, column, etc. using double expansion shields or other method as approved by the Engineer.

B. Pipe shall be attached to supports using methods hereinbefore specified to meet the intent of this Specification.

C. All supports shall be galvanized.

2.06 BASE ANCHOR SUPPORT

A. Where pipes change direction from horizontal to vertical via a bend, a welded or cast base anchor support shall be installed at the bend to carry the load. The bend anchor shall be fastened to the floor with double expansion shields or other method as approved by the Engineer.

B. Where shown on the Drawings, pipe bends shall be supported using concrete anchor posts. Pipes shall be securely fastened to concrete supports with suitable metal bands as required and approved by the Engineer.

2.07 VERTICAL PIPE SUPPORTS

A. Where vertical pipes are not supported by a Unistrut system as specified in Paragraph 2.08, they shall be supported in one of the following methods.

1. For pipes 1/4-inch to 2-inch in diameter, an extension hanger ring shall be provided with an extension rod and hanger flange. The rod diameter shall be as recommended by the manufacturer for the type of pipe be supported. The hanger ring shall be galvanized steel or PVC clad depending, on the supported pipe. The hanger ring shall be equal to

Carpenter & Peterson Figure number 81 or 81CT. The anchor flange shall be galvanized malleable iron similar to Carpenter & Patterson Figure number 85.

2. For pipes equal to or greater than 1/2-inch in diameter extended pipe clamps similar to Carpenter and Patterson Figure number 267 may be used. The hanger shall be attached to concrete structures using double expansion shields, or to steel support numbers using welding lugs similar to Carpenter & Patterson Figure number 220.
3. Pipe riser clamps shall be used to support all vertical pipes extending, through floor slabs. Riser clamps shall be galvanized steel similar to Carpenter & Patterson Figure number 126. Copper clad or PVC coated clamps shall be used on copper pipes. Insulation shall be removed from insulated pipes prior to installing riser damps.
4. Unless otherwise specified, shown, or specifically approved by the Engineer, vertical runs exceeding 11 feet, pipes shall be supported by approved pipe collars, clamps, brackets or wall rests at all points required to insure a rigid installation.

2.08 SPECIAL SUPPORTS

A. Pipe supports shal1 be provided for closely spaced vertical piping systems as shown on the Drawings or as otherwise required to provide a rigid installation. The support system shall consist of a framework suitably anchored to floors, ceilings and walls and be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.

B. Vertical and horizontal supporting members shall be U shaped channels similar to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut series P1100M and series P2558. All components shall be of mild steel.

C. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly including end caps for all members.

D. The design of each individual framing system shall be the responsibility of the Contractor. Shop drawings, as specified above shall be submitted and shall show all details of the installation, including dimensions and types of supports. In all instances the completed frame shall be adequately braced to provide a complete rigid structure when all the piping has been attached.

E. Any required pipe supports for which the supports specified in this Section are not applicable shall be fabricated or constructed from standard structural steel shapes in accordance with AISC Specifications, have anchor hardware similar to items previously specified herein, shall meet the minimum requirements listed below and be subject to the approval of the Engineer.

1. Pipe support systems shall meet all requirements of this Section and all related Sections of the Specification.
2. Complete design details of the entire pipe support systems shall be provided, for review by the Engineer.
3. The pipe support system shall not impose loads on the supporting structures in excess of the loads for which the supporting structure is designed.

2.09 SURFACE PREPARATION AND SHOP PAINTING

A. All surfaces shall be prepared and shop painted as part of the work of this Section. Surface preparation and shop painting shall be as specified in SECTION 09900.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pipe and appurtenances connected to the equipment shall be supported in a manner to prevent any strain from being imposed on the equipment or piping system.

B. Pipe and tubing shall be supported as required to prevent damaging stresses in the pipe or tubing material, valves and fittings, and to support and secure the pipe in the intended position and alignment. Supports shall be sufficiently close together such that the sag of the pipe is within limits that will permit drainage and avoid excessive bending stresses from concentrated loads between supports.

C. Pipes, horizontal and vertical, requiring rigid support shall be supported from the building structure by approved methods. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specific herein. No piping shall be supported from metal stairs, ladders and walkways unless specifically directed or authorized by the engineer.

D. Where flexible couplings are required at equipment, tanks, etc. the end Opposite to the piece of equipment, tank, etc. shall be rigidly supported.

E. Pipe supports shall be installed to minimize, lateral forces through valves, both sides of split type couplings and sleeve type couplings, and to minimize all pipe forces on pump housings. Pump housings shall not be utilized to support connection pipes.

END OF SECTION

CERTIFICATE OF DESIGN FOR PIPE HANGERS AND SUPPORTS

_____(Owner)

Contract Reference: _____

_____

_____, dated _____.

In accordance with the provisions of the above referenced Contract, as the designated Contractor,

_____

_____
(Contractor's Name and Address)

hereby certifies that _____

_____
(Contractor's Name and Address)

(1) Is properly licensed and currently registered as a Professional Engineer in the State (or Commonwealth) of _____;

(2) Is fully qualified to design and supervise the _____

_____
(Item of work and location)

In accordance with the provision specified under the appropriate Section and/or Subsections of the Contract Documents:

(3) Has successfully designed and supervised _____

_____
(Item of work)

before and demonstrates a minimum of ten (10) documented years of proven experience in such field;

(4) Has personally examined the type(s) and locations(s) of the Work required under this Contract, and the overall conditions associated therewith, to the extent necessary to fully satisfy his or her professional responsibilities for designing and supervising the above referenced work;

(5) Has prepared the attached design in full compliance with the applications and requirements of the Contract Documents, sound engineering practice, modern accepted principles of construction, and all applicable federal, state and local laws, regulations, rules and codes having jurisdiction over the Work;

(6) Will provide sufficient supervision and technical guidance to the Contractor throughout the Work to ensure compliance with the design and all quality assurances necessary to successfully complete the Work;

(7) Hereby indemnifies and holds harmless the _____

_____ and BETA Group, Inc.,
(name of owner)

and their agents, employees and representatives, from and against any and all claims, whether directly or indirectly, arising out of, relating to or in connection with the Work; and

(8) This "Certificate of Design" together with all applicable designs, drawings, details, specifications on other related documents necessary to complete the Work as specified, have been signed and sealed pursuant to applicable state law.

In recognition and observance of the above referenced statements, the undersigned parties hereby acknowledge and accept the responsibilities and obligations associated therewith.

CONTRACTOR:CONTRACTOR'S ENGINEER

_____	_____
(Contractor's Name)	(Engineer's Name)
_____	_____
By: _____	By: _____
_____	_____
(Name and Title)	(Name and Title)
Date: _____	Date: _____
(SEAL)	(P.E. STAMP)

(Note: Contractor to fully reference all attachments below)

_____

_____

_____

_____

_____

_____

END OF SECTION

DIVISION 16

SECTION 16000

BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes all labor, materials, tools, equipment, and accessory items and performing all operations necessary to furnish and install the complete electrical work in accordance with this section of these specifications, the drawings and the standards of the applicable codes listed herein.

B. The work shall include, but not be limited to, furnishing and installation of equipment and items listed below and installation only of items furnished under other sections of these specifications.

1. Complete electrical service as hereinafter specified.

2. Conduit, wire and electrical connections are required on certain items specified in sections of these specifications other than the electrical section. This Contractor shall examine all sections of these specifications to determine the complete scope of the electrical work.

3. Raceways and fittings

4. Wires and cables

5. Miscellaneous equipment

6. Panelboards

7. Lighting systems

8. Generators

9. Grounding systems

10. Underground system

11. Demolition of existing electrical systems.

C. Mount and wire operator's stations, power conversion equipment, and motor control systems furnished under other Divisions of these Specifications.

D. Mount and wire process instruments and control cabinets furnished under other Divisions of these Specifications. Furnish and install all conduit, wire and interconnections between process instrumentation primary elements, transmitters, local indicators and receivers. Mount and wire all lightning and surge protection equipment at process instrumentation transmitters and receivers.

D. Mount and make field connections to “packaged” equipment furnished under other Divisions of these Specifications.

F. Documents Applicable to the Work of this Section:

1. Division 0 of the Contract Documents (Contract Forms and Requirements).

2. Division 1 of the Technical Specifications.

3. Technical Specifications: Section 16000 - Basic Electrical Requirements, and the following sub-sections:
   a. Section 16060 – GROUNDING SYSTEM
   c. Section 16080 – UNDERGROUND SYSTEMS
   b. Section 16085 – MISCELLANEOUS EQUIPMENT
   c. Section 16120 – WIRE AND CABLES
   d. Section 16130 – RACEWAYS AND FITTINGS
   e. Section 16442 – PANELBOARDS
   f. Section 16500 – LIGHTING SYSTEM
   g. Section 16612 – DIESEL ENGINE GENERATOR
   h. Section 16613 – PORTABLE ENGINE GENERATOR

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Circuit breakers
2. Panelboards
3. Generators
4. Automatic transfer switch
5. Manual transfer switch
6. Lighting fixtures
7. Miscellaneous equipment

B. The manufacturer's data sheets with product designation or catalog numbers shall be submitted for the following material:

1. Wire
2. Conduit
3. Receptacles
4. Boxes and fittings

C. Submit all other data as specified herein.

D. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section 16000.

E. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

F. Prior to submitting shop drawings for lighting fixtures, verify the type of ceiling suspension systems being installed. Notify Engineer of any discrepancies between fixture type specified and suspension system. Additional cost rising from failure to notify the Engineer will be the responsibility of the Contractor.

G. Operation and Maintenance Manuals - Prepare manuals in accordance with Section 01730.

H. Record Drawings - Prepare as specified in Part 1 of this Section.

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600 and as specified herein.

B. Electrical equipment shall at all times during construction be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of-doors. Electrical equipment shall be stored in dry permanent shelters. If stored for more than two weeks, the equipment shall receive all maintenance considerations required by the manufacturer for the proper storage of equipment. Proper storage in this context shall include the provision of heaters and dehumidifiers to keep the equipment dry at all times. If any apparatus has been damaged, such damage shall be repaired at no additional cost to the Owner. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, or shall be replaced at no additional cost to the Owner.

1.04 DESIGN CRITERIA

A. Parkside Pump Station Service Characteristics

1. Primary Utility Voltage: 13.8KV

2. Secondary Voltage - 120/240V, 1-Phase.

3. All equipment and wiring shall be suitable for the applied voltage.

B. Pinecrest Pump Station Service Characteristics

4. Primary Utility Voltage: 13.8KV

5. Secondary Voltage - 120/208V, 3-Phase.

6. All equipment and wiring shall be suitable for the applied voltage.

C. Service and Metering

1. The power company serving this project is Rhode Island Energy.

2. For the Parkside Pump Station the existing service pole riser shall be replaced with a new service pole riser that will be obtained at 120/240 Volts, 1-phase, 3-wire from a utility pole.

3. For the Pinecrest Pump Station the existing service pole riser shall be replaced with a new service pole riser that will be obtained at 120/208 Volts, 3-phase, 4-wire from existing transformers mounted on a utility pole.

4. Furnish and install the secondary service conduit, wire and connectors.

5. The power company will provide the meter, the contractor shall provide the meter socket and install all the metering equipment in accordance to the utility company requirements.

6. All work and material for the electrical service shall be in accordance with the requirements of the utility company.

7. Make all arrangements with the power utility company for obtaining the service, pay all charges and furnish all labor and material for the services. The utility company's charges shall be identified in the bid as an Allowance. An invoice from the utility company shall be submitted to the Contractor. There shall be no additional changes for overhead profit, insurance, or incidental expenses.

C. Requirements of the Regulatory Agencies

1. The final, complete installation shall comply with all state and local statutory requirements having jurisdiction. The Contractor shall arrange for all necessary permits, pay all fees and arrange for all required inspections by local authorities. In general, all work shall comply with the requirements of the National Electrical Code, all state codes and the codes and ordinances of the city or town in which the work is to be done.

D. Tests and Settings

1. Test all systems furnished under DIVISION 16 - ELECTRICAL and repair or replace all defective work. Make all necessary adjustments to the systems and instruct the Owner's personnel in the proper operation of the system.

2. Make all circuit breaker and motor circuit protector settings based on the connected equipment manufacture's recommendations.

3. The following minimum tests and checks shall be made prior to the energizing of electrical equipment. A certified test report shall be submitted stating that the equipment meets and operates in accordance with manufacturer's and job specifications, and that equipment and installation conforms to all applicable standards and specifications.

a. Testing of protective relays, static devices, transfer switches, circuit breakers and motor circuit protectors for calibration and proper operation and settings.

b. Over potential, high potential, insulation resistance and shield continuity tests for cables.

c. Mechanical inspection of switches, transfer switches and circuit breakers.

4. The Engineer shall be immediately notified of any unfavorable test results or indication of faulty equipment. No piece of equipment shall be energized until the test data is evaluated and the equipment is proven acceptable.

5. If the test and inspection data submitted should indicate deficiencies in the operation of the electrical apparatus or in the manufacturer thereof, the Contractor shall promptly implement the necessary adjustments, corrections, modifications and/or replacements necessary to be made to meet the specified requirements.

1.05 RELATED WORK NOT INCLUDED

A. Excavation and backfilling, including gravel or sand bedding for underground electrical work is included under DIVISION 2 - SITE WORK of these Specifications.

B. Concrete work, including concrete electrical duct encasement, is included under DIVISION 3 - CONCRETE of these Specifications.

1.06 SLEEVES AND FORMS FOR OPENINGS

A. Provide and place all sleeves for conduits penetrating floors, walls, partitions etc. When located in formed concrete walls locate all necessary slots for electrical work and form before concrete is poured.

B. Provide waterproof sealing for the penetrations through exterior walls, etc.

C. Provide fireproof sealing for penetrations through fireproof walls, etc.

D. Foam type fire and water proofing is not allowed.

1.07 CORING

A. Provide all coring for conduits penetrating floors, walls, partitions etc.

B. Provide waterproof sealing for the penetrations through exterior walls, etc.

C. Provide fireproof sealing for penetrations through fireproof walls, etc.

D. Foam type fire and water proofing is not allowed.

1.08 SUPPLEMENTARY SUPPORTING STEEL

A. Provide all supplementary steelwork required for mounting or supporting equipment and materials.

B. Steelwork shall be firmly connected to building construction as required.

C. Steelwork shall be of sufficient strength to allow only minimum deflection in conformity with manufacturer's published requirements.

D. All supplementary steelwork shall be installed in a neat and workmanlike manner parallel to floor, wall and ceiling construction; all turns shall be made at forty-five and ninety degrees, and/or as dictated by construction and installation conditions.

E. All manufactured steel parts and fittings shall be galvanized steel for NEMA 12 Areas and stainless steel for NEMA 4X, NEMA 7, and NEMA 8 areas.

1.09 ELECTRICAL HAZARDOUS CLASSIFICATION AND NEMA RATINGS FOR ELECTRICAL INSTALLATION AND ENCLOSURES

A. Unclassified, NEMA Type 1 for within the electrical enclosure.

B. Unclassified, NEMA Type 4X for exterior.

C. Class 1, Division I, NEMA Type 7 for within and 18” above Wet Well.

D. Class 1, Division II, NEMA Type 7 for within the valve vault.

1.10 INTERPRETATION OF DRAWINGS

A. The Drawings are not intended to show exact routing of conduit runs or terminations. Contractor shall determine exact location of conduit terminations by examinations of approved shop drawings. The Contractor shall not reduce the size or number of conduit runs indicated on the drawings.

B. The final routing of raceways shall be determined by structural conditions, interferences with other trades and by terminal locations on apparatus. The Engineer reserves the right of a reasonable amount of shifting at no extra cost up until time of roughing in the work.

C. Locate pull boxes, panelboards, control pushbuttons, terminal cabinets, safety switches and such other apparatus as may require periodic maintenance, operation, or inspection, so that they are easily accessible. If such items are shown on the drawings in locations which are found to be inaccessible, advise the Engineer of the situation before work is advanced to the point where extra costs will be involved.

D. Each three-phase circuit shall be run in a separate conduit unless otherwise shown on the drawings.

E. Unless otherwise approved by the Engineer conduits shown exposed shall be installed exposed; conduits shown concealed shall be installed concealed.

F. Where circuits are shown as “home-runs” all necessary fittings and boxes shall be provided for a complete raceway installation.

G. In general, wiring and raceway systems for lighting, receptacles, fire alarm, telephone and intercommunications systems are not indicated on the drawings but shall be furnished and installed under this section.

H. Each branch circuit shall have its own neutral, dedicated to that circuit. A common neutral for more than one single phase circuit is not allowed.

I. Verify with the Engineer the exact locations and mounting heights of lighting fixtures, switches and receptacles prior to installation.

J. Any work installed contrary to drawings shall be subject to change as directed by the Engineer, and no extra compensation will be allowed for making these changes.

K. The locations of equipment, fixtures, outlets, and similar devices shown on the drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

L. Circuits on three phase panelboards shall be field connected to result in evenly balanced loads on each phase.

M. Surface mounted panel boxes, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between wall and equipment.

N. Circuit layouts are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical system shown. Additional circuits shall be wherever needed to conform to the specific requirements of the equipment.

O. All connections to equipment shall be made as required, and in accordance with the approved shop and setting drawings.

P. Schematic diagrams shown on the drawings indicate the required functions only. Standard circuits of the particular manufacturer may be used to accomplish the functions indicated without exact adherence to the schematic drawings shown. Additional wiring or conduit required for such deviations shall be furnished at Contractor's expense. Contractor must ensure that all components necessary to accomplish the required function are provided.

1.11 SIZE OF EQUIPMENT

A. Investigate each space in the structure through which equipment must pass to reach its final location. If necessary, the manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the structure.

B. The equipment shall be kept upright at all times. When equipment has to be tilted for ease of passage through restricted areas during transportation, the manufacturer shall be required to brace the equipment suitable, to insure that the tilting does not impair the functional integrity of the equipment.

1.12 TEMPORARY POWER AND LIGHTING

A. The Electrical Subcontractor shall furnish and install feeders of sufficient size from the utility company for the electric light and power requirements for the project while under construction and until the permanent feeders and related equipment have been installed and are in operation. Temporary lighting shall be based on a minimum of one watt per square foot covering each and every square foot in the building. Sufficient wiring, lamps, and outlets shall be installed to insure proper lighting of the project area. Minimum sized lamp used shall be 1500 lumens. Where higher lighting intensities are required by Federal or State Standards of Laws or otherwise specified, the above specified lumens shall be increased to provide these increased intensities.

B. All necessary transformers, meters, cables, panelboards, switches, temporary lamp replacements and accessories required for the temporary light and power installation shall be provided by the Electrical Subcontractor.

C. The Electrical Subcontractor shall provide and maintain in each area of the building and the building exterior, a feeder or feeders of sufficient capacity for the requirements of the entire floor and he shall provide a sufficient number of outlets, located at convenient points, so that extension cords of not over 50 ft. in length will reach all work requiring temporary light or power.

D. The Electrical Subcontractor shall install and maintain the wiring and accessories for the portable trailer office of the General Contractor.

E. All temporary electrical work shall meet the requirements of the National Electrical Code Article 305 Temporary Wiring, the Local Utility Company, and all Federal Standards and Laws.

F. All temporary wiring and accessories thereto installed by the Electrical Subcontractor shall be removed after their purposes have been served.

G. The General Contractor will pay for the cost of electric energy consumed by himself and by all of his Subcontractors, unless otherwise indicated.

H. Provide all temporary lighting and power required above during the normal working hours of the project or a total of ten (10) hours per normal working day; Saturdays, Sundays and legal holidays are excluded. The ten hours per day shall include manning the temporary power and lighting 2 hour before and 2 hour after a normal eight (8) hour working day. In addition to the above, provide and maintain, to the satisfaction of the local authorities having jurisdiction, all temporary lighting and power that may be required for safety purposes. The Electrical Subcontractor will be compensated by the General Contractor for any additional standby time, materials or equipment required by the General Contractor or other Subcontractors beyond the normal working hours, as defined above.

1.14 RECORD DRAWINGS

A. Record drawings shall be provided under this Section in accordance with Section 01780 and as specified herein.

B. As work progresses and for the duration of the Contract, maintain a complete and separate set of prints of Contract Drawings at the job site at all times. On a daily basis, record work completed and all changes from original Contract Drawings clearly and accurately, including work installed as a modification or addition to the original design such as change orders, instructions issued by the Engineer, or conditions encountered in the field.

C. Drawings shall show record condition of details, sections, and riser diagrams, and control changes. Schedules shall show actual manufacturer and make and model numbers of final equipment installation. Remove all superceded data to show the completed work. Accurately indicate the location, size, type, and elevation of new utilities and their relationship to other utilities.

D. The Record Drawings will be used as a guide for determining the progress of the Work installed. They shall be inspected on a regular basis and shall be corrected immediately if found inaccurate or incomplete. Requisitions for payment will not be approved until the Drawings are accurate and up-to-date.

E. At completion of Work prepare a complete set of Record Drawings showing all systems as actually installed. The Contract Drawing electronic CAD files will be made available for this Contractor's copying, at his expense, into reproducibles to serve as backgrounds for the Record Drawings. Provide all drawings necessary to show the required as-built information. Submit three sets of prints to the Engineer for comments as to compliance with this Section. Make all modifications so noted by the Engineer.

F. Certify the accuracy of the record drawings. Record Drawings shall become the property of the Owner.

G. When required by jurisdiction, submit the record set for approval by the Authority Having Jurisdiction in a form acceptable to the jurisdiction.

1.15 COMPONENT INTERCONNECTIONS

A. Components of equipment furnished under this Specification will not be furnished as integrated systems.

B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

C. Furnish and install all component interconnections.

1.16 MANUFACTURER'S SERVICES

A. Provide manufacturer's services for testing, training and start-up of the following equipment:

1. Generators.

2. Automatic Transfer Switch.

3. The time required for each system shall be as hereinafter specified. The time specified shall be used as directed by the Engineer and shall not be used by the manufacturer or Contractor for field adjustments due to manufacturing or shipping defects.

1.17 MATERIALS

A. Materials and equipment used shall be Underwriters Laboratories, Inc. listed wherever standards have been established by that agency. Written approval by the Engineer and local inspecting authority is required wherever UL Listed approval is not available.

B. Manufacturer of Principal Equipment

1. All lighting and power panelboards shall be made by one manufacturer.

2. All conduit of a given type shall be made by one manufacturer.

3. All wire and cables of a given type shall be made by one manufacturer.

1.18 WARRANTY

A. Provide warranty and guarantee on all equipment furnished and work performed for a period of one (1) year from the date of substantial completion.

PART 2 (NOT USED)

PART 3 (NOT USED)

- END OF SECTION -

SECTION 16060

GROUNDING SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes the furnishing and installing of a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as specified herein and as shown on the drawings.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Ground rods
2. Ground bus bars

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

PART 2 – PRODUCTS

2.01 GROUND RODS

A. Ground rods shall be copper clad steel 3/4 inch in diameter and 10 feet in length unless otherwise shown on the drawings. Rods shall one 10 foot length rod. Ground rods shall be Copperweld, equal by A.B. Chance Co., or equal.

2.02 GROUNDING BUS BARS

A. Provide a grounding bus bar within the electrical enclosure.

B. Grounding bus bars shall be copper, not less than ¼ inch by 2 inch by 12 inch.

C. All lugs, bolts and nuts shall be silicon bronze.

D. Buses shall be mounted to the room wall with standoff isolators, standoff brackets, and mounting bolts.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Grounding electrode conductors shall be run in rigid steel conduits. Protecting conduits shall be bonded to the grounding electrode conductors at both ends.

B. Grounding conductors shall be run with feeders where shown on the drawings or hereinafter specified.

C. Liquid tight flexible metal conduit in sizes 1 inch and larger shall have bonding jumpers. Bonding jumpers shall be external, run parallel (not spiraled) and fastened with plastic tie wraps. Tie wraps shall be installed 12 inches apart and not more than 6 inches from ends.

D. Connect the following equipment by separate wire or cable directly to the grounding grid system:

1. Service entrance circuit breaker
2. Ground buses
3. Metal Fencing
4. Generator Enclosure
5. Door frames and railings.

E. Connect the following equipment by separate wire or cable to the ground bus in the distribution equipment servicing the equipment:

1. Panelboards
2. Motors
3. Control panels
4. All feeders and branch circuits
5. Receptacle circuits

F. The following equipment shall be grounded through the metallic raceway systems with permanent and effective ground connections:

1. All metal cases and support frames
2. Lighting system

G. Bond the following N.E.C. approved electrodes together to form a ground grid system:

1. Grounding rods and buses
2. Buried bare copper conductors

H. Grounding electrodes shall be driven where shown on the drawings.

I. All grounding connections shall be made by means of approved bronze clamps. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A, or equal.

J. All buried connections shall be made by a thermic welding process equal to Cadweld or permanent crimp press type connectors. Molds used for the welding process shall be new having no prior usage. Molds shall be the specific type for the connection to be made.

K. Light fixture bases shall be furnished with a grounding point.

L. All buried conductors shall be laid slack in trenches. The earth surrounding the cables shall be void of sharp objects which may injure the cables. Backfill material shall be natural earth. Where cables are exposed to mechanical injury they shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard. Connections shall be made as hereinbefore specified.

M. Do not allow water main connection to be painted. If the connections are painted, they shall be disassembled and remade with new fittings.

3.02 TESTING

A. The grounding system shall be tested under this section.

B. The equipment grounding shall be checked to insure continuity of the ground return path.

C. The ground grid systems shall be tested using the three terminal fall in potential method. A minimum of eight test points for each ground grid system shall be submitted for review by the Engineer. The test points shall be made along a straight line from the grid system to the reference terminal. The distance between the grid system and the reference terminal shall be consistent with normal practices for ground testing.

D. All test equipment shall be furnished hereunder and shall be similar to Biddle Earth Tester No. 250220 or equal.

E. These tests shall be performed during the dry season. Tests shall be performed before loaming and seeding or paving work has been performed.

F. The Contractor shall notify the Engineer immediately if the ground grid system exceeds 5 ohms.

3.03 CLOSEOUT ACTIVITIES

A. Provide in accordance with Section 01700.

- END OF SECTION -

SECTION 16080

UNDERGROUND SYSTEMS

1.00 PART 1 – GENERAL

1.01 SCOPE

A. The work of this section includes furnishing and installing of a complete underground system of raceways, handholes, and frames and covers as specified herein and as shown on the drawings.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Raceways
2. Warning Tape

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

2.00 PART 2 – PRODUCTS

2.01 RACEWAYS

A. Raceways shall be PVC schedule 40 conduit. Raceway materials shall be in accordance with Section 16130 (Raceways and Fittings).

2.02 POLYETHYLENE WARNING TAPE

A. Warning tape shall be red polyethylene film, 6 inch minimum width, Type XB-720 by W.H. Brady Co., or equal.

3.00 PART 3 – EXECUTION

3.01 INSTALLATION

A. Raceways shall be installed to drain away from structures. Raceway slopes shall not be less than 3 inches per one hundred feet.

B. Plastic spacers shall be used to hold raceways in place. Spacers shall provide not less than two inch clearance between raceways.

C. The minimum cover for raceway banks shall be 30 inches unless otherwise permitted by the Engineer.

D. Where bends in raceways are required, long radius elbows, sweeps and offsets shall be used. Sweeps at riser pole shall be rigid steel encased in concrete.

E. All raceways shall be swabbed clean before cable installation.

F. Spare raceways shall be plugged and sealed watertight at all buildings and structures.

G. Raceways in use shall be sealed watertight at all buildings and structures.

H. Rigid steel conduit shall be used for risers at the service pole and other locations shown on the drawings. Conduit sweep at pole base shall be rigid steel conduit.

I. Raceway terminations at manholes shall be with end bells.

J. All underground metallic conduit run underground in direct contact with earth shall be coated with asphaltum or bitumastic varnish or similar corrosion protection the entire length of the run.

K. All underground raceways/ductbanks shall be marked with warning tape located approximately 12 inches below grade above the raceway/ductbank.

- END OF SECTION -

SECTION 16085

MISCELLANEOUS EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes the furnishing and installing of all miscellaneous equipment as specified herein and as shown on the drawings.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300.

1. Automatic Transfer Switch
2. Manual Transfer Switch
3. Electrical Enclosure Cabinet
4. Surge Suppression Devices
5. Enclosed Circuit Breakers
6. Generator Inlet Plug
7. Enclosure types
8. Wireway
9. Nameplates
10. Meter Socket

B. Operation and Maintenance Manuals - Prepare manuals in accordance with Section 01730.

C. Record Drawings - Prepare as specified in Section 16000.

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. All circuit breakers, magnetic motor starters, and fuses furnished under this section shall be of the same manufacturer for each type of equipment.

PART 2 – PRODUCTS

2.01 AUTOMATIC TRANSFER SWITCH

A. Three phase automatic transfer switches shall be true 3-pole, solid neutral type, microprocessor based control designed for an emergency and normal source of 208 Volts, 3 Phase, 4 Wire, 60 Hertz. Current ratings shall be as indicated on the drawings.

B. The complete switch assembly including accessories shall be listed under UL-1008 for use on emergency systems.

C. The complete transfer switch assembly shall be factory tested to ensure proper operation and compliance with the specification requirements. A copy of the factory test report shall be available upon request.

D. System Operation

1. When the voltage on any phase of the normal source drops below 80% or increases to 120%, or frequency drops below 90%, or increase to 110%, or 20% voltage differential between phases occurs, after a programmable time delay period of 0-9999 seconds factory set at 3 seconds to allow for momentary dips, the engine starting contacts shall close to start the generating plant.

2. The transfer switch shall transfer to emergency when the emergency source has reached specified voltage and frequency on all phases.

3. After restoration of normal power on all phases to a preset value of at least 90% to 110% of rated voltage, and at least 95% to 105% of rated frequency, and voltage differential is below 20%, an adjustable time delay period of 0-9999 seconds (factory set at 300 seconds) shall delay retransfer to allow stabilization of normal power. If the emergency power source should fail during this time delay period, the switch shall automatically return to the normal source.

4. After retransfer to normal, the engine generator shall be allowed to operate at no load for a programmable period of 0-9999 seconds, factory set at 300 seconds.

E. Construction

1. The transfer switch shall be double throw, actuated by two electric operators momentarily energized, and connected to the transfer mechanism by a simple over center type linkage. Dual circuit breaker or movable beam construction is not acceptable. Minimum transfer time shall be 400 milliseconds.

2. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Main contacts shall be mechanically locked in both the normal and emergency positions without the use of hooks, latches, magnets, or springs, and shall be silver-tungsten alloy. Separate arcing contacts with magnetic blowouts shall be provided on all transfer switches. Interlocked, molded case circuit breakers or contactors are not acceptable.

3. The transfer switch shall be equipped with a safe manual operator, designed to prevent injury to operating personnel. The manual operator shall provide the

same contact to contact transfer speed as the electrical operator to prevent a flashover from switching the main contacts slowly.

4. Transfer switch shall be adequately constructed to carry its full rated current on a continuous 24 hour basis in all approved enclosures and shall not show excessive heating or be subject to de-rating.

5. The minimum withstand and close-in current rating in symmetrical amperes shall be equal to or greater than the interrupting rating of the normal power source circuit breaker. In no case shall this rating be less than 20 times the transfer switch full load current rating. The switch contacts shall not weld or be damaged in any way as a result of a fault of up to the withstand and close-in rating.

6. The main contacts shall be visible for inspection without any major disassembly of the transfer switch.

7. A fully rated solid neutral bus bar with required AL-CU neutral lugs shall be provided.

8. Control components and wiring shall be front accessible. All control wires shall be multiconductor 18 gauge 600-volt SIS switchboard type point to point harness. All control wire terminations shall be identified with tubular sleeve-type markers.

9. The switch shall be equipped with 90 degrees C rated copper/aluminum solderless mechanical type lugs.

10. Transfer switches enclosures indicated as NEMA 4 shall be totally enclosed gasketed door in door with blank exterior door and the controller mounted on the interior door.

F. Controls

1. The transfer switch shall be equipped with a microprocessor based control system, to provide all the operational functions of the automatic transfer switch. The controller shall have two asynchronous serial ports. The controller shall have a real time clock with NiCad battery back up.

2. The CPU shall be equipped with self diagnostics which perform periodic checks of the memory I/O and communication circuits, with a watchdog/power fail circuit

3. A door mounted controller with a 20 character, LCD display, with a keypad, which allows access to the system shall be provided The controller shall have password protection required to limit access to qualified and authorized personnel.

4. The controller shall include three-phase over/under voltage, over/under frequency, phase sequence detection and phase differential monitoring on both normal and emergency sources.

5. The controller shall be capable of storing the following records in memory for access either locally or remotely:

   a. Number of hours transfer switch is in the emergency position (total since record reset).

   b. Number of hours emergency power is available (total since record reset).

   c. Total transfer in either direction (total since record reset).

   d. Date, time, and description of the last four source failures.

   e. Date of the last exercise period.

   f. Date of record reset.

G. Accessories

1. Programmable three phase sensing of the normal source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage. Programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases, set at 20%, and phase sequence monitoring.

2. Programmable three phase sensing of the emergency source set to pickup at 90% and dropout at 80% of rated voltage and overvoltage to pickup at 120% and dropout out at 110% of rated voltage programmable frequency pickup at 95% and dropout at 90% and over frequency to pickup at 110% and dropout at 105% of rated frequency. Programmable voltage differential between phases set at 20%, and phase sequence monitoring.

3. Time delay for override of momentary normal source power outages (delays engine start signal and transfer switch operation). Programmable 0-9999 seconds. Factory set at 3 seconds, if not otherwise specified.

4. Time delay to control contact transition time on transfer to either source. Programmable 0-9999 seconds, factory set at 3 seconds.

5. Time delay on retransfer to normal, programmable 0-9999 seconds, factory set at 300 seconds if not otherwise specified, with overrun to provide programmable 0-9999 second time delay, factory set at 300 seconds, unloaded engine operation after retransfer to normal.

6. Time delay on transfer to emergency, programmable 0-9999 seconds, factory set at 3 seconds.

7. A maintained type load test switch shall be included to simulate a normal power failure, keypad initiated.

8. A remote type load test switch shall be included to simulate a normal power failure, remote switch initiated.

9. A time delay bypass on retransfer to normal shall be included. Keypad initiated.

10. Dry contact, rated 10 Amps 120 volts AC, to close on failure of normal source to initiate engine starting.

11. Dry contact, rated 10 Amps 120 volts AC, to open on failure of normal source for customer functions.

12. Light emitting diodes shall be mounted on the microprocessor panel to indicate: switch is in normal position, switch is in emergency position and controller is running.

13. A exerciser shall be provided with (10) 7-day events, programmable for any day of the week and (24) calendar events, programmable for any month/day, to automatically exercise generating plant programmable in one-minute increments. Also include selection of either "no load" (switch will not transfer) or "load" (switch will transfer) exercise period. Keypad initiated.

14. Provision to select either "no commit" or "commit" to transfer operation in the event of a normal power failure shall be included. In the "no commit position," the load will transfer to the emergency position unless normal power returns before the emergency source has reach 90% of it's rated values (switch will remain in normal). In the "commit position" the load will transfer to the emergency position after any normal power failure. Keypad initiated.

15. Two auxiliary contacts rated 10 Amp, 120 volts AC , shall be mounted on the main shaft, one closed on normal, the other closed on emergency. Both contacts will be wired to a terminal strip..

16. A three phase digital LCD voltage readout, with 1% accuracy shall display all three separate phase to phase voltages simultaneously, for both the normal and emergency source.

17. A digital LCD frequency readout with 1% accuracy shall display frequency for both normal and emergency source.

18. An LCD readout shall display normal source and emergency source availability.

19. Include (2) time delay contacts that open simultaneously just (milliseconds) prior to transfer in either direction. These contacts close after a time delay upon transfer. Programmable 0-9999 seconds after transfer.

2.02 MANUAL TRANSFER SWITCH

A. The manual transfer switch shall be UL listed, designed for transfer between normal source and alternate source of 120/240 Volts, 1 Phase, 3 Wire. Current ratings shall be as indicated on the drawings.

B. The transfer switch shall be service entrance rated of double throw disconnect switch type with a 3-postion emergency-off-normal external handle.

C. Enclosure shall meet the area NEMA designation for which they are located.

D. NEMA Type 12, 4X and 7 enclosures shall be as specified herein.

2.03 ELECTRICAL ENCLOSURE CABINET

A. Provide a free standing heavy-duty stainless-steel weather-tight and corrosion resistant custom fabricated electrical two door cabinet enclosure with sealed neoprene gasketing around all edges of the door. Cabinet enclosures shall be made of 14 gauge steel. The enclosure shall have the minimum dimensions as shown on the drawings. Actual sizes of the enclosures and lengths of the enclosures may be larger to incorporate all of the required equipment. The Contractor is responsible to properly size the control cabinet required at no additional cost to the Owner. Submit cabinet layout drawing with all dimensions shown for all installed devices.

B. The enclosures shall have a 2-door configuration with single post in the middle of the enclosure for door latches. Doors shall have vault type operating handles with three point catch. The doors shall be fully gasketed with opening of sufficient size to permit ready removal of any of the equipment installed in the compartments. Doors shall have provisions for pad locking.

C. Enclosure shall have a natural mill finish.

D. Enclosures shall have a sidewall mounted exhaust fan and intake louvers on the opposite sidewall. Ventilation louvers shall be equipped with filters, fan shall be equipped with a thermostat.

E. Heavy duty padlock with six sets of keys for each lock shall be furnished. Padlocks shall have forged brass case with brass shackle. Shackle shall be $^{5}/_{16}$ inch diameter with 2½ inch clearance. Locks shall be No. 3841 as manufactured by Yale, or equal by Corbin.

F. Enclosure roof shall slant to the rear of the enclosure. Drip shield shall extend over door opening. All exposed hardware shall be Type 316 stainless steel.

G. Cabinet enclosures shall be leveled and bolted to a concrete pad using Type 316 stainless steel hardware. Conduits shall enter through the open bottom entry.

H. In the cabinet enclosure provide a linear LED light with light switch, a dedicated 120V receptacles heater, ground bus, a duplex 120 Volt and weather-proof convenience outlet.

I. Enclosure shall be provided with a plug in style ceramic 350W electric space heater with integral adjustable thermostat and LCD display.

2.04 SURGE PROTECTION DEVICE (SPD)

A. Electrical Service SPD

1. Certify unit listed to UL 1449, 4th Edition.

2. SPD shall be UL labeled as Type 1, intended for use without need for external or supplemental overcurrent devices. Every metal oxide varistors shall be self-protected.

3. SPD to be totally enclosed in a plastic NEMA 4X surface mounted enclosure and phase phase/line LEDs.

4. Minimum surge current capability (single pulse rated) per phase shall be 50 0kA

5. Voltage Protection Ratings (VPRs) shall not exceed the following:

System Voltage	L-N	L-G	L-L	N-G
120/208-240	700V	1200V	1200V	800V

6. Maximum Continuous Operating Voltage (MCOV):

System Voltage	MCOV
120/208-240	150V

7. SPD shall be installed per manufacturer’s installation instructions with lead lengths as short (less than 24”) and straight as possible. Gently twist conductors together.

2.05 ENCLOSED CIRCUIT BREAKERS

A. Circuit breakers shall be molded case, three pole unless otherwise noted, with voltage rating as required. Ampere rating shall be as shown on the drawings. Provide with service entrance rating where required.

B. Main breaker shall be solid state with digital trip and adjustable trip setting with LED on face of breaker providing amps per phase. Provide auxiliary contacts for trip status to remote alarm.

C. The interrupting capacity shall be not less than 65,000 Amperes, RMS symmetrical at 480V AC.

D. All circuit breakers with 225 Ampere frames and larger shall have interchangeable trips.

E. Enclosure shall meet the area NEMA designation for which they are located.

F. NEMA Type 12, 4X and 7 enclosures shall be as specified herein.

2.06 GENERATOR INLET PLUG

A. UL 1682 Listed wall mounted 240VAC, 60 Amp, 1-phase, 3-wire plus ground wall mounted male inlet plug. Current ratings shall be as indicated on the drawings.

B. Housing shall be NEMA 4X with 30 degree mounting angle.

C. Provide the matching female plug receptacle pre-wired to a breakout cable with cam lok connectors for each leg, neutral, and ground.

2.07 ENCLOSURE TYPE

A. NEMA Type 1 and Type 12 shall be general purpose sheet steel.

B. NEMA Type 4X shall be cast iron or stainless steel.

C. NEMA Type 7 and Type 8 shall be cast iron.

D. All metal enclosures shall be finish painted over a rust inhibiting primer.

2.08 WIREWAY

A. Wireway shall be steel.

B. Wireway shall be manufactured by General Electric Co., or equal by Siemens Corp or Hoffman Enclosures.

2.09 NAMEPLATES

A. Nameplates shall be provided for all special purpose tumbler switches, disconnect switches, remote control stations, motor starters, time clocks, panelboards, terminal cabinet, etc. to designate the equipment controlled and function.

B. Nameplates shall be black and white laminated, phenolic material having engraved letters approximately 1/4 inch high, extending through the black face into the white layer.

C. Nameplates shall be attached to the panel by self-tapping stainless steel screws or rivets.

2.10 METER SOCKET

A. Provide a utility meter socket in a NEMA 3R enclosure with HASP cover provision of the type approved by the utility company.

B. Meter Socket shall be 7 terminal, 200 Amp continuous rated, self-contained ringless type meter socket with a manual single handled bypass with locking jaw and safety arc shield.

PART 3 – EXECUTION

3.01 INSTALLATION

A. All field mounted devices shall be mounted four feet-six inches above the finished floor or grade. Devices shall be adequately supported on walls, columns or other supports. The Contractor shall furnish and install channel iron imbedded in the ground or floor to support devices where necessary.

B. All control equipment shall be identified as to the equipment it controls. Provide lamacoid nameplates at all equipment.

3.02 TESTS AND CHECKS

A. The following minimum tests and checks shall be made before energizing the automatic transfer switch.

1. Perform insulation resistance tests phase-to-phase and phase-to-ground with switch in both source positions. The Insulation resistance test voltages and minimum values to be in accordance with manufacturer's published data.

2. Measure contact resistance in normal and alternate source position.

3. Determine contact resistance in micro-ohms. Investigate any value exceeding 500 micro-ohms or any values which deviate from adjacent poles by more than fifty percent (50%).

- END OF SECTION -

SECTION 16120

WIRES AND CABLES

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes the furnishing, installing and testing of all wire, cable and appurtenances as specified herein and as shown on the drawings. All wiring of a given type shall be the product of one manufacturer.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Wire
2. Cable
3. Terminations
4. Lugs
5. Wire and Cable Markers

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. Wire for branch circuits shall be Type XHHW or THWN-THHN.

B. Wire for the service and pump feeders shall be Type XHHW.

C. Single conductor wire for control, indication and metering shall be Type THWN/THHN No. 12 or 14 AWG, stranded.

D. Multi-conductor control cable shall be used for the underground system and shall be No. 12 or 14 AWG, stranded with an overall jacket.

E. Wire for process instrumentation shall be twisted shielded pairs No. 16 AWG, stranded.

F. Ground wires shall be Type THW, green. Bare ground wires shall be soft drawn copper, 98 percent conductivity.

1.05 MINIMUM SIZES

A. Except for control and signal wiring, no wire smaller than number 12 AWG shall be used.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Wires and cables shall be of annealed, 98 percent conductivity, soft drawn copper.

B. All conductors No. 8 AWG and larger sizes shall be stranded.

2.02 600 VOLT WIRE

A. Type XHHW shall be cross-linked polyethylene, as manufactured by Prysmian Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.

B. Type THWN/THHN shall be as manufactured by Prysmian Cable Corp., Collyer Insulated Wire Co., The Okonite Co. or equal.

C. Multi-conductor control cable shall be stranded, 600 Volt, cross-linked polyethylene insulated, neoprene jacketed, as manufactured by Allied Wire and Cable, or equal.

2.03 INSTRUMENTATION CABLE

A. Process instrumentation wire shall be twisted pair, 600 Volts, polyethylene insulated, aluminum tape, tinned copper braid shielded, polyvinyl chloride jacketed, as manufactured by Okonite Co., Belden Corp., or equal.

2.04 CONNECTORS AND TERMINAL LUGS

A. Splices for No. 10 or No. 12 A.W.G. solid wires, such as for lighting branch circuits, shall be made with insulated wire connectors.

B. Connectors and terminal lugs on wires No. 8 A.W.G. and larger shall be of the mechanical or clamp type.

2.05 WIRE AND CABLE MARKERS

A. Wire and cable markers shall be “Omni-Grip” as manufactured by W.H. Brady Co., or equal.

B. Wire and cables with diameters exceeding the capacity of the “Omni-Grip” shall be marked with pre-printed, self-adhesive vinyl tapes as manufactured by W.H. Brady Co., T&B Fasteners Inc., or equal.

C. The "to" and "from" destinations shall be clearly identified on each cable at each termination and within manholes, pull boxes and junction boxes.

PART 3 – EXECUTION

3.01 INSTALLATION

A. All conductors shall be carefully handled to avoid kinks or damage to insulation.

B. All wires, cables and each conductor of multi-conductor cables (except lighting and receptacle wiring) shall be uniquely identified at each end with wire and cable markers.

1. Where wiring originates from a motor control center or process control panel the wire identification number shall incorporate the terminal numbers used in the control center or panel and a number to identify the motor control center or panel.

2. Wires shall be identified at both ends and at intermediate junction boxes, terminal cabinets, etc. Wire identification numbers shall be unique.

3. A typed list of the numbers used at each motor control center and control cabinet shall be submitted with the as built drawings.

C. Lubrications shall be used to facilitate wire pulling. Lubricants shall be U.L. approved for use with the insulation specified.

D. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.

E. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only shielded instrumentation wire.

F. Shielding on instrumentation wire shall be grounded at the transmitter end only.

G. Each branch circuit shall have a dedicated neutral.

H. Cables penetrating fire rated floors, walls, etc. shall be fireproofed. Fireproofing material shall be U.L. classified for three hour fire rating. Fire-proofing system shall be as manufactured by 3M Co., Thomas & Betts, or equal.

I. Power conductors (other than lighting & receptacle) shall be run continuous and splicing should be kept to a minimum. The Engineer should be informed of where splices will occur.

3.02 TESTS

A. All 600 Volt wire insulation shall be tested with a megohm meter after installation. Tests shall be made at not less than 500 Volts. Submit a written test report of the results to the Engineer.

- END OF SECTION -

SECTION 16130

RACEWAYS AND FITTINGS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes the furnishing and installing of complete raceway systems as specified herein and as shown on the drawings.

B. All raceway systems shall be complete with fittings, boxes or cabinets, and necessary connections to result in a complete system.

C. Aluminum materials shall not be used.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Raceways.

2. Boxes and Fittings.

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. Except where otherwise shown on the drawings, or hereinafter specified, all raceways installed exposed shall be rigid heavy wall galvanized steel conduit.

B. PVC coated galvanized rigid steel conduit shall be used within the wet well.

C. PVC Schedule 40 conduit shall be used underground.

D. Raceway between components within the electrical enclosure shall be Liquidtight, Flexible Metal Conduit.

E. When routing signal cables in raceways, maintain 12” spacing from power raceways and only cross at a 90 degree angle.

F. Unless otherwise specified or shown on the drawings, all boxes shall be metal.

G. Unless otherwise specified or shown on the drawings, exposed switch, outlet and control station boxes and fittings shall be cast or malleable iron.

H. Terminal boxes, cabinets, junction boxes, pull boxes and wireways used in areas designated as NEMA 4X shall be stainless steel 316, gasketed.

I. Conduit wall seals shall be used where conduits penetrate walls and floors or at other locations shown on the drawings.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Rigid Conduit

1. Rigid heavy wall steel conduit shall be hot-dipped galvanized as manufactured by the Youngstown Sheet and Tube Co., Allied Tube and Conduit Corp., Wheeling-Pittsburgh Steel Corp., or equal.

2. PVC conduit used underground shall be rigid polyvinyl chloride Schedule 40 as manufactured by Carlon, Phillips Petroleum Co., Triangle Pipe & Tube Co., Inc., or equal.

3. PVC coated rigid steel conduit shall have a 0.040 inch thick, polyvinyl chloride coating permanently bonded to hot-dipped galvanized steel conduit, as manufactured by Calbond, Ocal, Robroy Industries, or equal.

B. Liquidtight, Flexible Metal Conduit, Couplings and Fittings.

1. Liquidtight, flexible metal conduit shall be Sealtite, Type UA, as manufactured by Anaconda American Brass Co., or equal by American Flexible Conduit Co., Inc., or equal.

2. Fittings used with flexible conduit shall be of the screw-in type as manufactured by Thomas and Betts Co., Crouse-Hinds Co., O.Z. Manufacturing Co., or equal.

D. Flexible couplings shall be as manufactured by Crouse-Hinds Co., Appleton Electric Co., O.Z. Manufacturing Co., or equal.

E. Boxes and Fittings

1. Pressed steel switch and outlet boxes shall be hot-dipped galvanized as manufactured by Raco Manufacturing Co., Adalet Co., O.Z. Manufacturing Co., or equal.

2. All boxes including, but not limited to, terminal boxes, junction boxes and pull boxes shall be sheet steel unless otherwise shown on the drawings. Boxes shall be galvanized and have continuously welded seams. Welds shall be ground smooth and galvanized. Box bodies shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14 gauge metal and covers shall not be less than 12 gauge metal. Covers shall be gasketed and fastened with stainless steel screws. Boxes shall be as manufactured by Hoffman Engineering Co. or equal.

3. All boxes and fittings used with PVC coated conduit shall be furnished with a PVC coating bonded to the metal. The tensile strength of the bond shall be not less than 2,000 pounds.

4. Cast or malleable iron boxes and fittings shall be galvanized with cast galvanized covers and corrosion-proof screws as manufactured by the Crouse-Hinds Co., Appleton Electric Co., O.Z. Manufacturing Co., or equal.

5. PVC fittings shall be as manufactured by Carlon, An Indian Head Co., O.Z. Manufacturing Co., or equal.

6. Steel elbows and couplings shall be hot-dipped galvanized. Elbows and couplings used with PVC coated conduit shall be furnished with a PVC coating bonded to the steel, the same thickness as used on the coated steel conduit.

7. Conduit hubs shall be as manufactured by Myers Electric Products, Inc., Raco Div., O.Z. Manufacturing Co., or equal.

8. Conduit wall seals shall be Type WSK as manufactured by O.Z. Manufacturing, Co., or equal by Link Seal Co.

9. Combination expansion-deflection fittings shall be Type XD as manufactured by Crouse-Hinds Co., or equal by Appleton Electric Co., O.Z. Manufacturing Co.

10. Conduit seal bushings shall be Type CSB as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co.

11. Explosion proof conduit seals shall be Type EYS as manufactured by O.Z. Manufacturing Co., or equal by Crouse-Hinds Co. and Appleton Electric Co.

PART 3 – EXECUTION

3.01 INSTALLATION

A. No conduit smaller than 3/4 inch electrical trade size shall be used, nor shall any have more than three 90 degree bends in any one run. Approved factory elbows shall be used when sharper bends are necessary. Pull boxes shall be provided as required or directed.

B. No wire shall be pulled until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; in the case of exposed work, until the conduit system has been completed in every detail.

C. The ends of all conduits shall be tightly plugged to exclude dust and moisture while the buildings are under construction.

D. Conduit supports shall be spaced at intervals of eight feet or less, as required to obtain rigid construction.

E. Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Plastic "CLIC" system supports are not acceptable.

F. All conduits on exposed shall be run perfectly straight and true.

G. Conduit terminating in pressed steel boxes shall have double locknuts and insulated bushings.

H. PVC conduits shall be installed using a fusing cement process. Conduits shall be water tight.

I. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs.

J. Metallic heavy wall conduits shall be installed using threaded fittings. Threadless fittings may be used in isolated instances when approved by the Engineer.

K. Liquidtight flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present.

L. PVC coated rigid steel conduits shall extend a minimum of 12 inches above finished slabs. Conduits penetrating walls shall be caulked gas tight on both sides.

M. When a conduit has to be cut in the field, it shall be cut square using a hand or power hacksaw cutter, or an approved pipe cutter using knives. The use of pipe cutter wheels will not be permitted. The cut ends of the field cut conduit shall be reamed to remove burrs and sharp edges. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory cut threads on conduits. Field cut threads shall be protected by a field applied cold galvanizing compound.

N. Conduits entering structures below grade shall be furnished with a conduit seal bushing.

O. Where ducts terminate at panelboards, terminal cabinets, etc. panel of sufficient width and depth shall be provided to maintain the 2 inch spacing between ducts or wireways shall be provided below panels, cabinets, etc.

P. A ground wire shall be run in all runs of PVC conduit.

Q. All bends in PVC conduit shall be made using a hotbox and bending guide tool.

R. Conduits run underground below the highest known ground water level shall not enter buildings below this groundwater level without first being run through a drain manhole, handhole, or exterior pull box.

- END OF SECTION -

SECTION 16442

PANELBOARDS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes the furnishing and installing of all panelboards as specified herein and as shown on the drawings. All panelboards shall be provided with the applicable NEMA enclosure in accordance with the Electrical Specifications, NEMA Type 1 panels can be provided in lieu of NEMA Type 12.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Panelboards, including construction details and enclosures
2. Terminals and lugs
3. Trim
4. Buses
5. Circuit Breakers
6. Groundfault Circuit Interrupter

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. Panelboard ratings shall be as shown on the drawings. All panelboards shall be rated for the intended voltage.

B. Panelboards shall be in accordance with the Underwriter Laboratories, Inc. “Standard for Panelboards” and “Standard for Cabinets and Boxes” and shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards and the National Electrical Code.

PART 2 – PRODUCTS

2.01 PANELBOARD CONSTRUCTION

A. Interiors

1. All interiors shall be completely factory assembled with circuit breakers, wire connectors, and buses. All wire connectors, except screw terminals, shall be of

the anti-turn solderless type and all shall be suitable for copper wire of the sizes indicated.

2. Interiors shall be designed such that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be such that circuits may be changed without machining, drilling or tapping.

3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.

4. A factory provided label shall be provided listing panel type, number of circuit breakers and ratings.

5. The main breaker shall be at the top or bottom of the bus construction and not a branch breaker.

B. Buses

1. Main bus shall be copper. Full size neutral bars shall be included. Phase bussing shall be full height without reduction. Cross connectors shall be copper. All buses shall be tinned.

2. Main bus shall be distribution phase sequence type configuration to allow installation of two or three pole circuit breakers at any location.

3. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.

4. Spaces for future circuit breakers shall be bussed for the maximum device that can be fitted into them.

5. Solderless main lugs or main circuit breakers shall be furnished as shown on the drawings.

6. Bus bracing to be at least equal to the interrupting rating of lowest rated circuit breaker installed in panel. Series rated breakers and panels shall not be acceptable.

C. Boxes

1. Boxes shall be made from galvanized code gauge steel having multiple knockouts unless otherwise noted. Surface mounted boxes shall be painted to match the trim. Boxes shall be of sufficient size to provide a minimum gutter space of four inches on all sides.

2. Surface mounted boxes shall have an internal and external finish as specified herein. Surface mounted boxes shall be field punched for conduit entrances.

3. At least four interior mounting studs shall be provided.

4. Panelboards shall be "door-in-door" construction.

D. Trim

1. Hinged door-in-door construction shall enclose all circuit breaker handles and shall be included in all panel trims.

2. Doors shall have semi flush type cylinder lock and catch, except that doors over 48 inch in height shall have a vault handle and three point catch, complete with lock, arranged to fasten door at top, bottom and center. Door hinges shall be concealed. Two keys shall be supplied for each lock. All locks shall be keyed alike. A directory frame and card having a transparent cover shall be furnished on each door.

3. Trims shall be fabricated from code gauge sheet steel.

4. All exterior and interior steel surfaces of NEMA 1, 1A, 3R and 12 panelboards shall be properly cleaned and finished with ANSI Z55.1, No. 61 light gray paint over a rust-inhibiting phosphatized coating. The finish paint shall be of a type to which field applied paint will adhere.

5. Trims for flush panels shall overlap the box by at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be fastened with quarter turn clamps.

E. Manufacturer

1. 120/240 Volt, single phase, 3 wire and 120/208 Volt, three phase, 4-wire branch circuit panelboards rated for 200 Amps and less shall load center type as manufactured by Eaton, or equal by Square D and General Electrical.

2.02 CIRCUIT BREAKERS

A. Panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the drawings. Circuit breaker mounting shall not exceed 78 inches above floor.

B. Circuit breakers shall be molded case, bolt-in type.

C. Circuit breakers shall have an interrupting capacity as shown on the Electrical Contract Drawings.

D. Main circuit breaker shall be attached to the main vertical bus.

2.03 GROUND FAULT CIRCUIT INTERRUPTER (GFCI)

A. GFCI shall be provided for circuits where indicated on the drawings. GFCI units shall be molded case, bolt-on breakers, incorporating a solid state ground fault interrupter circuit insulated and isolated from the breaker mechanism. The unit shall be U.L. listed Class A Group I device (5 milliamp sensitivity, 25 millisecond trip time), and an interrupting capacity matching the circuit breakers in the panelboards.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Boxes for surface mounted panelboards shall be mounted so there is at least ½ inch air space between the box and the wall.

B. Circuit directories shall be typed identifying location and nature of load served.

C. Panelboards installed in areas with finished walls shall be installed recessed into the wall with the front of the panel flush with the finished wall.

- END OF SECTION -

SECTION 16500

LIGHTING SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTON

A. The work of this section includes the furnishing and installing of complete lighting systems including panelboards, transformers, lighting fixtures, receptacles, switches, contactors, clocks and all accessories and appurtenances required as specified herein and as shown on the drawings.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Light Switches
2. Receptacles
3. Astronomical Time Clock Switch
4. Lighting Fixtures
5. Device Plates

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. All lighting fixtures shall be in accordance with the National Electrical Code and shall be constructed in accordance with the Underwriters Laboratories “Standards for Safety, Electric Lighting Fixtures.” All lighting fixtures shall be Underwriters Laboratories labeled.

PART 2 – PRODUCTS

2.01 LIGHT SWITCHES

A. NEMA WD 1, UL 20, Heavy-Duty, AC only general-use toggle switch.

B. Rated 20 Amperes, 120/277 Volts for inductive and resistive loads.

C. Motor rated up to 80 percent of ampere rating.

D. Totally enclosed in a phenolic base and cover.

2.02 RECEPTACLES

A. NEMA WD 1, UL 498, Heavy-duty general use receptacle.

B. GFCI Receptacle: UL 943, Convenience receptacle with integral ground fault circuit interrupter and indication light that is lighted when device is not tripped.

C. NEMA WD 6, straight blade type for rated current and phases as indicated on drawings.

D. Weatherproof Cover Plate: NEMA 3R, thermoplastic while use type covers by Hubbell or equal.

2.03 ASTRONOMICAL TIME CLOCK SWITCH

A. Astronomical Time Clock Switch shall be programmable astronomically controlled switch front LCD time display and programmable buttons mounted in a standard back box.

B. The switch shall be 1-pole, 15 Amp rated and capable of 7-day week time scheduling, equal to Leviton VPT24-1PZ Vizia by Leviton or equal by Hubbell or Legrand.

C. Operation: The exterior pole light shall be energized when the astronomical dusk time of day is past time. The lights shall remain energized until either the “Off” time of day or astronomical dawn time of day is past time.

2.04 DEVICE PLATES

A. Plates for shall be of the required number of gangs for the application involved and shall be Type 302 (18-8) high nickel stainless steel of the same manufacturer as the device.

2.05 LIGHTING FIXTURES

A. Lighting fixture shall be LED illuminated and of type as shown on the drawings. The catalog numbers listed are given as a guide to the design and quality of fixture desired. Equivalent designs and equal quality fixtures of other manufacturers will be acceptable.

B. The fixture shall be tested to IESNA LM-79-08 and LM-80 Testing Standards at 25° C ambient temperature

C. The LED package shall be designed around the lumen maintenance of 87% at 60,000 hrs. and is to be expected to achieve L70 at 100,000 hrs.

D. The Light Engine shall be a high efficacy LED light engine equipped with brand-name LEDs available in outputs of 100%, 85%, 70% and 55%.

E. The LED Drivers shall be Electronic Class 2, high efficiency, with the following power factor correction (PFC):

1. Standard Non-Dimming Driver (PFC>0.95).
2. Dimming Drivers (PFC>0.90).

PART 3 – EXECUTION

3.01 INSTALLATION

A. Each fixture shall be a completely finished unit with all components, mounting and/or hanging devices necessary, for the proper installation of the particular fixture in its designated location and shall be completely wired ready for Connection to the branch circuit wires at the outlet. All pendant mounted fixtures shall be mounted plumb with floors and walls.

3.02 CLEANING UP

A. All fixtures shall be left in a clean condition, free of dirt and defects, before acceptance by the Engineer.

- END OF SECTION -

SECTION 16612

DIESEL ENGINE GENERATORS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The work of this section includes all labor, materials, tools, equipment and incidentals necessary to furnish and install, put in operation and field test diesel engine driven generator units with sound attenuated weatherproof enclosure and doubled wall base tank of the size and rating as specified herein and on the Drawings.

1.02 SUBMITTALS

A. Shop Drawings and/or brochures shall be submitted to the Engineer in accordance with Section 01300.

B. Submit all pertinent technical data including but not limited, to the following:

1. Manufacturer and model of engine and generator

2. Rated capacity B.H.P.

3. Generator

4. Generator KVA, KW and P.F. rating

5. Voltage

6. Class insulation

7. Temperature rise above 40 degree C ambient

8. Generator efficiency and fuel consumption at full load, 3/4 load and l/2 load

9. Operating weight of complete unit

10. Exhaust piping

11. Double walled base tank

12. Battery and charger

13. Auxiliary system power requirements and wiring diagrams

14. Enclosure with all conduit openings for system operation identified.

C. Manufacturer's certified test record. The test record shall show the generator performance and frequency regulation to satisfy the requirements specified herein, and shall also show fuel consumption rates at 1/2 load, 3/4 load and full rated load.

D. Submit all other data specified in this section and as outlined in Section 01300.

1.03 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01600.

B. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

1.04 DESIGN CRITERIA

A. The engine generator units shall comply with the requirements of the Federal Environmental Protection Agency, State of Rhode Island Department of Environmental Protection, and NFPA 70.

B. The engine generator unit shall be arranged for automatic starting and stopping on failure of, and restoration of the normal source of power, and for automatic load transfer, but not including the automatic load transfer switch which will be furnished separately.

C. The engine generator unit shall include, but not be limited to excitation system, controls, keep warm system, cooling system, silencer, starting batteries, charger, and all essential and desirable appurtenances whether specifically mentioned in this specification or not.

D. The system described herein, including but not necessarily limited to the engine generator set, engine auxiliaries, batteries and engine generator control panels shall be furnished by a single supplier who is regularly engaged in the production of diesel fueled engine driven generators.

E. The voltage regulation shall be within plus or minus two percent from no load to full rated load. On application or removal of full rated load in one step, the transient voltage dip or overshoot shall not exceed twenty percent of rated voltage. Frequency regulation shall be within 3 Hertz from no load to full load.

F. The voltage regulator shall be insensitive to severe load induced waveshape distortion from SCR or thyrister circuits such as those used in battery charging (UPS) and motor speed control equipment. This SCR immune regulator shall not reduce the motor starting capabilities as specified herein.

G. Engine generator unit of not less than KW rating indicated on the contract drawings, three phase, 60 Hertz, 120/208 Volts, 4 wire alternating current generator shall be furnished.

H. The engine generator units shall be completely prewired and piped so that only field connections to a master terminal strip for control, auxiliaries and alarms, and power connections to a molded case line circuit breaker and fuel fill and vent line connections will be required.

I. The engine generator unit and associated auxiliaries systems and components shall be skid mounted and installed outdoors.

1.05 QUALIFICATIONS

A. The generator units shall be the standard product, as modified by these Specifications, of one of the following manufacturer listed below. Engine generator unit shall be a standard production model of proven ability and shall be designed, constructed, and installed in accordance with the best practice and methods. In addition, the manufacturer shall maintain a permanent service organization and supply of spare parts as necessary to provide adequate service within 60 miles of the site. The design basis for the generator sizes including the enclosure and base tank are based on Kohler units. Due to constraints on the sites, units by the other manufactures must not exceed the dimensions shown on scaled contract drawings by more than 10% which may require custom fabricated enclosures by the manufacture.

1. Caterpillar
2. Cummins
3. Kohler

B. The engine generators shall be a factory assembled unit specifically designed and fitted for operation on diesel fuel. The engine generator unit shall be free from injurious torsional or other vibration, and shall be assembled on an adequate steel subbase suitable for mounting on vibration isolation pads, on a flat concrete surface which is suitable for supporting the weight of the unit. The vibration installation material shall be furnished with the engine generator unit.

C. The engine generator unit will be installed in Pawtucket, RI and rated for use at this location's elevation level. Outdoor enclosed units shall be provided with heating and cooling as required to maintain the generator set operational within the temperature limits of all devices and equipment. The engine generator unit shall be suitable for continuous operation at any temperature between 0 and 110 degree F at its full load rating and at 80 percent power factor.

D. The engine generator unit shall be designed and built in accordance with the latest standards of IEEE, NEMA, ANSI and ASME.

E. The engine generator unit shall be designed to minimize the danger of accidents to operating and maintenance personnel. The manufacturer shall, prior to shipment, verify that all electrical connections are tight and that circuits are isolated, that on-set piping connections are well-made, and that standard safety equipment is included and functions according to design.

1.06 ENGINE GENERATOR UNIT PERFORMANCE

A. The engine generator unit shall maintain rated frequency from no load to full rated load.

B. The voltage regulation shall be as specified herein and recovery to steady state operation shall be within two seconds.

C. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus one percent of rated voltage. A rheostat shall provide a minimum of plus or minus five percent voltage adjustment from rated voltage.

D. Frequency regulation shall be maintained within 2½ percent of rated frequency from no load to full load. The steady state frequency shall be within 0.5 percent of rated frequency.

E. The engine shall be equipped with a electronic isochronous governor capable of maintaining the engine speed from no load to full load within plus or minus .25 percent of the synchronous speed.

1.07 PRODUCT HANDLING

A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance.

B. Protect material and equipment, in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Stored items shall be protected from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.08 WARRANTY/SERVICE

A. The manufacturer's and dealers Extended Service Coverage shall in no event be for a period of less than five (5) years from date of Owner/Engineer's acceptance of the system and shall include repair parts, labor, travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of maintenance and repair. Applicable deductible costs applying only after the first year shall be specified in the manufacturer's warranty and not exceed $500 per site visit. Submittals received without written warranties as specified will be rejected in their entirety. Warranty and maintenance shall be issued and executed by the dealer and may not be subcontracted.

B. The generator set supplier shall have factory trained service representatives and tooling necessary to install, test maintain, and repair all provided equipment and shall be located within 150 miles of the customer's site.

PART 2 – PRODUCTS

2.01 ENGINE

A. The engine shall be diesel fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM. The engine shall meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State and Federal emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 Emissions Cycle at specified ekW/bHP rating.

B. The engine shall be furnished with thermostatically controlled jacket water heaters of the size recommended by the supplier. Heaters for units rated less than 150KW shall be rated for operation at 120 Volts, and 208 Volts for units 150KW and greater.

C. The oil sump will be fitted with pipe nipples, a ball valve, and an extension oil drain.

D. The engine shall be provided with a governor which maintains the frequency within a bandwidth of the rated frequency, over a steady-state load range of zero to 100% of rated output capacity. The governor shall be configured for safe manual adjustment of the speed/frequency during operation of the engine-generator set, without special tools, from 90 to 110% of the rated speed/frequency, over a steady state load range of 0 to 110% or rated capacity.

1. Steady state speed band, +/- 0.25% of rated speed.

2. Internal oil pump, relief valve and accumulator controls governor operating pressure.

3. Manual speed adjustment knob at top of unit.

4. Positive locking to allow manual speed adjustment.

2.02 COOLING SYSTEM

A. The engine shall be furnished with a unit mounted radiator. The radiator shall be of sufficient size to cool the water when ambient temperature is 100 degrees F. and the engine generator unit is operating at full rated load continuously.

B. Cooling system shall further include water cooled manifolds, pusher fans and high temperature cutout. Provide radiator duct connector complete with suitable gasket, bolts and nuts. The cooling system shall be furnished with sufficient antifreeze solution to protect the cooling system with ambient air temperature down to minus fifty degrees F.

C. Provide an anti-freeze treatment as recommended by the manufacturer for protection against corrosion and scale formation. The anti-freeze treatment shall be compatible with

the antifreeze solution. The anti-freeze will be long life environmentally friendly polypropylene glycol. The concentration will be as recommended by the manufacturer.

2.03 FUEL SYSTEM

A. The engine shall be furnished with filter, fuel pressure gage and engine priming pump.

B. The engine-generator unit shall be furnished with an approximate 25 inch high, double-walled fuel base-tank with leak detection and fuel capacity for 48 hours of generator operation at full load. Tank shall be constructed of heavy gauge steel; epoxy coated interior, and Housing surfaces shall have a corrosion resistant epoxy based hardened rubberized coating.

1. Tank shall conform to NFPA 30 and NFPA 47.

2. The diesel fuel oil tank shall have tappings for fuel supply and return. It shall be equipped with a suitable vent cap. The fill pipe shall be extended to the exterior wall and easily accessible and lockable.

3. The tank shall be dual wall constructed of steel and mounted directly to the generator set skid, and shall be provided with low fuel and leak detection alarms and dry contacts. For added protection the rupture basin portion of the tank shall have a leak monitoring system utilizing a non-toxic, non-volatile liquid to determine integrity of external rupture basin wall. This shall be coordinated to operate with floats and sensors of the fuel tank.

4. An 8 gallon overflow tank shall be furnished at the generator fill. The generator shall be furnished with a 2 inch diesel vent fuel line. The diesel fuel tank shall be furnished with audible and visual alarms at the fill gauge.

5. Vent and overflow piping to be provided.

6. Fuel gauge.

7. Provide tank openings to allow manual level measurement with stick gauges.

2.04 EXHAUST SILENCER

A. The engine generator unit shall be provided with a critical type silencer including flexible exhaust fittings. Silencers shall be mounted so that its weight is not supported by the engine. Exhaust piping shall be sized as recommended by the manufacturer. Connection between engine and silencer shall be of the stainless steel flexible type.

B. A flexible section shall be provided at each engine and an expansion joint at each muffler. Flexible sections and expansion joints shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for diesel-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable

of absorbing vibration from the engine and compensation for thermal expansion and contraction.

C. Horizontal sections of exhaust piping shall be sloped downward away from the engine to a drip leg for collection of condensate with drain valve and cap. Changes in direction shall be long radius. Exhaust piping, mufflers and silencers installed shall be insulated with 3 inches of calcium silicate insulation and covered with aluminum flashing to protect personnel.

D. All portions of the exhaust system shall be insulated and covered with flashing.

2.05 STARTING SYSTEM

A. The electric starting system shall consist of the following equipment:

1. The engine shall have a two wire, direct current starter suitable for automatic starting through the load transfer switch.

2. Batteries shall be of the lead-acid type. Batteries shall be guaranteed to have sufficient capacity when in a fully charged state to perform not less than five, 15 second cranks while in an ambient temperature of 0 degrees F without recharging.

3. Current limiting type automatic battery charger conforming to UL 1236 shall be of the static type, magnetic amplifier control with led status lights, battery temperature compensation, and user adjustable parameters factory set to match battery charge curve. Charger to be completely automatic, charging rate to be determined by the state of the battery, and reducing to milliamp current on a fully charged battery. Charger shall be for 120 Volt, single phase, 60 Hertz A.C. input with an output of not less than 10 amperes. The charger shall be for the correct voltage for the battery, and specifically for charging a lead-acid battery and for panel mounting.

2.06 ALTERNATOR

A. The alternator shall be single bearing, open, dripproof revolving field, four pole brushless type, permanently aligned to the engine by flexible disc coupling. Each unit shall be reconnectable type having nine leads and shall be factory connected for three phase, 4 wire, 60 Hertz. The rating of the unit shall be as indicated on the drawings.

B. Alternators shall have Class F insulation and shall be furnished with Amortisseur windings. Alternators shall have a complete static automatic voltage regulator which will hold the voltage within plus or minus two percent from no load to full rated load. On application of rated load in one step, the transient voltage dip shall not exceed twenty percent. The generator windings shall be braced to withstand any possible short circuit stresses. Alternator shall be “Radio Interference Proof” (RIP) and “Telephone Influence Factor” (TIF) and shall be within the limits of Section 9, ANSI C50.12. Alternators shall have a rotating brushless exciter and rectifier.

C. The alternator characteristics shall be matched to the torque characteristics of the engine in such a manner that with full load connected to the alternator terminals, the alternator will utilize all the available engine power without exceeding it at all speeds.

D. The generator exciter shall be of the brushless type. Semiconductor rectifiers shall have a minimum safety factor of 300% for peak inverse voltage and forward current ratings for all operating conditions, including 110% generator output at 40 degrees C 104 degrees F ambient. The exciter and regulator in combination shall maintain generator-output voltage within the limits specified.

E. Each generator shall be provided with a solid-state voltage regulator, separate from the exciter. The regulator shall maintain the voltage within a bandwidth of the rated voltage, over a steady-state load range of zero to 100% of rated output capacity. Regulator shall be configured for safe manual adjustment of the engine-generator voltage output without special tools, during operation, from 90 to 110% of the rated voltage over the steady state load range of 0 to 100% of rated output capacity. Regulation drift shall not exceed plus or minus 0.5% for an ambient temperature change of 20 degrees C. 68 degrees F.

F. Alternators shall be furnished with 120V stator heater and controls.

2.07 CONTROLS

A. The engine generator units shall be furnished with a shock resistant, engine mounted NFPA 110 compliant microprocessor based controller.

B. Standard data available shall include:

1. Jacket water temperature

2. Lube oil temperature

3. Lube oil pressure

4. Battery voltage

5. RPM

6. A.C. Voltmeter

7. A.C. Ammeter

8. Frequency meter

9. Elapsed time meter calibrated in hours and tenths of hours

C. Accessories shall include:

1. Current transformers.

2. Fuses

3. Generator voltage regulator

4. Voltage adjusting rheostat.

5. Fault indication lights one each for:

   a. low oil pressure
   b. high water temperature
   c. overspeed
   d. overcrank (fail to start).

6. Prewarn indication lights one each for:

   a. low oil pressure
   b. high water temperature.

7. 90 DB (a) Audible alarm to sound on any fault or prewarn and an alarm silencer.

8. Mode selector switch – "AUTO", "OFF", "MANUAL" with audible alarm when switch is not in "AUTO" position.

9. Control power fuse.

10. Fixed overcrank timer - four-10 second cranks shall be provided. After four cranks, the unit shall stop and an alarm initiated.

11. Auxiliary contacts which close when engine is in operation. Contacts shall be rated 10 amperes and shall be used to interlock combustion and ventilation air dampers.

12. Common failure relay

13. Dry contact kit with the minimum following contact signals:

    a. Engine Running
    b. Engine Trouble
    c. Battery Charger Alarm

14. Engine sensors for low water temperature near low oil pressure, near high water temperature.

D. In addition to the equipment included in the control panel described above, the unit shall include a power and control junction box mounted on the generator. This junction box shall include:

1. Power conductors terminated with pressure type ring connectors.

2. Neutral connection.

3. Terminal block with marked connection points for all external control connections and for jacket heaters, etc.

4. Molded case line circuit breaker with interrupting rating of 100 KA amperes RMS, electronic LSI, and ground fault relay alarm.

E. Automatic shutdown shall be provided for each of the following conditions:

1. High jacket water temperature

2. Low jacket water pressure

3. Low lubricating oil pressure

4. Engine overspeed

5. Unit fail to start.

F. Auxiliary normal open dry contacts shall be provided for remote transmission of unit failure.

G. Provide a factory wired weather proof remote emergency stop pushbutton operator station mounted on the generator enclosure.

2.08 SUB-BASE

A. The engine, generator and radiator shall be mounted on a structural steel base designed to maintain proper alignment. Vibration isolators shall be furnished of the size and type recommended by the supplier.

2.09 ENCLOSURE

A. A sound-attenuated weather-protective housing shall be furnished. The housing shall enclose the complete unit and all related equipment (e.g. battery, battery charger, engine controls and control panel, etc). All components shall be wired and piped within the enclosure.

B. The housing shall be constructed of 2mm formed aluminum, and shall include hinged locking access doors. Housing surfaces shall be prime painted with two coats of a rust resistant primer and finished with a dark green enamel paint.

C. The housing shall be sound insulated, vandal proof, and padlocked. The resulting structure with engine-generator in operation shall not transmit more than 65 db at a distance of 23 feet from the generator in any direction. There shall be no Puretone. The generator set manufacturer shall choose the thickness of insulation to meet the aforementioned sound criteria.

D. The housing shall be furnished with weather-protective fixed louvers, and weather-protective flanged door openings to insure weather-resistant construction.

E. Stainless steel flexible exhaust sections shall be provided. Exhaust outlet shall be terminated with a "shanty cap" designed so to prevent entrance of rain into exhaust outlet. All handles, sheet metal screws, bolts, nuts, hinges, and other exterior hardware shall be stainless steel.

F. Provide factory wired instruction detection style doors switches for each of the enclosure entry doors that shall be wired in series to one another and terminated at a junction box within the generator enclosure.

PART 3 – EXECUTION

3.01 MANUFACTURER'S SERVICES

A. A minimum of one, eight-hour day shall be provided to supervise the installation and testing of the equipment furnished, to assist in start-up and train Owners maintenance personnel.

B. A minimum of one, four hour day, not including travel time to and from the site, shall be used by a fully qualified field service engineer to make necessary adjustments and to provide operator training on the equipment furnished. This work shall occur after the equipment has been in operation and at the request of the owner, but not to exceed one year after the acceptance of the facility.

3.02 TESTS

A. At least 48 hours prior to the load test, the manufacturer shall perform a pretest. The pretest shall be conducted in the presence of the Engineer. The pretest shall determine that the unit is ready for load testing and that all components are functioning correctly. All adjustment for tuning the unit shall be made during the pretest. If remedial work is required, the work shall be performed before the load test is conducted.

B. Upon completion of the installation, the manufacturer of the equipment shall test the complete unit, at full load, using load banks, for four continuous hours. During the test, the following data shall be taken at 15 minute intervals:

1. Outside air temperature
2. Generator room temperature
3. Oil pressure
4. Oil temperature
5. Jacket water temperature
6. Battery charge rate
7. Fuel pressure
8. A.C. Volts
9. A.C. Amps
10. Frequency

11. Kilowatts.

C. Following the test, three successive simulated power outages shall be conducted using all connected building load.

D. The equipment shall be left in good operating order and the settings of all alarm and shutdown devices verified.

E. The diesel fuel required for testing shall be supplied by the electrical contractor, upon engineer acceptance of the tests results the electrical contractor shall fill the generator's base tank and make the unit completely ready for full operation.

3.03 OPERATION AND MAINTENANCE MANUALS

A. Furnish Operation and Maintenance Manuals as specified in Section 01730.

B. Maintenance instructions shall be furnished for batteries, to include simple and clear procedures for addition of liquids, maintaining cleanliness, proper ventilation, proper electrical connections.

C. Maintenance instruction shall be furnished for engines, including recommended lubricants, coolants, etc., recommended maintenance intervals, and recommended ventilation requirements.

D. The Operating manual shall be a simple starting and stopping procedure, with reference to shop drawings information for more complicated procedures.

- END OF SECTION -

SECTION 16613

PORTABLE ENGINE GENERATOR

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemental Conditions, Division 0 and Division 1 Specification Sections, apply to this section.

1.02 SUMMARY OF WORK

A. The work of this section includes all labor, materials, tools, equipment and incidentals necessary to furnish and install, put in operation and field test one 100KW diesel engine driven, industrial towable trailer mounted generator set with a sound attenuated enclosure and a fuel base tank as specified herein.

1.03 SUBMITTALS

A. Manufacturer's literature and brochures shall be submitted for all items to be furnished in accordance with the provisions of Section 01300 – Submittals

B. Submittals required under this section include, but are not limited to the following:

1. Manufacturer and model of engine and generator

2. Rated capacity B.H.P.

3. Generator

4. Generator KVA, KW and P.F. rating

5. Voltage

6. Class insulation

7. Temperature rise above 40 degree C ambient

8. Generator efficiency and fuel consumption at full load, 3/4 load and l/2 load

9. Exhaust system and associated pipe arrangement

10. Fuel tanks and alarm indications.

11. Battery and charger

12. Auxiliary system power requirements

13. Sound Attenuated weatherproof enclosure.

14. Trailer and all towing, parking, and interconnection cables.

15. Operating weight and noise levels of complete unit

16. Manufacturer's certified test record. The test record shall show the generator performance and frequency regulation to satisfy the requirements specified herein, and shall also show fuel consumption rates at 1/2 load, 3/4 load and full rated load.

1.04 QUALITY ASSURANCE

A. The generator unit shall be the standard product, as modified by these Specifications, of a manufacturer regularly engaged in the production of this type of equipment. Engine generator unit shall be a standard production model of proven ability and shall be designed, constructed, and installed in accordance with the best practice and methods. In addition, the manufacturer shall maintain a permanent service organization and supply of spare parts as necessary to provide adequate service within 60 miles of the site.

B. The engine generator set shall be a factory assembled unit specifically designed and fitted for operation using diesel fuel. The engine generator unit shall be free from injurious torsional or other vibration and shall be assembled on an adequate steel subbase suitable for mounting on heavy duty, industrial grade spring-type vibration isolators, on a towable trailer. The spring isolators shall be furnished as part of the complete engine generator set.

C. The engine generator unit shall be designed and built in accordance with the latest standards of IEEE, NEMA, ANSI and ASME.

D. The engine generator unit shall be designed to minimize the danger of accidents to operating and maintenance personnel. The manufacturer shall, prior to shipment, verify that all electrical connections are tight and that circuits are isolated, that on-set piping connections are well-made, and that standard safety equipment is included and functions according to design

E. Warranty/Service

1. The manufacturer’s and dealers Extended Service Coverage shall in no event be for a period of less than five (5) years from date of Owner/Engineer’s acceptance of the system and shall include repair parts, labor, travel expense necessary for repairs at the jobsite, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of maintenance and repair. Applicable deductible costs applying only after the first year shall be specified in the manufacturer’s warranty. Submittals received without written warranties as specified will be rejected in their entirety. Warranty and maintenance shall be issued and executed by the dealer and may not be subcontracted.

2. The generator set supplier shall have factory trained service representatives and tooling necessary to install, test maintain, and repair all provided equipment and shall be located within 150 miles of the customer’s site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. All materials shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability, or appearance

B. Protect material and equipment, in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Stored items shall be protected from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.06 DESIGN CRITERIA

A. The engine generator units shall comply with the requirements of the Federal Environmental Protection Agency and State of Rhode Island Department of Environmental Protection.

B. The engine generator set shall be arranged for manual starting.

C. The engine generator unit shall include, but not be limited to excitation system, controls, keep warm system, cooling system, silencer, starting batteries, charger, and all essential and desirable appurtenances whether specifically mentioned in this specification or not.

D. The systems described herein, including but not necessarily limited to the engine generator set, engine auxiliaries, batteries and engine generator control panels shall be furnished by a single supplier who is regularly engaged in the production of diesel fueled engine driven generators.

E. The voltage regulation shall be within plus or minus two percent from no load to full rated load. On application or removal of full rated load in one step, the transient voltage dip or overshoot shall not exceed twenty percent of rated voltage. Frequency regulation shall be within 3 Hertz from no load to full load.

F. The voltage regulator shall be insensitive to severe load induced waveshape distortion from SCR or thyrister circuits such as those used in battery charging and motor speed control equipment. This SCR immune regulator shall not reduce the motor starting capabilities as specified herein.

G. Provide an engine generator unit of not less than 100 KW, 0.8 power factor capacity with the following selectable outputs, in a weather-proof, sound attenuated enclosure.

1. 3-Phase, 60 Hertz, 277/480 A.C. Volts, 4 Wire

2. 3-Phase, 60 Hertz, 120/208 A.C. Volts, 4 Wire

3. 1-Phase, 60 Hertz, 120/240 A.C. Volts, 3 Wire

H. The engine generator unit shall be completely pre-wired and piped. Receptacle cord connections for each output type at full generator capacity output power and 120V, 20A battery charger input power shall be required.

I. The weather protected unit shall be trailer mounted. Trailer and accessories shall be furnished as hereinafter specified. The entire assembly shall be provided with a lunette lifting eye capable of evenly supporting the entire system from the eye location.

1.07 ENGINE GENERATOR UNIT PERFORMANCE

A. The engine generator unit shall maintain rated frequency from no load to full rated load.

B. The voltage regulation shall be as specified herein and recovery to steady state operation shall be within two seconds.

C. Stable or steady state operation is defined as operation with terminal voltage remaining constant within plus or minus one percent of rated voltage. A rheostat shall provide a minimum of plus or minus five percent voltage adjustment from rated voltage.

D. Frequency regulation shall be maintained within 2-1/2 percent of rated frequency from no load to full load. The steady state frequency shall be within 0.5 percent of rated frequency.

E. The engine shall be equipped with a electronic isochronous governor capable of maintaining the engine speed from no load to full load within plus or minus .25 percent of the synchronous speed.

PART 2 –PRODUCTS

2.01 ENGINE

A. The engine shall be diesel oil fueled, four (4) cycle, water-cooled, while operating with nominal speed not exceeding 1800 RPM. The engine shall meet applicable EPA non-road mobile regulations and/or the EPA NSPS rule for stationary reciprocating compression ignition engines. Additionally, the engine shall comply with the State Emission regulations at the time of installation/commissioning. Actual engine emissions values must be in compliance with applicable EPA emissions standards per ISO 8178 Emissions Cycle at specified ekW/bHP rating.

B. The engine shall be furnished with thermostatically controlled jacket water heaters of the size recommended by the supplier. Heaters shall be rated for operation on 120 Volts.

C. The oil sump will be fitted with pipe nipples, a ball valve, and an extension oil drain.

D. The engine shall be provided with a governor which maintains the frequency within a bandwidth of the rated frequency, over a steady-state load range of zero to 100% of rated output capacity. The governor shall be configured for safe manual adjustment of the speed/frequency during operation of the engine-generator set, without special tools, from 90 to 110% of the rated speed/frequency, over a steady state load range of 0 to 110% or rated capacity.

1. Steady state speed band, +/- 0.25% of rated speed.

2. Internal oil pump, relief valve and accumulator controls governor operating pressure.

2.02 COOLING SYSTEM

A. The engine shall be furnished with a unit mounted radiator. The radiator shall be of sufficient size to cool the water when ambient temperature is 100 degrees F. and the engine generator unit is operating at full rated load continuously.

B. Cooling system shall further include water cooled manifolds, pusher fans and high temperature cutout. Provide radiator duct connector complete with suitable gasket, bolts and nuts. The cooling system shall be furnished with sufficient antifreeze solution to protect the cooling system with ambient air temperature down to minus fifty degrees F.

C. Provide an anti-freeze treatment as recommended by the manufacturer for protection against corrosion and scale formation. The anti-freeze treatment shall be compatible with the antifreeze solution. The anti-freeze will be long life environmentally friendly polypropylene glycol. The concentration will be as recommended by the manufacturer.

2.03 FUEL SYSTEM

A. The engine shall be furnished with filter, fuel pressure gage and engine priming pump.

B. A minimum of one full-flow fuel filter shall be provided for each engine. The filter shall be readily accessible and capable of being changed without disconnecting the piping or disturbing other components. The filter shall have inlet and outlet connections plainly marked

C. The engine generator shall be provided with a sub-base fuel tank package sized for continuous operation at 100% load for 24 hours, minimum.

1. Tank shall be constructed of heavy gauge steel; rust proofed and finished painted exterior.

2. Tank shall be furnished with a lift off cover; 1 inch npt. connections for engine suction; return, drain cock; vent and overflow; float switch with adjustment to maintain reserve, control panel with press to test button; fuel gauge; pressure relief valve, and a low fuel level.

3. The storage tank shall be a secondarily contained rectangular steel tank. The tank shall be “Special Purpose” UL142 listed.

4. The tank shall have lifting eye(s) and be approved by UL with a 2 to 1 safety factor.

5. The primary and secondary tanks shall be fabricated from minimum ¼” steel.

6. Primary tank shall be air pressure tested at three (3) PSI using a leak detection solution and the secondary tank shall be air pressure tested at one and one-half (1-1/2) PSI using a leak detection solution.

7. There shall be an annular space between the primary and secondary tank to provide an immediate leak path for external monitoring manually or electronically.

8. All tank-top fittings shall be forged steel weld flanges.

9. The outer tank shall be cleaned and painted with one coat of industrial enamel.

10. The tanks shall be labeled by product, capacity and manufacturer.

11. Updraft and emergency venting shall be provided by tank manufacturer per UL 142 requirements.

12. The outer tank shall be abrasive blasted per SSPS-SP10 (White metal blast), then painted with one coat of high build polyester glass flake to a minimum of 12 - 15 mils (DFT), and a finish coat of aliphatic urethane with a minimum of 3 mils (DFT).

13. Tanks shall be provided with UL listed 10 gauge stainless steel overspill box welded and permanently affixed to top of tank and shall include a handle pull overfill drain to allow fuel to return to the tank.

14. The rear of fuel tank shall be equipped with an attached compartment, which acts as an electrical stub-up area. The rear panel of this compartment shall be detachable to allow for contractor access to connect electrical conduits.

15. Through inner tank stub-up area shall be available per generator design requirements.

2.04 EXHAUST SILENCERS

A. The engine generator unit shall be provided with a critical type silencer including flexible exhaust fittings. Mounting shall be provided within the enclosure by the Manufacturer. Silencers shall be mounted so that its weight is not supported by the engine. Exhaust piping shall be sized as recommended by the manufacturer. Connection between engine and silencer shall be of the flexible steel.

B. A flexible section shall be provided at each engine and an expansion joint at each muffler. Flexible sections and expansion joints shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for natural gas-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable of absorbing vibration from the engine and compensation for thermal expansion and contraction.

C. Horizontal sections of exhaust piping shall be sloped downward away from the engine to a drip leg for collection of condensate with drain valve and cap. Changes in direction shall be long radius. Exhaust piping, mufflers and silencers installed shall be insulated with 3 inches of calcium silicate insulation and covered with aluminum flashing to protect personnel.

D. All portions of the exhaust system shall be insulated and covered with flashing

2.05 STARTING SYSTEM

A. The electric starting system shall consist of the following equipment:

1. The engine shall have a two wire, direct current starter suitable for automatic starting through the load transfer switch.

2. Batteries shall be of the lead-acid type. Batteries shall be guaranteed to have sufficient capacity when in a fully charged state to perform not less than five, 15 second cranks while in an ambient temperature of 0 degrees F without recharging.

3. Current limiting type automatic battery charger conforming to UL 1236 shall be of the static type, magnetic amplifier control with D.C. voltmeter, D.C. ammeter and potentiometer for voltage adjustment. Charger to be completely automatic, charging rate to be determined by the state of the battery, and reducing to milliamp current on a fully charged battery. Charger shall be for 120 Volt, single phase, 60 Hertz A.C. input. The charger shall be for the correct voltage for the battery, and specifically for charging a lead-acid battery and for panel mounting.

2.06 ALTERNATOR

A. The alternator shall be single bearing, open, dripproof revolving field, four pole brushless type, permanently aligned to the engine by flexible disc coupling. Each unit shall be reconnectable type having nine leads and shall be factory connected for three phase, 4 wire, 60 Hertz. The rating of the unit shall be as hereinbefore specified.

B. Alternators shall have Class H insulation provided with a 2/3 pitch rated for use with non-linear variable frequency drive loads and shall be furnished with Amortisseur windings. Alternators shall have a complete static automatic voltage regulator which will hold the voltage within plus or minus two percent from no load to full rated load. On application of rated load in one step, the transient voltage dip shall not exceed twenty percent. The generator windings shall be braced to withstand any possible short circuit stresses. Alternator shall be “Radio Interference Proof” (RIP) and “Telephone Influence Factor” (TIF) and shall be within the limits of Section 9, ANSI C50.12. Alternators shall have a rotating brushless exciter and rectifier.

C. The alternator characteristics shall be matched to the torque characteristics of the engine in such a manner that with full load connected to the alternator terminals, the alternator will utilize all the available engine power without exceeding it at all speeds.

D. The generator exciter shall be of the brushless type. Semiconductor rectifiers shall have a minimum safety factor of 300% for peak inverse voltage and forward current ratings for all operating conditions, including 110% generator output at 40 degrees C 104 degrees F ambient. The exciter and regulator in combination shall maintain generator-output voltage within the limits specified.

E. Each generator shall be provided with a solid-state voltage regulator, separate from the exciter. The regulator shall maintain the voltage within a bandwidth of the rated voltage, over a steady-state load range of zero to 100% of rated output capacity. Regulator shall be configured for safe manual adjustment of the engine-generator voltage output without special tools, during operation, from 90 to 110% of the rated voltage over the steady state load range of 0 to 100% of rated output capacity. Regulation drift shall not exceed plus or minus 0.5% for an ambient temperature change of 20 degrees C. 68 degrees F.

F. Alternators shall be furnished with vacuum-impregnated windings with fungus-resistant epoxy varnish

2.07 CONTROLS

A. The engine generator unit shall be furnished with a shock resistant, engine mounted microprocessor instrument panel.

B. Standard data available shall include

1. Jacket water temperature

2. Lube oil temperature

3. Lube oil pressure

4. Battery voltage

5. RPM

6. A.C. Voltmeter

7. A.C. Ammeter

8. Frequency meter

9. Elapsed time meter calibrated in hours and tenths of hours

C. Accessories shall include:

1. Current transformers

2. Fuses

3. Generator voltage regulator

4. Voltage adjusting rheostat

5. Fault indication lights one each for:

i. Low Oil Pressure
ii. High Water Temperature
iii. Overspeed
iv. Overcrank (Fail to Start).

6. Prewarn indication lights one each for:

i. Low Oil Pressure
ii. High Water Temperature.
iii. Low Fuel
iv. Low Battery

7. 90 DB (a) Audible alarm to sound on any fault or prewarn and an alarm silencer.

8. On-Off key switch.

9. Control power fuse.

10. Fixed overcrank timer - four-10 second cranks shall be provided. After four cranks, the unit shall stop and an alarm initiated.

11. Engine sensors for low water temperature near low oil pressure, near high water temperature.

12. Emergency stop button.

D. In addition to the equipment included in the control panel described above, the unit shall include a power and control junction box mounted on the generator. This junction box shall include:

1. Circuit breaker shall be 100% rated insulated case, adjustable trip type, rated 25KA symmetrical.

   i. Circuit breaker trip system shall be a microprocessor-based true rms sensing design with sensing accuracy through the thirteenth (13^{th}) harmonic.
   ii. The integral trip system shall be independent of any external power source and shall contain no less than industrial grade electronic components.
   iii. The ampere rating of the circuit breaker shall be determined by the combination of an interchangeable rating plug, the sensor size and the long-time pickup adjustment on the circuit breaker. The sensor size, rating plug and switch adjustments shall be clearly marked on the face of the circuit breaker. Circuit breakers shall be UL Listed to carry 100% of their ampere rating continuously.
   iv. Main circuit breaker shall be equipped with lockable handle.

2. 3-postion lockable voltage output selector switch.

3. 480/208/120V, 3-phase, 4-wire, plus ground flush mounted female cam lok connectors with full rated capacity of the generator and connected to the load side of the generator main circuit breaker.

4. 240V/120V, 1-phase, 3-wire, plus ground flush mounted female cam lok connectors with full rated capacity of the generator and connected to the load side of the generator main circuit breaker.

5. 120V, 1-phase, 20A, 2-wire, plus ground flush mounted shore power plug connected to the 120VAC input of the battery charger. Plug to have a NEMA 1-20 configuration.

6. 120V, 1-phase, 20A, 2-wire, plus ground flush mounted shore power plug connected to the 120VAC input of the block heater. Plug to have a NEMA 1-20 configuration.

2.08 SUBBASE

A. The engine, generator and radiator shall be mounted on a structural steel base designed to maintain proper alignment. Vibration isolators shall be furnished of the size and type recommended by the supplier.

2.09 ENCLOSURE

A. A sound-attenuated weather-protective housing shall be furnished. The housing shall enclose the complete unit and all related equipment (e.g. battery, battery charger, engine controls and control panel, etc). All components shall be wired and piped within the enclosure.

B. The housing shall be constructed of 14 gauge rolled steel and shall include hinged locking access doors. Housing surfaces shall be prime painted with two coats of a rust resistant primer and finished with a dark green enamel paint.

C. The housing shall be sound insulated, vandal proof, and padlocked. The resulting structure with engine-generator in operation shall not transmit more than 70 db at a distance of 23 feet from the generator in any direction. There shall be no Puretone. The generator set manufacturer shall choose the thickness of insulation to meet the aforementioned sound criteria.

D. The housing shall be furnished with weather-protective fixed louvers, and weather-protective flanged door openings to insure weather-resistant construction.

E. Stainless steel flexible exhaust sections shall be provided. Exhaust outlet shall be terminated with a “shanty cap” designed so to prevent entrance of rain into exhaust outlet. All handles, sheet metal screws, bolts, nuts, hinges, and other exterior hardware shall be stainless steel.

F. The enclosure and the entire engine generator shall be securely bolted to the frame of the trailer.

2.10 TRAILER

A. The trailer shall be designed and built for transporting an electric generating set and sub-base tank with a maximum of safety at highway speeds. The generator set including the enclosure shall be mounted on a heavy duty “highway” type trailer. The trailer may be of double axle design and shall be determined by the overall size and weight of the complete unit. However, the capacity of the trailer shall be at least 10 percent more than the total gross weight of the enclosed generator with a full fuel tank. Tires shall be at least 14-inch diameter.

B. The trailer shall be equipped with hydraulic surge brakes or electric brake system. Hydraulic brakes shall not require any external connection in order to function properly. Electric brake system shall have break away and battery backup. A steel tether shall be provided for connection between the tow vehicle and brake actuator. The trailer chassis shall be welded all steel channel and angle construction with heavy gauge bed plate. The V-torque shall be equipped with ball coupler.

C. The trailer shall include, but not be limited to, the following accessories with required ICC equipment:

1. Hitch connection

2. Steel fenders

3. Stop, directional, running and side marker lights

4. Reflectors on each upper corner and rear of the weather protective enclosure

5. Leveling jacks front and rear

6. Four wheel checks with holding brackets for when not in use

7. Welded link safety chains with shackles

8. Spare tire with rack and jack

9. Registration mounting plate bracket with light.

10. Lockable utility box large enough to house the power cables

D. All lights shall be wired to a plug at the trailer tongue. A mating pigtail shall be supplied.

E. The entire unit shall be in accordance with the Department of Transportation, State, and local regulations.

F. The certification of origin for the trailer shall be furnished directly to the Owner by the supplier after the equipment is accepted by the Owner and the supplier has been paid in full.

2.11 POWER CABLES

A. Provide colored power cables for each phase and neutral connection with pre-wired NEMA 4X cam lok connectors at each end.

1. Cable to be UL type W portable power cable with copper conductors insulated with synthetic rubber (EPDM). The cable is be covered with a black CPE rubberjacket applied in two layers whith reinforcement placed between the layers

2. Cable and connector assemble to have full rated capacity of the generator.

B. Provide two 1-phase, 2-wire, plus ground, 20A rated, heavy duty power cable with pre-wired NEMA 4X plug and receptacle. Plug and receptacle to have a NEMA 1-20 configuration.

C. All cables shall have a minimum length of 50 feet.

PART 3 – EXECUTION

3.01 MANUFACTURERS' SERVICES

A. The engine-generator set manufacturer shall perform onsite tests and instruct personnel as to the operational and maintenance features of the equipment.

B. A minimum of one eight-hour day shall be provided to supervise the installation and testing of the equipment furnished, to assist in start-up and train Owners maintenance personnel

3.02 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700 – Contract Closeout

B. Operation and Maintenance Manuals

1. Furnish Operation and Maintenance Manuals as specified in SECTION 01710 – Operation and Maintenance Data.

2. Maintenance instructions shall be furnished for batteries, to include simple and clear procedures for addition of liquids, maintaining cleanliness, proper ventilation, proper electrical connections.

3. Maintenance instruction shall be furnished for engines, including recommended lubricants, coolants, etc., recommended maintenance intervals, and recommended ventilation requirements.

4. The Operating manual shall be a simple starting and stopping procedure, with reference to shop drawings information for more complicated procedures

END OF SECTION 16612

APPENDIX A

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street
Providence, Rhode Island 02908

June 18, 2026

City of Pawtucket
c/o Mayor Donald R. Grebien
250 Armistice Blvd.
Pawtucket, RI 02860

Freshwater Wetlands Permit

Re: **Application No. 26-0083 (IA 22006) for the property and project located:**

Approximately 140 feet southeast of the Crest Drive culdesac, approximately 550 feet east southeast of the intersection of Crest Drive and Pinecrest Drive, Utility Pole No. 7, Assessor's Plat 1B, Lot 290, Pawtucket, RI.

Dear Ms. Morse:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Application for a Freshwater Wetlands Permit** as described in Section 3.11 of the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act, 250-RICR-150-15-3 ("Rules"). This review included a site inspection of the above referenced property ("subject property") and an evaluation of the proposed improvements to an existing pump station, to include demolition of the existing station and pavement, vegetative clearing, installation of a new pervious access drive, new paved and stone surfacing, a new concrete pad, new generator and underground electrical line, and new chain link fencing, as illustrated and detailed on site plans submitted with your application. These site plans were received by the DEM on June 3, 2026.

Our observations of the subject property, review of the site plans and evaluation of the proposed project reveals that alterations of jurisdictional areas are proposed. However, pursuant to Rule 3.7.3B, this project meets the Variance Criteria for Public and Governmental Bodies, and a **Freshwater Wetlands Permit** may be issued under the following terms and conditions:

Terms and Conditions for Wetlands Application No. 26-0083 (IA 22006):

1. This letter is the DEM's permit for this project under the R.I. Fresh Water Wetlands Act, R.I. Gen. Laws § 2-1-18 et seq.

2. This permit is specifically limited to the project, site alterations and limits of disturbance as detailed on the site plans submitted with your application and received by the DEM on June 3, 2026. A copy of the site plans stamped approved by the DEM can be found on the Permit Search page on the OWR Application Portal by searching for any of the application numbers listed above. Changes or revisions to the project that would alter freshwater wetlands are not authorized without a permit from the DEM.

3. Where the terms and conditions of the permit conflict with the approved site plans, these terms and conditions shall be deemed to supersede the site plans.

4. You must notify this Program in writing of the anticipated start date, and of your contractor's contact information, by submitting the Notice of Start of Construction on the OWR Application Portal from the Requests Tab referencing this Freshwater Wetlands permit number prior to commencement of any permitted site alterations or construction activity. You must also notify this Program upon completion of the project by submitting a Notice of Termination from the Requests Tab on the OWR Application Portal.

5. A copy of the stamped approved site plans and a copy of this permit must be kept at the site at all times during site preparation, construction, and final stabilization. Copies of this permit and the stamped approved plans must be made available for review by any DEM or city/town representative upon request.

6. The effective date of this permit is the date this letter was issued. This permit expires five (5) years from the date of this letter unless renewed pursuant to the Rules.

7. Any material utilized in this project must be clean and free of matter that could pollute any jurisdictional area.

8. Prior to commencement of site alterations, you shall erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which boldly identifies the initials "DEM" and this application number. This sign must be maintained at the site in a conspicuous location until such time that the project is complete.

9. Temporary erosion and sediment controls detailed or described on the approved site plans shall be properly installed at the site prior to or commensurate with site alterations. Such controls shall be properly maintained, replaced, supplemented, or modified as necessary throughout the life of this project to minimize soil erosion and to prevent sediment from being deposited in any freshwater wetland, buffer, floodplain, area subject to storm flowage, or area subject to flooding or other jurisdictional areas not subject to disturbance under this permit.

10. Upon permanent stabilization of all disturbed soils, temporary erosion and/or sediment controls must be removed.

11. You are responsible for the proper installation, operation, maintenance and stability of any mitigative features, stormwater treatment facilities, and systems of treatment and control that are installed or used in compliance with this permit to prevent harm to adjacent freshwater wetland, buffer or floodplain, area subject to storm flowage, or area subject to flooding or other jurisdictional areas until documentation is provided that this responsibility has been assigned to another entity. Operation and maintenance shall be as described in the plan entitled, "RIDEM Application No. IA 22006, Pinecrest Pump Station Improvements, Pawtucket, Rhode Island; Supplemental Information: Pervious pavement Operation & Maintenance Plan", dated June 2006, dated received 6/03/2026, submitted by Christopher R. Cronin, P.E. of Beta, 701 George Washington Hwy, Lincoln, Rhode Island 02865. The long-term operation and maintenance plan shall be strictly followed.

12. You are obligated to install, utilize and follow all best management practices detailed or described on the approved site plans in the construction of the project to minimize or prevent adverse impacts to any adjacent freshwater wetland, buffer or floodplain, area subject to storm flowage or area subject to flooding or jurisdictional areas and the functions and values provided by such freshwater wetlands, buffer or floodplain, area subject to storm flowage or area subject to flooding

Pursuant to the provisions in 250-RICR-150-15-3.8.13 and 250-RICR-150-15-3.14.4(A), as applicable, any properly recorded and valid Freshwater Wetlands Permit is automatically transferred to the new owner upon sale of the property.

You are required to comply with the terms and conditions of this permit and to carry out this project in compliance with the Rules at all times. Failure to do so may result in an enforcement action by this Department.

In permitting the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

Kindly be advised that this permit is not equivalent to a verification of the type or extent of freshwater wetlands on site. Should you wish to have the types and extent of freshwater wetlands verified, you may submit the appropriate application in accordance with 250-RICR-150-15-3.9.3.

This permit does not remove your obligation to obtain any local, state, or federal approvals or permits required by ordinance or law and does not relieve you from any duties owed to adjacent landowners with specific reference to any changes in drainage.

Please contact Claire Swift of this office (telephone: 401-537-4183) should you have any questions regarding this letter.

Sincerely,

Martin D. Wencek, Supervising Environmental Scientist
Office of Water Resources
Freshwater Wetlands Program

MDW/CVS/cvs

ec: Emily Morse, GIS Coordinator, City of Pawtucket
Kyle Dias, BETA Group, Inc.
Alan Gunnison, PE, BETA Group, Inc.

APPENDIX B

May 26, 2026

Kyle Dias
BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island 02865

Re: Focused Hazardous Materials Survey
Pinecrest Pump Station
Pawtucket, Rhode Island

Dear Mr. Dias:

BETA Group, Inc. (BETA) has completed a Focused Hazardous Materials Survey (the survey) at the Pinecrest Pump Station located off Crest Drive in Pawtucket, Rhode Island (the site). The objective of the survey was to assess the boiler exhaust piping insulation associated with the emergency generator. No other areas, building materials and internal equipment components were assessed.

On May 14, 2026 BETA arrived at the site to perform the survey. The survey was conducted by Chris Oien, who is certified as an Asbestos Inspector pursuant to Title II of the Toxic Substance Control Act (TSCA), 15, U.S.C. 2646. BETA observed the existing emergency generator exhaust piping to have white pipe insulation, gray pipe elbow insulation and white pipe elbow insulation covered with cloth wrapping. The pipe and elbow insulation had an appearance similar to molded magnesia insulation and was in poor condition. Refer to Attachment 1 – Photographic Documentation for details.

A total of seven (7) representative bulk samples were collected and submitted to ESML Analytical of Woburn, MA. Bulk samples were analyzed by Polarized Light Microscopy (PLM) utilizing dispersion staining (DS) techniques in accordance with EPA Method 600/R-93/116. A copy of the analytical report is included as Attachment 2. Bulk asbestos analytical results are presented on Table 1 below.

Table 1 – Summary of May 2026 Asbestos Analytical Results – Pinecrest Pump Station

SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE LOCATION	QUANTITY	RESULTS (% ASBESTOS)
1A	White pipe insulation	Interior-ground floor	---	NAD
1B	White pipe insulation	Interior-ground floor	---	NAD
2A	Cloth pipe insulation wrapping	Interior-ground floor	---	NAD
2B	Cloth pipe insulation wrapping	Interior-ground floor	---	NAD
3A	Gray pipe elbow insulation	Interior-ground floor	---	NAD
3B	Gray pipe elbow insulation	Interior-ground floor	---	NAD
4A	White pipe elbow insulation	Interior-ground floor	---	NAD

Notes:

1) NAD – No Asbestos Detected

2) "---" Quantity Not Applicable

As detailed in Table 1, no asbestos was identified in all seven samples for submitted for laboratory analysis. Therefore, the pipe and elbow insulation materials associated with the emergency generator can be handled as routine construction waste during future disturbance.

If we can be of any further assistance regarding this matter, please contact us at our office.

Very truly yours,

BETA Group, Inc.



Chris Oien
Senior Project Scientist

Job No: 26.11430.16

Attachments:

1 Photographic Documentation

2 Laboratory Certificates of Analysis

3 Asbestos Inspector Certification

Attachment 1 - Photographic Documentation

PHOTOGRAPHS

Site Location:	Pinecrest Pump Station Pawtucket, RI Hazardous Building Materials Survey	Project No. 26.11909.00

Photo No.	Sample ID
1	---

Location:

Pinecrest Pump Station-Exterior

Description:

View of the Pinecrest Pump Station.



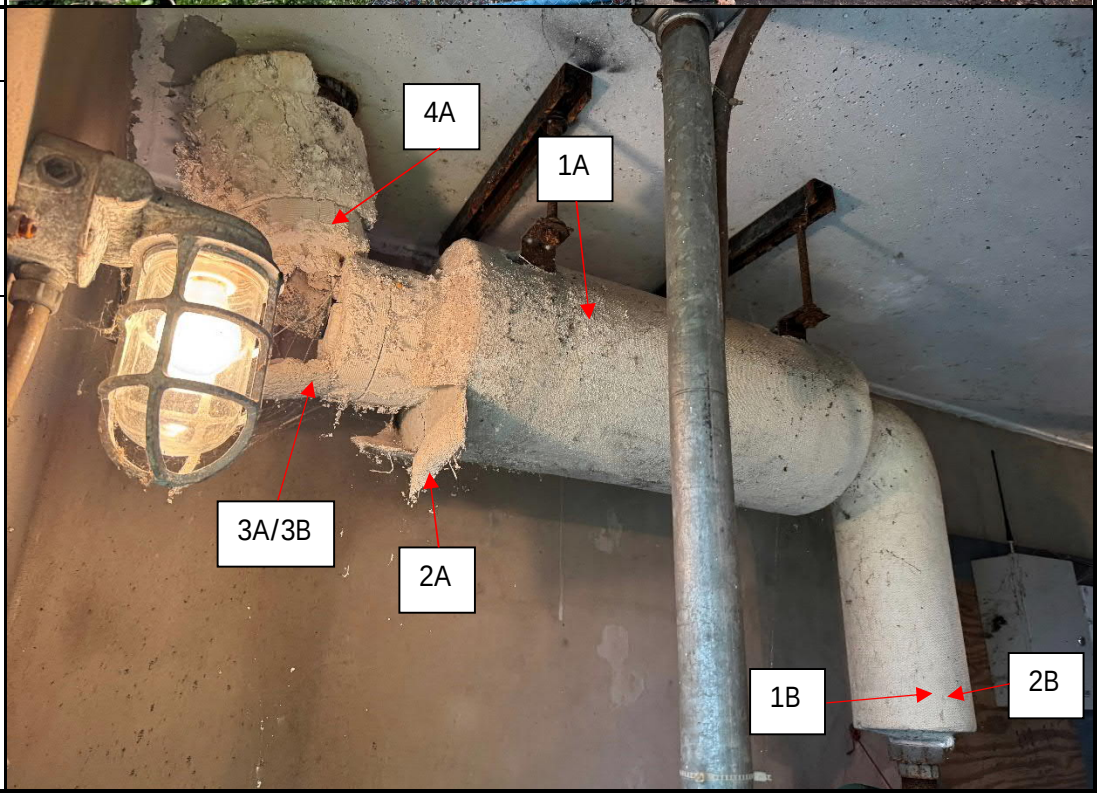
Photo No.	Sample ID
2	---

Location:

Interior-Ground Floor

Description:

View of emergency generator exhaust pipe insulation and representative sample locations. Note that all pipe and elbow insulation were not identified as an ACM.



Attachment 2 - Certificates of Analysis

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

http://www.EMSL.com / bostonlab@emsl.com

EMSL Order:	132603274
Customer ID:	BETA25
Customer PO:	
Project ID:	

Attention:	Chris Oien	**Phone:**	(401) 333-2382
	Beta Group	**Fax:**	
	701 George Washington Highway	**Received Date:**	05/15/2026 9:40 AM
	Lincoln, RI 02865	**Analysis Date:**	05/22/2026
		Collected Date:	05/14/2026
Project:	11909 - Pinecrest PS		

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1A *132603274-0001*	Interior - Generator Exhaust - White Pipe Insulation	White Fibrous Homogeneous	10% Synthetic	90% Non-fibrous (Other)	None Detected
1B *132603274-0002*	Interior - Generator Exhaust - White Pipe Insulation	White Fibrous Homogeneous	10% Synthetic	90% Non-fibrous (Other)	None Detected
2A *132603274-0003*	Interior - Generator Exhaust - Cloth Pipe Insulation Wrapping	White Fibrous Homogeneous	95% Synthetic	5% Non-fibrous (Other)	None Detected
2B *132603274-0004*	Interior - Generator Exhaust - Cloth Pipe Insulation Wrapping	White Fibrous Homogeneous	95% Synthetic	5% Non-fibrous (Other)	None Detected
3A *132603274-0005*	Interior - Generator Exhaust - Gray Pipe Elbow Insulation	Gray Fibrous Homogeneous	18% Min. Wool	82% Non-fibrous (Other)	None Detected
3B *132603274-0006*	Interior - Generator Exhaust - Gray Pipe Elbow Insulation	Gray Fibrous Homogeneous	18% Min. Wool	82% Non-fibrous (Other)	None Detected
4A *132603274-0007*	Interior - Generator Exhaust - White Pipe Elbow Insulation	White Fibrous Homogeneous	18% Synthetic	82% Non-fibrous (Other)	None Detected

Analyst(s)

Ramon Buenaventura (7)

Steve Grise, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 “Interim Method”) but augmented with procedures outlined in the 1993 (”final”) version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Woburn, MA NVLAP Lab Code 101147-0, CT PH-0315, MA AA000188, RI PLM00139, VT AL998919, ME LB-0039

Initial report from: 05/22/2026 06:27:18

OrderID: 132603274

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

132603274

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
PHONE: (800) 220-3675
EMAIL: CinnAslab@EMSL.com

EMSL ANALYTICAL, INC.
TESTING LABS • PRODUCTS • TRAINING

Customer Information		Billing Information	
Customer ID:		Billing ID:	
Company Name:	BETA Group, Inc.	Company Name:	BETA Group, Inc.
Contact Name:	Chris Oien	Billing Contact:	Stacy Wildanger
Street Address:	701 George Washington Highway	Street Address:	701 George Washington Highway
City, State, Zip:	Lincoln, RI 02865	Country:	City, State, Zip: Lincoln, RI 02865 Country: US
Phone:	401.333.2382		Phone: 401.333.2382
Email(s) for Report:	coien@BETA-Inc.com		Email(s) for Invoice: AP@BETA-Inc.com

Project Information

Project Name/No:	11909 - Pinecrest PS	Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)		US State where samples collected:	RI
State of Connecticut (CT) must select project location:	☐ Commercial (Taxable) ☐ Residential (Non-Taxable)		
Sampled By Name:	C.Oien	Sampled By Signature:	
Date Sampled:	5/14/2026	No. of Samples in Shipment	7

Turn-Around-Time (TAT)

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 32 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☑ 1 Week ☐ 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

Test Selection

PLM - Bulk (reporting limit)

- ☑ PLM EPA 600/R-93/116 (<1%)
- ☐ PLM EPA NOB (<1%)
- ☐ POINT COUNT
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ POINT COUNT w/ GRAVIMETRIC
  - ☐ 400 (<0.25%) ☐ 1,000 (<0.1%)
- ☐ NIOSH 9002 (<1%)
- ☐ NYS 198.1 (Friable - NY)
- ☐ NYS 198.6 NOB (Non-Friable - NY)
- ☐ NYS 198.8 (Vermiculite SM-V)

TEM - Bulk

- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (Non-Friable - NY)
- ☐ TEM EPA 600/R-93/116 w Milling Prep (0.1%)

Other Tests (please specify)

☑ Positive Stop - Clearly Identified Homogeneous Areas (HA)

Sample Number	HA Number	Sample Location	Material Description
1A	1	Interior-generator exhaust	white pipe insulation
1B	1	Interior-generator exhaust	white pipe insulation
2A	2	Interior-generator exhaust	cloth pipe insulation wrapping
2B	2	Interior-generator exhaust	cloth pipe insulation wrapping
3A	3	Interior-generator exhaust	gray pipe elbow insulation
3B	3	Interior-generator exhaust	gray pipe elbow insulation
4A	4	Interior-generator exhaust	white pipe elbow insulation

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

SM 940

Method of Shipment:		Sample Condition Upon Receipt:	REC'D EMSL-BOSTON MAY 15 2026
Relinquished by:	Date/Time:	Received by:	fx 8717.980 Date/Time 6296
Relinquished by:	Date/Time:	Received by:	Date/Time

Controlled Document - Asbestos Bulk R7 9/14/2021

☑ **AGREE TO ELECTRONIC SIGNATURE** (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

Attachment 3 - License/Certifications

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

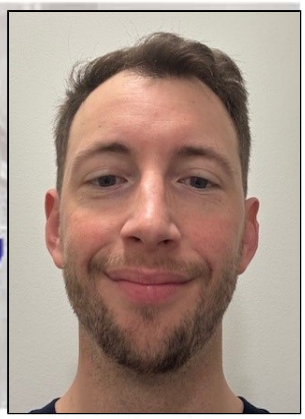
Michael Flanagan
Director

ASBESTOS INSPECTOR

Christopher Evan Oien
Eff.Date: 02/02/2026
Exp.Date: 02/02/2027
AI901014

Member C.O.N.E.S.

27





This is to certify that

Christopher E. Oien

750 Whittenton Street, Unit 24, Taunton, MA 02780
MA DLS Asbestos Inspector License# AI901014

has completed requisite training by Video Conference, and has passed an examination for reaccreditation as:

Asbestos Inspector Refresher

pursuant to Title II of the Toxic Substance Control Act, 15 U.S.C. 2646

Course Location
Zoom Video Conference
Institute for Environmental Education 16 Upton Drive Wilmington, MA 01887

January 22, 2026
Course Dates

26-6023-106-402749
Certificate Number

January 22, 2026
Examination Date

January 22, 2027
Expiration Date

Training Director

16 Upton Drive, Wilmington, MA 01887 Telephone 978.658.5272 www.ieetrains.com

INSTITUTE FOR ENVIRONMENTAL EDUCATION

Appendix G

Plan Issued for Bid

CITY OF PAWTUCKET, RHODE ISLAND

PROVIDENCE COUNTY, RI

PARKSIDE PUMP STATION & PINECREST PUMP STATION IMPROVEMENTS

RFP #27-004

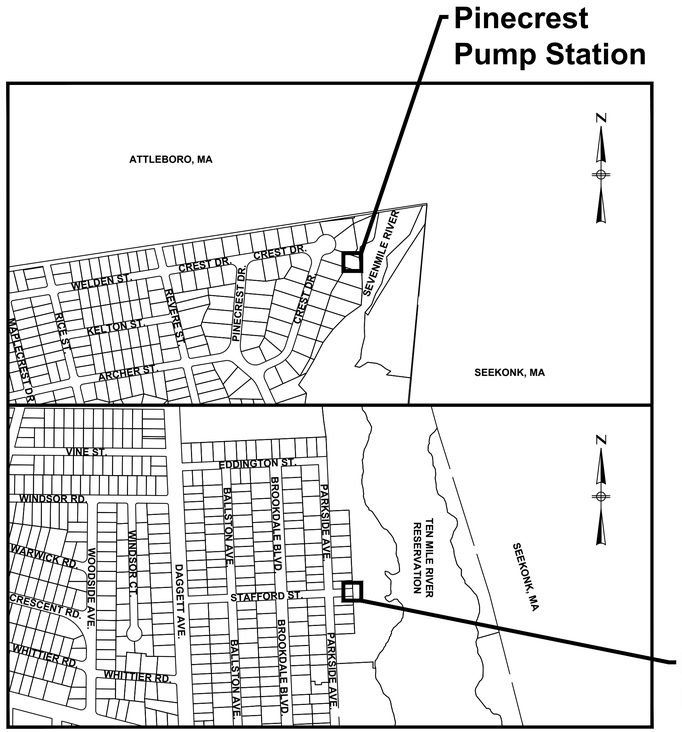
SEPTEMBER 2026

MAYOR
DONALD R. GREBIEN

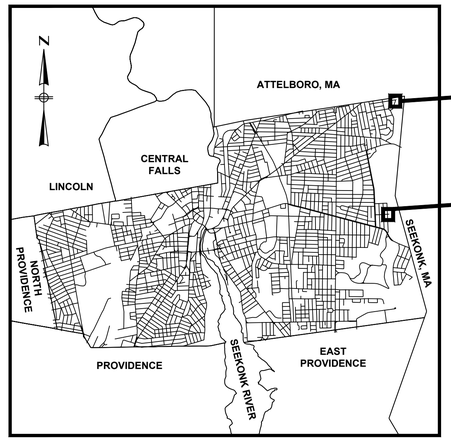
CITY ENGINEER
ERIC HAMMERSCHLAG

DEPARTMENT OF PUBLIC WORKS
CHRIS CRAWLEY, DIRECTOR

CITY COUNCIL
MICHAEL A. ARAUJO
ROBERTO H. MORENO
YESENIA RUBIO
DAVID P. MORAN
MARK J. WILDENHAIN
TERRENCE E. MERCER
NEICY CODERRE
CLOVIS C GREGOR
MARLENA MARTINS STACHOWIAK



PROJECT LOCATION MAP
NOT TO SCALE



LOCUS MAP
NOT TO SCALE

PREPARED BY:

BETA
www.BETA-Inc.com

ISSUE DATE: AUGUST 2026

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

REGISTERED PROFESSIONAL

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LEGEND

GENERAL SYMBOLS

EXISTING

CC EOP	CURB OR BERM (TYPE AS NOTED)
EOP	EDGE OF PAVEMENT
	CATCH BASIN (OR GUTTER INLET)
D	DRAIN MANHOLE
D	BRADLEY HEAD CATCH BASIN
S	SEWER MANHOLE
WV	WATER VALVE
CS	CURB STOP
GS	GAS VALVE
	HYDRANT
UP	UTILITY POLE
E	ELECTRIC MANHOLE
	SIGN
P	BOLLARD
	TREE
D D	DRAIN PIPE (SIZE AS NOTED)
S	SEWER MAIN (SIZE AS NOTED)
SS	SEWER SERVICE
FM	SEWER FORCE MAIN (SIZE AS NOTED)
E E	ELECTRIC DUCT
G	GAS MAIN (SIZE AS NOTED)
W	WATER MAIN
T T	TELEPHONE DUCT
EOH	OVERHEAD WIRES
X X	CHAIN LINKED FENCE
	GUARDRAIL
	PROPERTY LINE
	SHRUB
	CONSTRUCTION BASELINE
15	CONTOUR MAJOR
14	CONTOUR MINOR

PROPOSED

S	SEWER MANHOLE
S	SEWER MAIN (SIZE AS NOTED)
ECB ECB	EROSION CONTROL BARRIER/ STRAW WATTLE
x x	CHAIN LINK FENCE

ABBREVIATIONS

GENERAL

ABAN.	ABANDON
ADJ.	ADJUST
APPROX.	APPROXIMATE
℄	BASELINE
BM	BENCH MARK
BIT.	BITUMINOUS
B.B.	BITUMINOUS BERM
B.C.	BITUMINOUS CURB
B.O.B.	BOTTOM OF BORING
BOS	BOTTOM OF SLOPE
BOW	BOTTOM OF WALL
BD OR BND	BOUND
BLDG.	BUILDING
℄	CENTER LINE
CLF	CHAIN LINK FENCE
CONC.	CONCRETE
C.C.	CONCRETE CURB
DWY.	DRIVEWAY
E.P., E.O.P.	EDGE OF PAVEMENT
EL.	ELEVATION
EXIST. OR EX.	EXISTING
GAR.	GARAGE
GRAN.	GRANITE
G.C.	GRANITE CURB
G.E.	GRANITE EDGING
GRAV.	GRAVEL
GD	GROUND
HOR.	HORIZONTAL
HMA	HOT MIX ASPHALT
IP	IRON PIPE
LP	LOW POINT
MB	MAIL BOX
MHB	MASSACHUSETTS HIGHWAY BOUND
MAX.	MAXIMUM
MIN.	MINIMUM
N.T.S.	NOT TO SCALE
PVMT.	PAVEMENT
PEB	PERMANENT EASEMENT BOUNDARY
P OR PROP. LINE	PROPERTY LINE
PROP.	PROPOSED
R&D	REMOVE & DISPOSE
REM.	REMOVE
REMOD.	REMODEL
RET.	RETAINING
ROW	RIGHT–OF–WAY
S.H.L.	STATE HIGHWAY LAYOUT LINE
TBD	TO BE DETERMINED
TOS	TOP OF SLOPE
TOW	TOP OF WALL
TYP.	TYPICAL

UTILITIES

ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
BH–#	BRADLEY HEAD STYLE DRAIN STRUCTURE
CB	CATCH BASIN
CBCI	CATCH BASIN WITH CURB INLET
CIP	CAST IRON PIPE
CIT	CHANGE IN TYPE
CL.	CLASS (PIPE, CONCRETE, EXCAVATION, ETC.)
COND.	CONDUIT
CAP	CORRUGATED ALUMINUM PIPE
CMP	CORRUGATED METAL PIPE
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CULV.	CULVERT
CI	CURB INLET OR CAST IRON
DI	DUCTILE IRON
DMH	DRAIN MANHOLE
EL. (OR ELEV.)	ELEVATION
FM	FORCE MAIN
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
F&I	FURNISH AND INSTALL
GIP	GALVANIZED IRON PIPE
GG	GAS GATE
GI	GUTTER INLET
HDW	HEADWALL
HYD.	HYDRANT
INV.	INVERT ELEVATION
LP	LIGHT POLE
MH	MANHOLE
PVC	POLY–VINYL–CHLORIDE PIPE
PWW	PAVED WATER WAY
R&D	REMOVE & DISPOSE
RCP	REINFORCED CONCRETE PIPE
SMH	SEWER MANHOLE
SD	SUBDRAIN
TSV&B	TAPPING SLEEVE, VALVE AND BOX
TS	TRAFFIC SIGNAL
TSC	TRAFFIC SIGNAL CONDUIT
UP	UTILITY POLE
VCP, VC	VITRIFIED CLAY PIPE
WG	WATER GATE
WM	WATER METER/WATER MAIN
WIP	WROUGHT IRON PIPE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

LEGEND & INDEX

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

NONE

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

G-1

GENERAL CIVIL NOTES

GENERAL

1) THESE GENERAL NOTES ARE NOT INTENDED TO REPLACE THE SPECIFICATIONS FOR THIS CONTRACT. SEE SPECIFICATIONS FOR OTHER REQUIREMENTS IN ADDITION TO THE GENERAL NOTES.
2) THE CONTRACTOR SHALL CONFINE ALL ACTIVITIES FOR CONSTRUCTION PURPOSES WITHIN THE INDICATED LIMITS OF WORK AS SHOWN IN THE CONTRACT DRAWINGS. ALL SURFACES DAMAGED OUTSIDE THESE LIMITS BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT CONTRACTOR'S EXPENSE.
3) ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND SHALL BE MAINTAINED UNTIL ALL DISTURBED AREAS ARE STABILIZED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AND INSPECTION OF SUCH CONTROLS DURING CONSTRUCTION. UPON STABILIZATION, ALL EROSION CONTROL DEVICES AND ACCUMULATED ERODED MATERIAL SHALL BE REMOVED. SEE SOIL EROSION AND SEDIMENTATION CONTROL NOTES.
4) DUST CONTROL, USING CALCIUM CHLORIDE, SHALL BE PROVIDED FOR ALL SURFACES OF BACK FILLED AREAS, ALL EQUIPMENT ACCESS ROADWAYS AND/OR AS OTHERWISE DIRECTED BY THE OWNER/ENGINEER.

MAPPING

5) THE BASE PLANS PROVIDED FOR PARKSIDE PUMP STATION ARE BASED ON AVAILABLE RECORD INFORMATION AND FIELD SURVEY BY DIPRETE DATED DECEMBER 17, 2025.
5) THE BASE PLANS PROVIDED FOR PINECREST PUMP STATION ARE BASED ON AVAILABLE RECORD INFORMATION AND FIELD SURVEY BY DIPRETE DATED MARCH 23, 2026.
6) HORIZONTAL DATUM - COORDINATE VALUES REFER TO NORTH AMERICAN DATUM OF 1983 (NAD 83), MASSACHUSETTS STATE PLAN, MAINLAND ZONE.
7) VERTICAL DATUM - NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
8) THE LOCATION, SIZE, AND MATERIAL OF EXISTING PIPES, DUCTS, CONDUITS AND OTHER UNDERGROUND STRUCTURES AND/OR UTILITIES SHOWN ON THESE PLANS ARE FROM THE BEST AVAILABLE SOURCES AND ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES, UTILITIES OR STRUCTURES ARE SHOWN. EXACT LOCATION TO BE DETERMINED BY CONTRACTOR IN FIELD.
9) EXISTING UTILITIES HAVE BEEN PLOTTED FROM THE BEST AVAILABLE DATA AND ARE APPROXIMATE ONLY. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING UTILITIES AND NOTIFY ALL UTILITY COMPANIES (PUBLIC AND PRIVATE). IN ADDITION, "DIG SAFE" MUST BE CONTACTED AT 1(888)-DIG-SAFE 48 HOURS IN ADVANCE OF CONSTRUCTION.
10) THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES IN THE DESIGN PLANS PRIOR TO THE START OF CONSTRUCTION.
11) PROPERTY LINES AND CITY/TOWN LINES ARE SHOWN FOR INFORMATION ONLY.

EXISTING UTILITIES

12) EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION SHALL BE PROTECTED AND SUPPORTED AT ALL TIMES BY THE CONTRACTOR. ALL EXISTING SERVICES TO BE MAINTAINED AT ALL TIMES. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS TO INTERFERE AS LITTLE AS POSSIBLE WITH EXISTING UTILITIES. PAYMENT FOR PROVIDING SAID PROTECTION AND SUPPORTS SHALL BE CONSIDERED A PART OF AND PAID FOR UNDER THE APPROPRIATE PIPE OR STRUCTURE ITEMS UNLESS OTHERWISE INDICATED AND/OR DIRECTED BY THE OWNER. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION BY REASON OF DELAY AND/OR INCONVENIENCE IN ADAPTING HIS OPERATIONS ACCORDINGLY.
13) WHERE AN EXISTING UTILITY IS FOUND TO BE IN CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR THE RESOLUTION OF THE CONFLICT.
14) THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION, RELOCATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, CABLE TV, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES WITH THE UTILITY COMPANIES AS REQUIRED. CONTRACTOR TO COORDINATE AND SCHEDULE ANY AND ALL UTILITY RELOCATIONS WITH AFFECTED UTILITY COMPANY PRIOR TO CONSTRUCTION.
15) CONTRACTOR IS RESPONSIBLE FOR REPAIR OF DAMAGED UTILITIES CAUSED BY THE CONTRACTORS OPERATIONS AT NO ADDITIONAL COST TO THE OWNER.

REMOVAL AND DISPOSAL

16) THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING (R&D) ALL MATERIALS INDICATED ON THE PLANS INCLUDING BUT NOT LIMITED TO, MANHOLES, CATCH BASINS, PIPING, CONCRETE AND BITUMINOUS PAVEMENT, COBBLES, ROCK, TREES AND STUMPS ETC. ALL GRIT AND DEBRIS FROM THE EXISTING STRUCTURES TO BE DEMOLISHED SHALL BE CONSIDERED 'SPECIAL WASTE' AND SHALL BE REMOVED AND DISPOSED OF AS INDICATED IN THE SPECIFICATIONS (SPEC. 02769). ALL DEMOLITION MATERIAL INCLUDING CONCRETE, PIPE, AND BRICK THAT WAS IN CONTACT WITH SEWAGE SHALL BE CLEANED IN ACCORDANCE WITH MADEP REQUIREMENTS AND DISPOSED OF ACCORDINGLY. ONCE CLEANED, DEMOLITION MATERIALS SHALL NOT BE CONSIDERED SPECIAL WASTE.
17) NOTIFY APPROPRIATE UTILITY COMPANY TO TURN OFF AFFECTED SERVICES PRIOR TO REMOVAL AND DISPOSAL. SEAL WATER, SEWER, DRAINAGE AND GAS UTILITIES AND SERVICES AT EXCAVATION LIMITS OR AS REQUIRED, USING PLUGS, CAPS OR SEALS AS NEEDED.
18) UNDERGROUND PIPING TO BE ABANDONED AND REMAIN SHALL BE PROPERLY CAPPED UNLESS IT INTERFERES WITH NEW STRUCTURES OR AS INDICATED, SPECIFIED AND DIRECTED BY ENGINEER.
19) REMOVE AND DISPOSE OF ALL EXISTING BITUMINOUS CONCRETE, AS REQUIRED.

SEWER AND DRAIN

20) WHERE EXISTING MATERIALS ARE ENCOUNTERED WHICH, IN THE OPINION OF THE OWNER/ENGINEER ARE UNSUITABLE FOR BEDDING, BACKFILLING, OR OTHER INTENDED USE, SUCH MATERIALS SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SUITABLE GRAVEL BORROW, CRUSHED STONE AND/OR SELECTED BORROW, AS DIRECTED BY THE OWNER/ENGINEER AND PAID FOR UNDER THE APPROPRIATE BID ITEMS.
21) INVERTS AND DIRECTIONS OF PIPES AND CONDUITS ARE SHOWN FOR THE PURPOSE OF INDICATING THE BASIC PARAMETERS USED DURING THE DESIGN. HOWEVER, MINOR CHANGES IN HORIZONTAL AND VERTICAL LOCATIONS MAY BE REQUIRED DURING CONSTRUCTION AS FIELD CONDITIONS WARRANT. FINAL LOCATIONS OF OTHER PIPES AND/OR CONDUITS SHALL BE DETERMINED IN THE FIELD. ANY CHANGES SHALL BE APPROVED BY THE ENGINEER.
22) WHERE PIPING IS TO BE CONNECTED TO EXISTING PIPING OR STRUCTURES, THE CONTRACTOR SHALL FURNISH AND INSTALL ALL ADAPTERS, FITTINGS AND ADDITIONAL PIPE (REQUIRED AS A RESULT OF CUTTING THE EXISTING PIPE BACK) TO COMPLETE THE CONNECTION AS REQUIRED.
23) EXISTING PIPES RETAINED, BUT WHICH MUST BE REMOVED IN ORDER TO INSTALL NEW PIPES, SHALL BE REINSTALLED OR REPLACED IN KIND.
24) SHOULD ANY SEWER OR SEWER SERVICE CONNECTION NEED TO BE RELAYED, THE SEWER SHALL BE LAID AT LEAST 10 FEET HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER MAIN, SERVICES OR OTHER WATER FACILITIES. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. IN CASES WHERE IT IS NOT POSSIBLE TO ACHIEVE AND MAINTAIN A 10-FOOT MINIMUM HORIZONTAL SEPARATION AS DETERMINED BY THE OWNER/ENGINEER, THE SEWER SHALL BE LAID SUCH THAT THE CROWN OF THE SEWER IS AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER LINE. WHEN THE HORIZONTAL ALIGNMENT OR VERTICAL ELEVATION OF THE SEWER CANNOT BE VARIED TO MEET THE ABOVE REQUIREMENT AS DETERMINED BY THE OWNER/ENGINEER, THE SEWER SHALL BE ENCASED IN CONCRETE (MIN. 6-INCH THICKNESS) FOR AT LEAST 10-FEET EITHER SIDE OF THE AREA NOT COMPLYING WITH THE MINIMUM HORIZONTAL AND VERTICAL SEPARATION AS DIRECTED BY THE OWNER/ENGINEER.
25) WHERE SEWERS CROSS ANY EXISTING OR PROPOSED WATER MAINS OR SERVICES, THE SEWER SHALL CROSS BENEATH THE WATER LINES AND LAID TO PROVIDE A MINIMUM VERTICAL SEPARATION OF 18-INCHES BETWEEN THE INVERT OF THE WATER LINE AND THE CROWN OF THE SEWER. WHEN THE ELEVATION OF THE SEWER CANNOT BE VARIED TO MEET THE ABOVE REQUIREMENT, THE SEWER AND/OR WATER LINE SHALL BE ENCASED IN CONCRETE (MIN. 6-INCH THICKNESS) FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE CROSSING, MEASURED PERPENDICULAR TO THE WATER LINE, OR AS DETERMINED AND DIRECTED BY THE OWNER/ENGINEER, OR THE WATER LINE SHALL BE RELOCATED TO COMPLY WITH THE REQUIRED MINIMUM DIMENSIONS FOR AN ACCEPTABLE SEPARATION AS STIPULATED ABOVE. RELOCATED WATER LINES SHALL BE APPROVED BY OWNER/ENGINEER AND CONSTRUCTED OF AWWA APPROVED MATERIAL FOR POTABLE WATER CONVEYANCE AND DESIGNED FOR THE REQUIRED WATER SERVICE PRESSURE FOR A DISTANCE OF 10-FEET ON EACH SIDE OF THE CROSSING, MEASURED PERPENDICULAR TO THE SEWER. THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER LINE JOINTS.
26) WATER SERVICE CONNECTIONS SHALL BE PROTECTED THROUGHOUT THE WORK. REPLACEMENT OF ANY PORTION OF A WATER SERVICE, INCLUDING CORPORATION AND CURB STOP, SHALL BE CONSIDERED PART OF THE WORK AND SHALL NOT BE THE BASIS FOR ANY CLAIM AGAINST THE OWNER.

SITE RESTORATION

27) EXCEPT WHERE NOTED BY PROPOSED CONTOUR LINES, ALL FINAL CONTOUR LINE ELEVATIONS SHALL BE THE SAME AS EXISTING CONTOUR LINE ELEVATIONS.
28) JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN TACK COAT AND BACKSANDED.
29) ALL CURBING DISTURBED BY CONSTRUCTION OPERATIONS SHALL BE RESET, RESTORED OR REPLACED IN KIND, IF DAMAGED, INCLUDING CEMENT CONCRETE, REGARDLESS OF ITS PROXIMITY TO THE DRAIN OR SEWER, AS DIRECTED BY THE OWNER/ENGINEER. PAYMENT SHALL BE CONSIDERED PART OF AND PAID FOR UNDER THE APPROPRIATE PIPE ITEMS AS APPLICABLE UNLESS OTHERWISE INDICATED ON PLANS.
30) ALL SIDEWALK AND WHEELCHAIR RAMP AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED IN CONFORMANCE TO THE AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS AND THE ARCHITECTURAL ACCESS BOARD (AAB) REQUIREMENTS AT THE CONTRACTOR'S EXPENSE.
31) THE CONTRACTOR SHALL REMOVE AND RESET ALL SIGNS DISTURBED DURING CONSTRUCTION, IN CONFORMANCE WITH THE MASSACHUSETTS STANDARD SPECIFICATIONS AND CONSTRUCTION STANDARDS.
32) ALL GRASSED OR WOODED AREAS DISTURBED BY THE CONSTRUCTION OPERATIONS SHALL BE LOAMED AND SEEDED IN ACCORDANCE WITH THE SPECIFICATIONS. FINAL RESTORATION SHALL BE EQUAL TO OR BETTER THAN THAT WHICH EXISTED PRIOR TO CONSTRUCTION AS DETERMINED SOLELY BY THE OWNER/ENGINEER. PAYMENT SHALL BE CONSIDERED PART OF AND PAID FOR UNDER THE APPROPRIATE BID ITEMS AS APPLICABLE UNLESS OTHERWISE INDICATED.

MAINTENANCE OF EXISTING FLOWS

33) FLOW IN ALL SANITARY SEWERS TO BE MAINTAINED BY THE CONTRACTOR UNTIL THE MODIFICATIONS AND CONSTRUCTION ARE COMPLETE.
34) CONTRACTOR SHALL PROVIDE ACCESS TO THE CITY AS NECESSARY TO MAINTAIN THE EXISTING PUMP STATIONS.

EXCAVATION SUPPORT & DEWATERING

35) ALL CONSTRUCTION WORK SHALL BE PERFORMED IN THE DRY. THE CONTRACTOR SHALL PROVIDE, OPERATE AND MAINTAIN ALL PUMPS, DRAINS, WELL POINTS, SCREENS, OR OTHER FACILITIES NECESSARY TO CONTROL, COLLECT AND DISPOSE SURFACE AND SUBSURFACE WATER ENCOUNTERED IN THE PERFORMANCE OF THE WORK.
36) DISCHARGE FROM DEWATERING OPERATIONS SHALL NOT BE DIRECTLY DISCHARGED INTO THE SEWER OR DRAIN. ALL CONSTRUCTION DEWATERING SHALL HAVE SILT AND SEDIMENT REMOVED PRIOR TO DISCHARGE (SEE SPECIFICATIONS).

SOIL EROSION AND SEDIMENTATION CONTROL

37) IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN ALL SOIL EROSION AND SEDIMENT CONTROLS ON THE PROJECT SITE FOR THE ENTIRE DURATION OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL FOLLOW THE DIRECTION OF THE RESIDENT ENGINEER WITH REGARD TO INSTALLATION, MAINTENANCE, AND REPAIR OF ALL SOIL EROSION AND SEDIMENTATION CONTROLS ON THE PROJECT SITE. TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROLS (STAW WATTLES, HAY BALES, SILT FENCE, CATCH BASIN SILT SACKS, ETC.) SHALL BE MAINTAINED UNTIL ALL EXPOSED SOILS ARE SATISFACTORILY STABILIZED.
38) ALL EROSION AND SEDIMENTATION (E&S) CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE ENGINEER PRIOR TO THE START OF CONSTRUCTION. THE E&S CONTROLS SHALL BE CLEANED AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION OPERATIONS AND UNTIL ALL DISTURBED AREAS ARE STABILIZED AFTER CONSTRUCTION IS COMPLETE. E&S CONTROLS SHALL BE INSPECTED AND CLEANED AFTER ALL STORM EVENTS AND UPON THE REQUEST OF THE OWNER OR ENGINEER. CONTRACTOR SHALL MAINTAIN AN ADEQUATE SUPPLY OF HAY BALES ON SITE TO BE INSTALLED IN AREAS WHERE EXISTING E&S CONTROLS HAVE FAILED OR AS DETERMINED NECESSARY BY THE ENGINEER. NO WORK OR STORAGE OF CONSTRUCTION EQUIPMENT WILL BE PERMITTED OUTSIDE THE LIMIT OF DISTURBANCE.
39) PROVIDE SOIL EROSION AND SEDIMENT CONTROL MEASURES AT PERIMETERS OF ALL EXCAVATION AREAS, DISTURBED SURFACES AND AT ALL CATCH BASINS ADJACENT TO DISTURBED AREAS. PROVIDE SILT FENCING AND HAY BALES IN ACCORDANCE WITH DIVISION 2 SPECIFICATION REQUIREMENTS AND AS SHOWN ON THE CIVIL DETAIL DRAWINGS.

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

NOTES

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

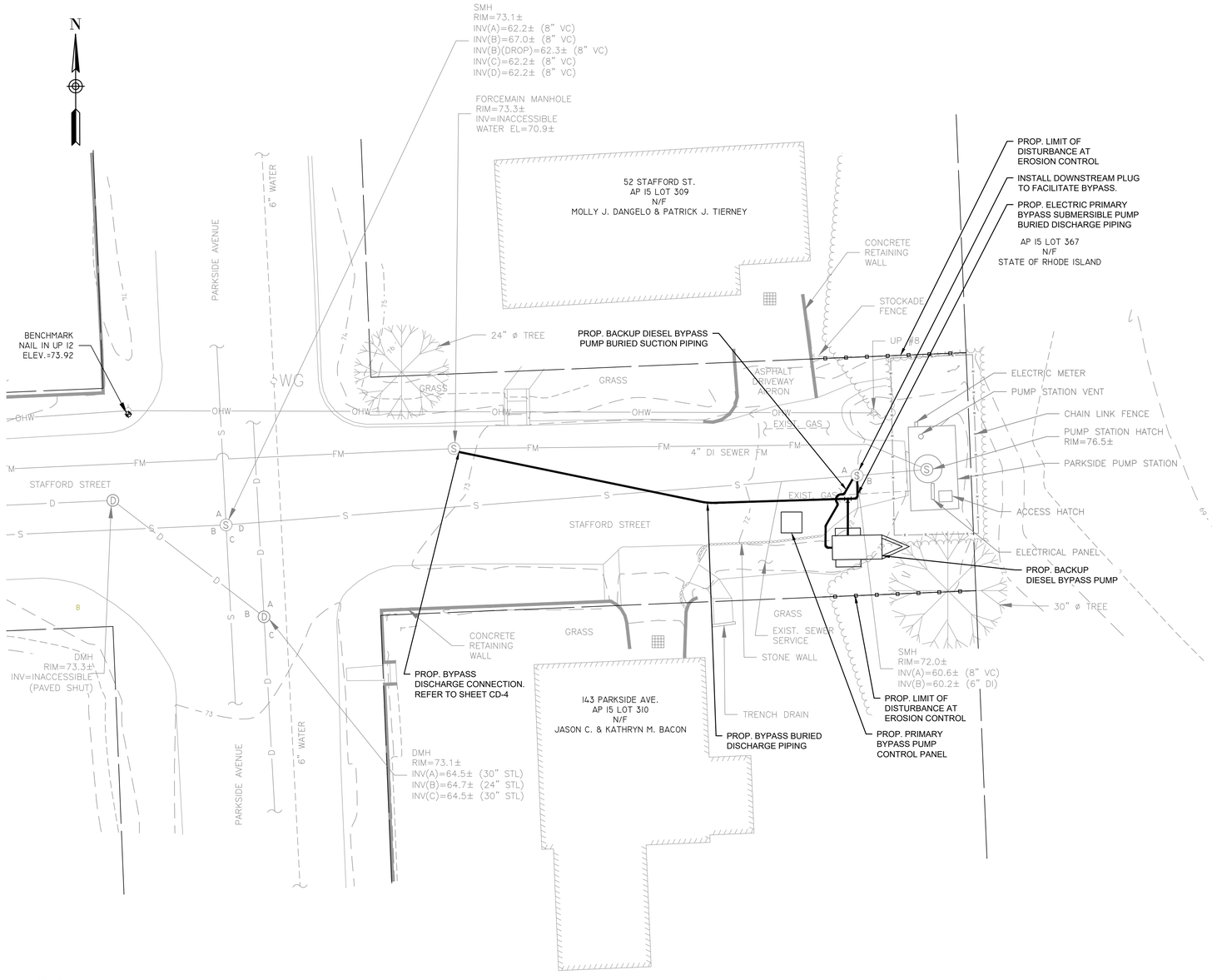
SCALE

NONE

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

G-2



BYPASS NOTES:

1. REFER TO SPECIFICATION SECTION 02149 MAINTAINING FLOW AND CONSTRUCTION NOTES.
2. THE CONTRACTOR'S SEQUENCE OF CONSTRUCTION SHALL BE BASED ON THE SCHEDULE SUBMITTED BY THE CONTRACTOR AND APPROVED BY THE OWNER AND ENGINEER AS SPECIFIED.
3. THE ORDER OF CONSTRUCTION SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER AND ENGINEER; SUCH APPROVAL OR DIRECTION, HOWEVER, SHALL IN NO WAY RELIEVE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM THE WORK IN STRICT ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE CONSTRUCTION PLAN AND SPECIFICATION HAVE BEEN DEVELOPED TO MINIMIZE THE CONSTRUCTION IMPACTS ON THE OPERATION OF THE CITY'S WASTEWATER COLLECTION SYSTEM.
4. WHENEVER THE CONTRACTOR'S PROPOSED WORK WILL REQUIRE THE OWNER TO DEVIATE FROM THE NORMAL OPERATION OF THE CITY'S WASTEWATER COLLECTION SYSTEM, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING. SUCH NOTIFICATION SHALL BE SUBMITTED ONE WEEK PRIOR TO THE PLANNED CONSTRUCTION ACTIVITY.
5. ALL BYPASS PIPING IS TO BE BURIED. ALL AREAS DISTURBED BY THE INSTALLATION AND MAINTENANCE OF THE PROPOSED BYPASS SYSTEM IS TO BE RESTORED TO EXISTING CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.



EXISTING VEGETATION IN LOCATION OF
RECOMMENDED DIESEL BYPASS PUMP LOCATION
IMAGE DATE: 5/5/2026



EXISTING VEGETATION IN LOCATION OF
RECOMMENDED DIESEL BYPASS PUMP LOCATION
IMAGE DATE: 5/5/2026

PREPARED BY

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Pawtucket, RI

TITLE

PARKSIDE PS - EXISTING CONDITIONS & RECOMMENDED BYPASS PLAN

NO.	REVISIONS	DATE

DRAWN BY:	KJD
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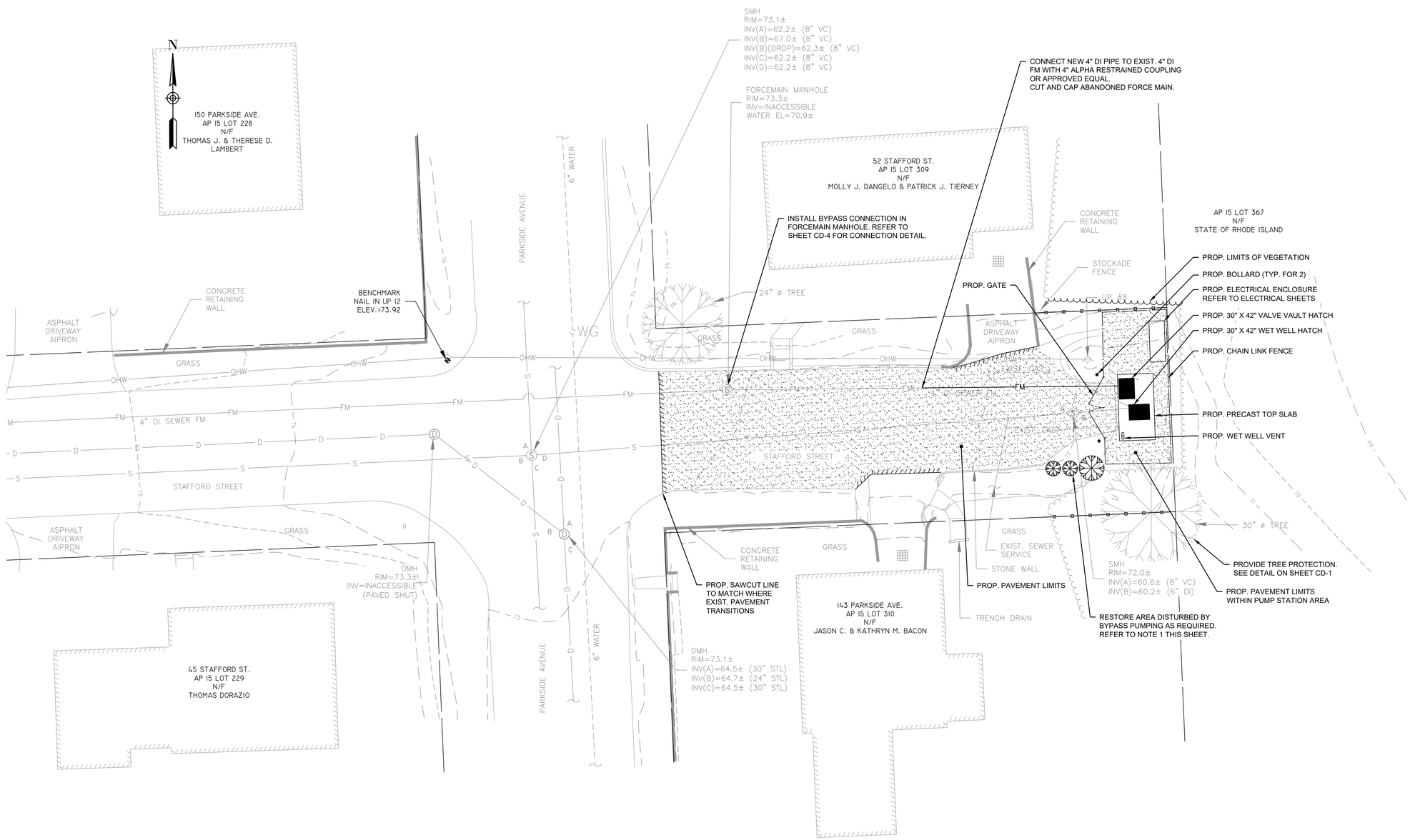
SCALE

10 0 10 20
SCALE IN FEET: 1"=10'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

C-1.1



GENERAL NOTES:

1. ANY AREA DISTURBED BY TEMPORARY BYPASS OR OUTSIDE THE LIMITS OF CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE ENGINEER. AREAS DISTURBED WITHIN THE LIMITS OF THE RECOMMENDED BYPASS DIESEL BACKUP PUMP LOCATION SHALL BE RESTORED USING A MINIMUM OF ONE JUNIPERUS VIRGINIANA, ONE ILEX VERTICILLATA SPARKLEBERRY AND ONE ILEX VERTICILLATA JIM DANDY PLANTINGS. THE CONTRACTOR SHALL SUBMIT A PROPOSED RESTORATION PLAN PRIOR TO RESTORING ANY AREA DISTURBED BY CONSTRUCTION ACTIVITIES.

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PARKSIDE PS - PROPOSED SITE PLAN

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
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BETA JOB NO.:	25.11884 / 26.11909

SCALE

10 0 10 20
SCALE IN FEET: 1"=10'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

C-1.2

AP IB LOT 214
N/F
JOSE E.G. & LISA K. LOPES

AP IB LOT 215
N/F
MICHAEL PAQUIN & HUE AITANA

AP IB LOT 291
N/F
DAVID F. CARDOSO

AP IB LOT 292
N/F
DAVID F. CARDOSO

AP IB LOT 290
N/F
CITY OF PAWTUCKET

AP IB LOT 288
N/F
LEAH MANDEVILLE

AP IB LOT 289
N/F
LEAH MANDEVILLE

ASPHALT DRIVEWAY

ASPHALT DRIVEWAY

CONCRETE CURB

APPROX. LOCATION OF EXIST. SEWER SERVICE

CURB INLET
ELEV= 71.07

DMH RIM=72.7
INV. (A)= 66.9
INV. (B)= 67.6
INV. (C)= 67.6

SMH RIM=72.6
INV. (A)= 59.9
INV. (B)= 60.1
INV. (C)= 60.0

SMH RIM=72.7
INV. (A)= 64.2
INV. (B)= 64.1

12" RCP SD

6" WATER

8" VCP SEWER

4" DI SEWER FM

4" STL G

PROP. TEMPORARY CONSTRUCTION FENCING

PROP. TEMPORARY BYPASS PLUG

PROP. ELECTRIC PRIMARY BYPASS SUBMERSIBLE PUMP DISCHARGE PIPING

PROP. BACKUP DIESEL BYPASS PUMP DISCHARGE PIPING

PROP. BYPASS MANHOLE. REFER TO SHEET CD-4

PROP. BACKUP DIESEL BYPASS PUMP

PROP. BACKUP DIESEL BYPASS PUMP SUCTION PIPING

PROP. PRIMARY BYPASS PUMP CONTROL PANEL

PROP. TEMPORARY PUMPING CHAMBER DISCHARGE PIPING

10' WIDE DRAINAGE EASEMENT (PER PLAN REF. 1 & 2)

TERMINUS UNKNOWN

101.16'

133.73' S72°14'56"E

PINECREST PUMP STATION

APPROX. LOCATION OF EXIST. WATER SERVICE

APPROX. LOCATION OF EXIST. SEWER SERVICE

EXIST. FLOWER BED

REMOVE EXIST. VEGETATION AS REQUIRED FOR CONSTRUCTION ACCESS TO SITE

WOOD FENCE

CHAIN LINK FENCE

TOP OF CONCRETE SLAB ELEV. = 70.5

GRASS

FLAG POLE

50-FOOT RIVERFRONT BUFFER

25-FOOT WETLAND BUFFER

REMOVE EXIST. DUCTBANK

TEMPORARY PUMPING CHAMBER WITHIN PUMP STATION. REFER TO SHEET CD-4

REMOVE EXIST. CHAIN LINK FENCE

CUT, CUP AND ABANDON EXIST. WATER SERVICE APPROX. 10' FROM EXTERIOR WALL OF PUMP STATION. COORDINATE WITH THE WATER DEPARTMENT TO TURN OFF PUMP STATIONS CURB STOP.

REMOVE EXIST. PUMP STATION TOP SLAB & BUILDING ABOVE GRADE

REMOVE EXIST. PROPANE TANKS & SLAB

REMOVE EXIST. WOOD PALLETS & DEBRIS WITHIN VEGETATED BUFFER

#100 ABS START

#101 ABS

#102 ABS

#103 ABS

#104 ABS END

*12.67' CLOSING LINE N2°10'32"E

PROPERTY LINE 76' ± ALONG THE WESTERLY BANK OF SEVEN MILE RIVER

SEVEN MILE RIVER

STOCKADE FENCE ALONG PROPERTY LINE

N72°14'56"W 201.77'

8" Ø TREE
6" Ø TREE
15" Ø TREE
4" Ø TREE
12" Ø TREE
8" Ø TREE
10" Ø TREE
40" Ø TREE
36" Ø TREE
24" Ø TREE

CREST DRIVE

CREST DRIVE

DMH RIM=72.8
INV.= 68.8

CURB INLET
ELEV= 72.1

SMH RIM=72.7
INV. (A)= 60.1
INV. (B)= 60.1

BENCHMARK
NAIL IN UP 7
ELEV.=73.27

25'

BYPASS NOTES:

1. CONTRACTOR TO EXTEND CONSTRUCTION FENCING WITHIN ROADWAY AND PROVIDE PROTECTION OF ALL BYPASS PIPING OR BURY.

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
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SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS - EXISTING CONDITIONS & RECOMMENDED BYPASS PLAN

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SCALE

10 0 10 20
SCALE IN FEET: 1"=10'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

C-2.1

AP IB LOT 214
N/F
JOSE E.G. & LISA K. LOPES

AP IB LOT 215
N/F
MICHAEL PAQUIN & HUE AITANA

ASPHALT DRIVEWAY

ASPHALT DRIVEWAY

AP IB LOT 291
N/F
DAVID F. CARDOSO

AP IB LOT 292
N/F
DAVID F. CARDOSO

CONCRETE CURB

LIMITS OF PAVING FOR BYPASS MANHOLE

PROPOSED SEWER BYPASS MANHOLE

APPROX. LOCATION OF EXIST. SEWER SERVICE

CURB INLET
ELEV= 71.07

DMH RIM=72.7
INV. (A)= 66.9
INV. (B)= 67.6
INV. (C)= 67.6

10' WIDE DRAINAGE EASEMENT
(PER PLAN REF. 1 & 2)

SMH RIM=72.6
INV. (A)= 59.9
INV. (B)= 60.1
INV. (C)= 60.0

SMH RIM=72.7
INV. (A)= 64.2
INV. (B)= 64.1

12" RCP SD

TERMINUS UNKNOWN

101.16'

133.73' S72°14'56"E

PROP. BOLLARD (TYP. FOR 2)

CONNECT NEW 4" DI PIPE TO EXIST. 4" DI FM WITH 4" ALPHA RESTRAINED COUPLING OR APPROVED EQUAL.

ABANDON EXIST. FORCE MAIN FROM PUMP STATION TO NEW FORCE MAIN CONNECTION

PROP. CHAIN LINK FENCE

PROP. 30" X 42" WATER TIGHT VALVE VAULT HATCH

PROP. 30" X 42" WATER TIGHT WET WELL HATCH

#100 ABS START

PROVIDE TREE PROTECTION. SEE DETAIL ON SHEET CD-1.

PROP. PRECAST TOP SLAB ELEV. = 72.0'±

PINECREST PUMP STATION

APPROX. LOCATION OF EXIST. WATER SERVICE

APPROX. LOCATION OF EXIST. SEWER SERVICE

EXIST. FLOWER BED

PROP. GATE

WOOD FENCE

CHAIN LINK FENCE

25-FOOT WETLAND BUFFER

72.67' N2°10'32"E CLOSING LINE

PROPERTY LINE 76' ± ALONG THE WESTERLY BANK OF SEVEN MILE RIVER

SEVEN MILE RIVER

6" WATER

8" VCP SEWER

4" DI SEWER FM

4" STL G

CREST DRIVE

SMH RIM=72.7
INV. (A)= 60.1
INV. (B)= 60.1

PROP. PERMEABLE GRASS PAVER LIMITS TYPE GRASSPAVE2 OR EQUAL. REFER TO SHEET 5 OF 5

150-FOOT RIVERFRONT BUFFER

EXIST. FLOWER BED

FLAG POLE

APPROX. LOCATION OF EXIST. SEWER SERVICE

PROP. SPOT GRADE

PROP. PROCESSED MILLINGS

PROP. WET WELL VENT

PROP. STONE WITH FILTER FABRIC

PROP. LIMITS OF VEGETATION

PROP. GENERATOR & PAD
PAD ELEV. = 71.0±

PROP. PUMP STATION ACCESS STAIRS

PROP. PREFABRICATED ALUMINUM GRATING BETWEEN STATION & ELECTRICAL ENCLOSURE

PROP. ELECTRICAL ENCLOSURE
ELEV. = 72.0±

70.5

70.4

70.3

8" Ø TREE

6" Ø TREE

#101 ABS

#102 ABS

#103 ABS

#104 ABS END

40" Ø TREE

36" Ø TREE

15" Ø TREE

6" Ø TREE

4" Ø TREE

12" Ø TREE

8" Ø TREE

10" Ø TREE

24" Ø TREE

24" Ø TREE

DMH RIM=72.8
INV.= 68.8

CURB INLET
ELEV= 72.1

AP IB LOT 290
N/F
CITY OF PAWTUCKET

PROP. DUCT BANK TO ELECTRICAL ENCLOSURE

STOCKADE FENCE ALONG PROPERTY LINE

N72°14'56"W 201.77'

PROVIDE TREE PROTECTION. SEE DETAIL ON SHEET CD-1.

PROVIDE TREE PROTECTION. SEE DETAIL ON SHEET CD-1.

BENCHMARK
NAIL IN UP 7
ELEV.=73.27

AP IB LOT 288
N/F
LEAH MANDEVILLE

AP IB LOT 289
N/F
LEAH MANDEVILLE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
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SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS -
PROPOSED SITE PLAN

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
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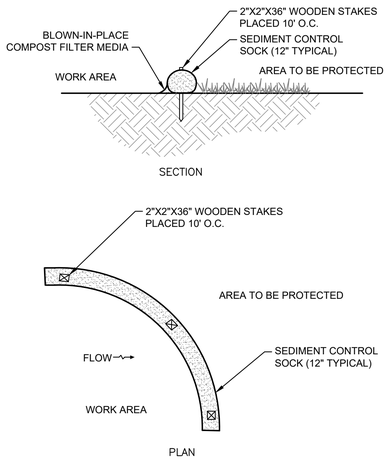
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SCALE IN FEET: 1"=10'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

C-2.2

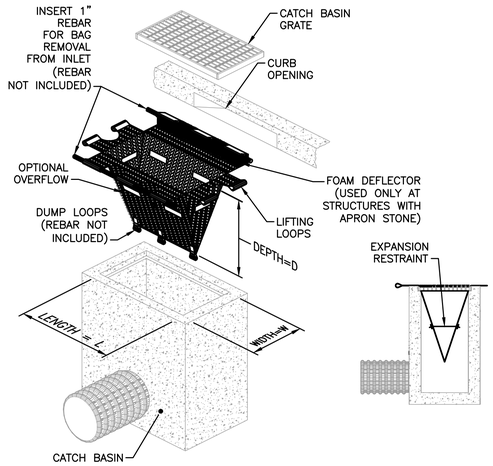


CONSTRUCTION SPECIFICATIONS

1. SOCKS SHALL BE PLACED IN A ROW WITH ENDS OVERLAPPING THE ADJACENT SOCK.
2. SOCKS SHALL BE SECURELY ANCHORED IN PLACE BY STAKES DRIVEN THOUGH THE SOCKS.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. SOCKS SHALL BE REMOVED WHEN WORK IS COMPLETE AN THE AREA HAS STABILIZED.

SEDIMENT CONTROL "COMPOST SOCK"

NOT TO SCALE

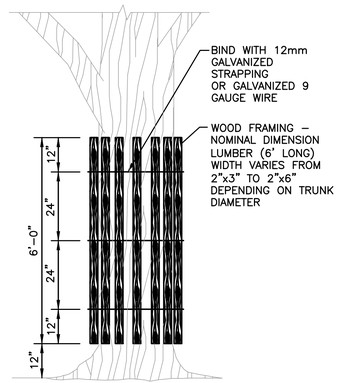


NOTES:

1. CONTRACTOR SHALL MAINTAIN ALL SILT SACK SEDIMENT CONTROL DEVICE INSTALLATIONS AND REPLACE WHEN SATURATED WITH SEDIMENT BASED ON MANUFACTURER RECOMMENDATIONS. SILT SACK SHALL BE INSPECTED AFTER EVERY RAIN EVENT BUT NO LONGER THAN EVERY TWO WEEKS.
2. SILT SACK SHALL BE DOUBLE NEEDLE SEWN POLYPROPYLENE GEOTEXTILE FABRIC AND RATED FOR HIGH FLOW UNLESS OTHERWISE DIRECTED.
3. CONTRACTOR SHALL PROVIDE CURB OPENING DEFLECTOR AT ALL CATCH BASINS AS NECESSARY.

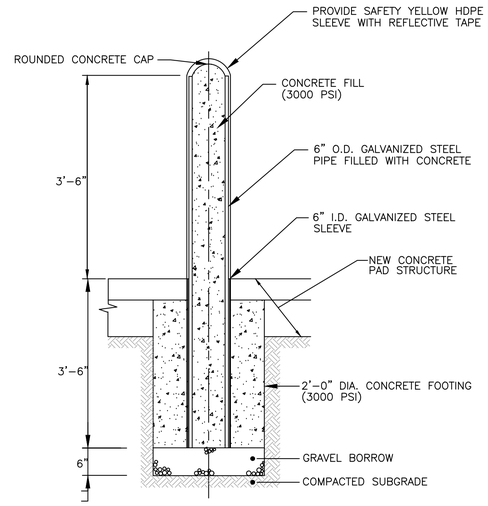
TYPICAL CATCH BASIN EROSION CONTROL PROTECTION

SCALE: NONE



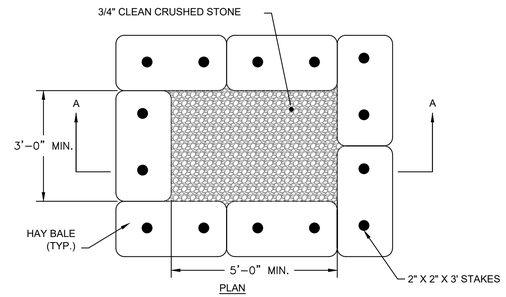
TREE PROTECTION

SCALE: NONE

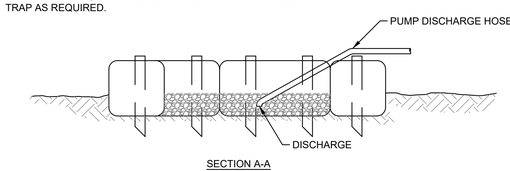


CONCRETE-FILLED STEEL BOLLARD

SCALE: NONE

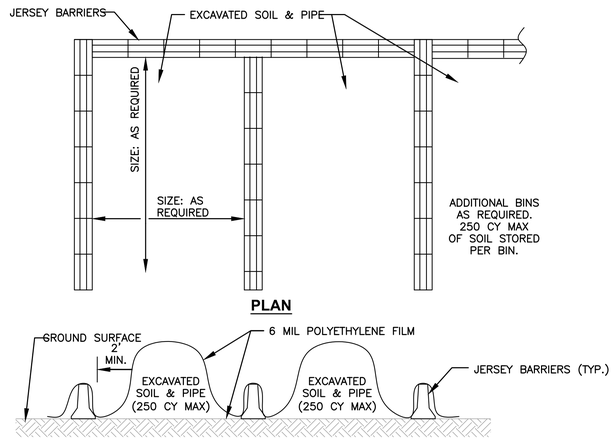


NOTES
ALL DEWATERING DISCHARGES SHALL BE THROUGH SEDIMENT CONTROL TRAPS, CONTRACTOR SHALL MAINTAIN AND CLEAN TRAP AS REQUIRED.



SEDIMENT CONTROL TRAP

NOT TO SCALE



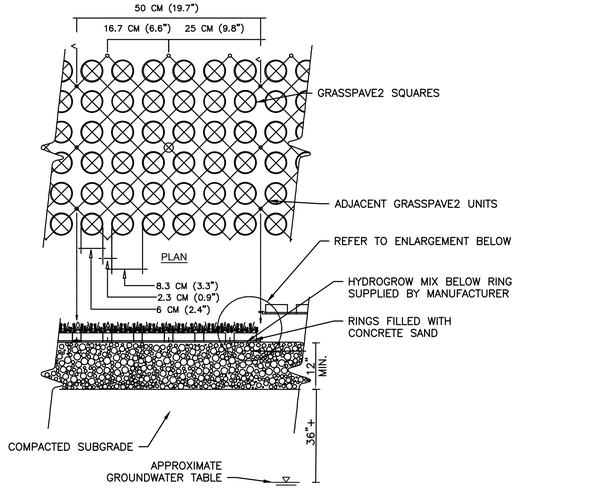
ELEVATION

NOTES:

1. PERIODICALLY (AT LEAST WEEKLY) INSPECT THE STOCKPILES TO INSURE THAT THE LINER AND COVER ARE INTACT AND SECURELY ANCHORED.
2. CONTROL FUGITIVE DUST AS DIRECTED BY THE OWNER'S REPRESENTATIVE.
3. SWEEP AND DISPOSE OF ALL RESIDUAL DIRT, DUST AND DEBRIS FROM THE STAGING AREA AFTER COMPLETION OF THE WORK.
4. JERSEY BARRIERS SHALL BE PLACED AS SHOWN ON PLANS OR AS DIRECTED BY THE OWNER'S REPRESENTATIVE UNTIL IT IS NO LONGER NEEDED FOR THE PURPOSE INTENDED.
5. JERSEY BARRIERS SHALL BE MAINTAINED OR REPLACED UNTIL THEY ARE NO LONGER NECESSARY FOR THE PURPOSE INTENDED. AT THE COMPLETION OF WORK, ALL POLYETHYLENE AND JERSEY BARRIERS SHALL BE REMOVED AND PROPERLY DISPOSED OF.
6. PRIOR TO CONSTRUCTION, COORDINATE WITH OWNER/ENGINEER IN REGARDS TO STOCKPILE SIZE. THE CONTRACTOR MAY STOCKPILE ON CITY PROPERTY LOCATED AT 100 FREIGHT STREET.

SURPLUS SOIL STOCKPILE AREA

SCALE: NONE



NOTES:
1. SEASONAL HIGH GROUNDWATER TABLE IS ESTIMATED AT A DEPTH OF 5.5' BASED ON HISTROICAL BORING DATA.

PERVIOUS ACCESS DRIVE DETAIL (PINECREST PS)

SCALE: NONE

PREPARED BY

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www.BETA-Inc.com

REGISTERED PROFESSIONAL

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No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

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Pawtucket, RI

TITLE

CIVIL DETAILS I

NO.	REVISIONS	DATE

DRAWN BY:	KJD
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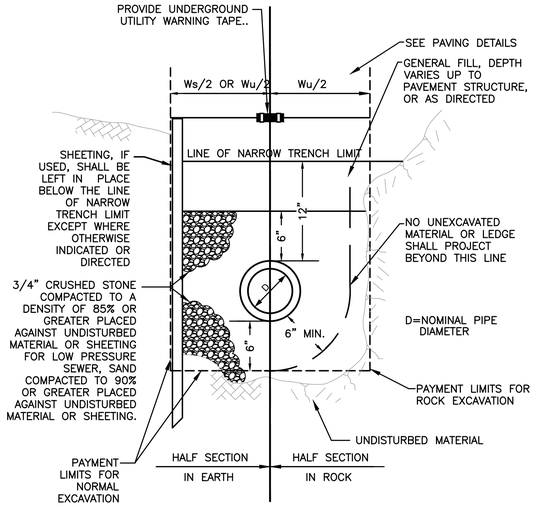
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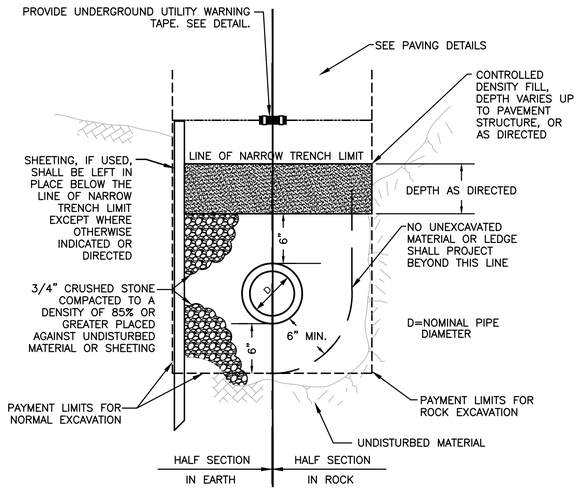
CD-1

J:\25.11844 PARKSIDE PUMP STATION\DRAWINGFILES\PLANSET\CIVIL DETAILS.DWG
8/4/2026



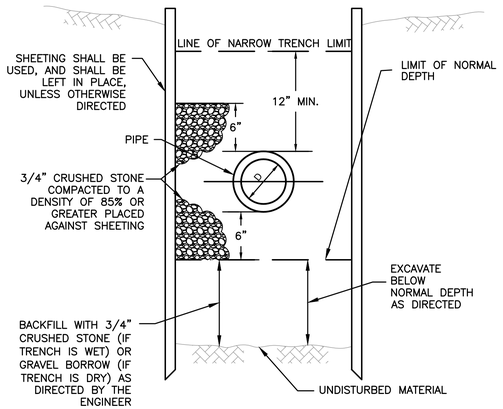
STANDARD TRENCH SECTION

SCALE: NONE



STANDARD TRENCH SECTION FOR CROSS TRENCHES AND WHERE CDF IS REQUIRED

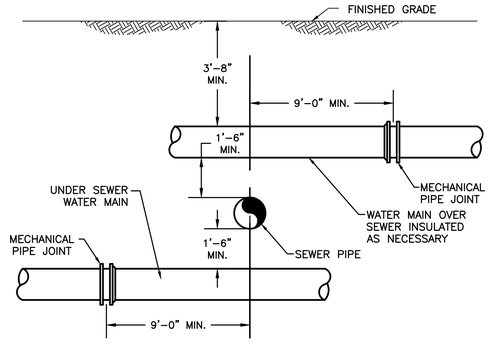
SCALE: NONE



DETAILS NOT SHOWN ARE SAME AS FOR TRENCH SECTIONS SHOWN ELSEWHERE.

STANDARD TRENCH SECTION (WHERE UNSUITABLE MATERIAL EXISTS BELOW NORMAL DEPTH)

SCALE: NONE

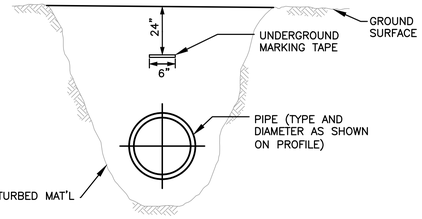


NOTES:

1. SEWERS SHALL BE KEPT REMOTE FROM WATER SUPPLY PIPING AND STRUCTURES. WHEREVER FEASIBLE, SEWERS SHOULD BE LAID AT A MINIMUM HORIZONTAL DISTANCE OF 10 FEET FROM WATER MAINS. IF LOCAL CONDITIONS PREVENT THIS, THE WATER MAIN SHOULD BE LAID IN A SEPARATE TRENCH, AND THE ELEVATIONS OF THE CROWN OF THE SEWER PLACED AT LEAST 18 INCHES BELOW THE INVERT OF THE WATER MAIN.
2. WHENEVER SEWERS MUST CROSS WATER MAINS, THE CROWN OF THE SEWER SHOULD BE PLACED A MINIMUM OF 18 INCHES BELOW THE INVERT OF THE WATER MAIN. IN ADDITION, THE WATER MAIN MUST BE CONSTRUCTED WITH ONE FULL LENGTH OF PIPE CENTERED ABOUT THE SEWER CROSSING. THE WATER PIPE SHALL HAVE MECHANICAL JOINTS FOR A DISTANCE OF 10 FEET ON EACH SIDE OF THE SEWER CROSSING.
3. WHEN IT IS IMPOSSIBLE TO OBTAIN HORIZONTAL OR VERTICAL SEPARATION AS STIPULATED ABOVE, BOTH THE WATER AND THE SEWER SHOULD BE ENCASED IN CONTROL DENSITY FILL FOR A DISTANCE OF 10 FEET ON EITHER SIDE OF THE CROSSING.

SEWER LINE / WATER LINE CROSSING

SCALE: NONE

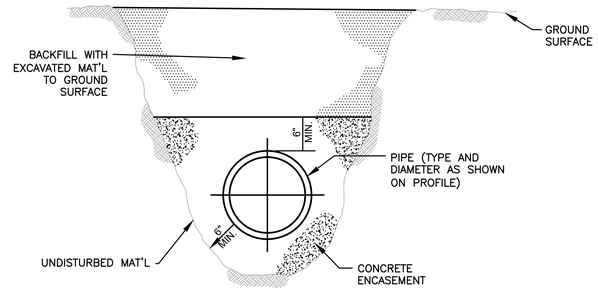


NOTES:

1. MARKING TAPE TO BE INSTALLED OVER ALL PIPELINES AND CONDUITS INSTALLED UNDER THIS CONTRACT.
2. MARKING TAPE FOR NON–FERROUS PIPE OR CONDUITS TO BE DETECTABLE, MAGNETIC TYPE.
3. MARKING TAPE FOR FERROUS PIPE OF CONDUITS TO BE NON–DETECTABLE, NON–MAGNETIC TYPE.
4. MARKING TAPE IS TO BE 6–INCHES WIDE AND INSTALLED DIRECTLY ABOVE THE PIPE OR CONDUIT APPROXIMATELY 24–INCHES BELOW THE PROPOSED FINISHED GRADE.

UNDERGROUND UTILITY MARKING TAPE DETAIL

SCALE: NONE

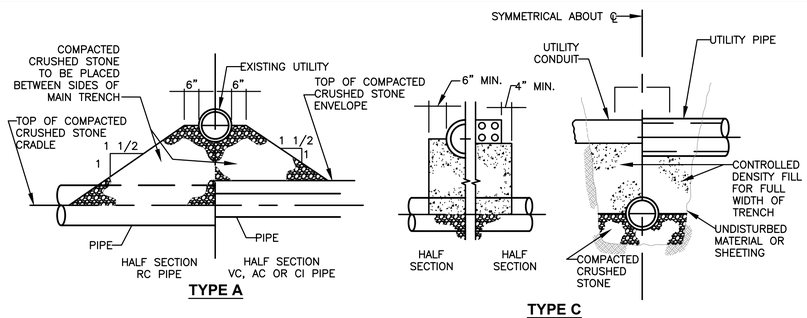


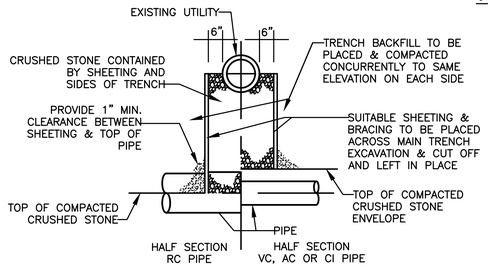
NOTES:

1. DETAIL FOR LOCATIONS WHERE INSUFFICIENT SEPARATION BETWEEN SEWER AND WATER EXISTS (<10' HORIZONTAL OR <18" VERTICAL).
2. THE PIPE SHALL BE PROPERLY SECURED TO PREVENT DISPLACEMENT DURING THE POURING OF CONCRETE ENCASEMENT.
3. LIMIT OF CONCRETE ENCASEMENT SHALL BE SHOWN ON THE PROFILE OR AS DIRECTED.

CONCRETE ENCASEMENT DETAIL

SCALE: NONE





TYPE B

NOTE: TYPE C SUPPORT TO BE PROVIDED UNLESS OTHERWISE DIRECTED

TYPICAL SUPPORTS FOR UTILITIES

SCALE: NONE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

CIVIL DETAILS II

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

NONE

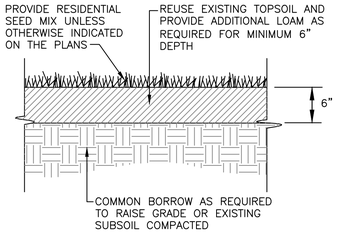
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SHEET NO.

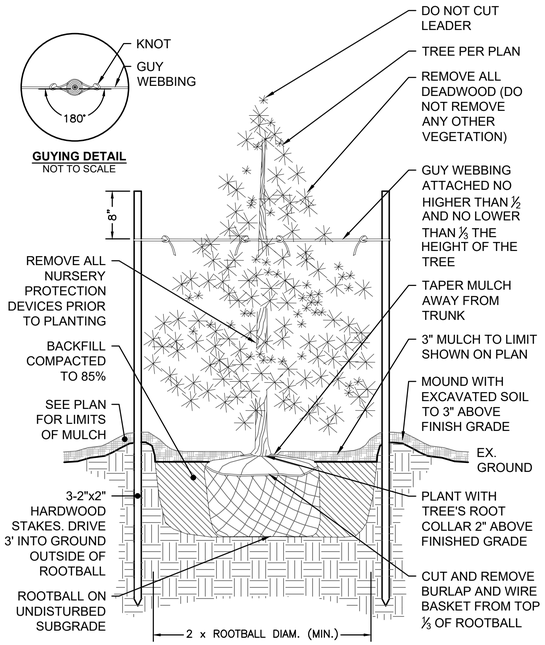
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8/4/2026



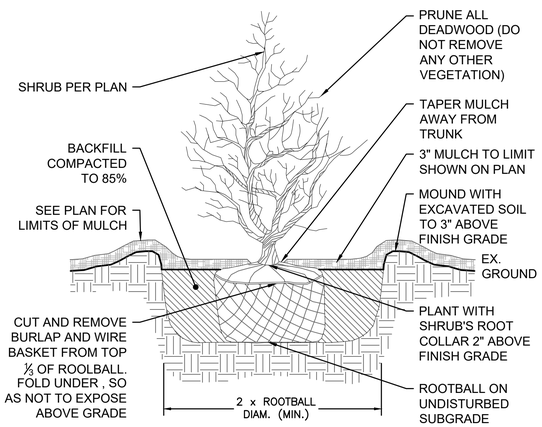
LOAM AND SEED DETAIL
SCALE: NONE



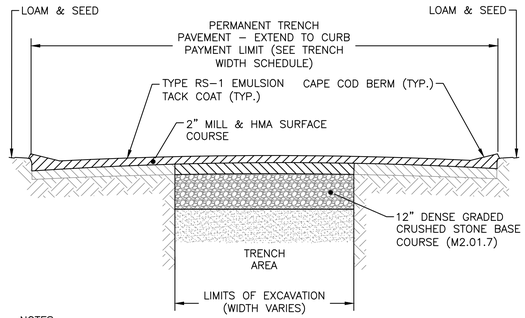
GUYING DETAIL
NOT TO SCALE

NOTE:
AFTER THE GUARANTEE PERIOD THE CONTRACTOR WILL BE RESPONSIBLE FOR THE REMOVAL OF STAKES AND GUY WEBBING.

EVERGREEN TREE STAKING & PLANTING (TYPICAL) (PARKSIDE PS)
SCALE: NONE



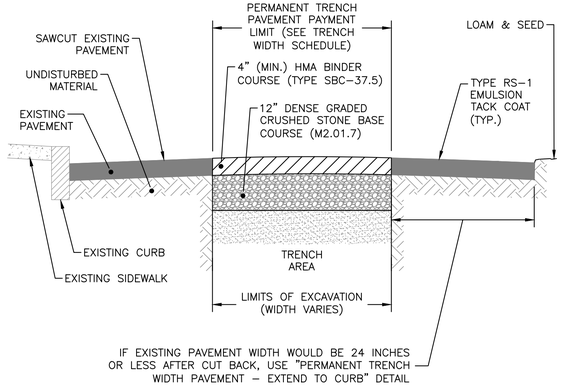
SHRUB PLANTING (TYPICAL) (PARKSIDE PS)
SCALE: NONE



NOTES:

1. A MINIMUM 120–DAY SETTLEMENT PERIOD SHALL BE OBSERVED PRIOR TO FINAL PAVEMENT.
2. MINIMUM PAVEMENT THICKNESS TO BE 1.5 INCHES.
3. MAXIMUM PAVEMENT THICKNESS PER COURSE NOT TO EXCEED 3 INCHES.
4. CONTRACTOR TO VARY PAVEMENT THICKNESS TO MAINTAIN A MINIMUM CROSS SECTIONAL SLOPE EQUALING 0.02 FT/FT OR 2%.

PERMANENT PAVEMENT RESTORATION - MILL AND OVERLAY
SCALE: NONE



NOTES:

1. MINIMUM PAVEMENT THICKNESS TO BE 1.5 INCHES.
2. MAXIMUM PAVEMENT THICKNESS PER COURSE NOT TO EXCEED 3 INCHES.
3. CONTRACTOR TO VARY PAVEMENT THICKNESS TO MAINTAIN A MINIMUM CROSS SECTIONAL SLOPE EQUALING 0.02 FT/FT OR 2%.

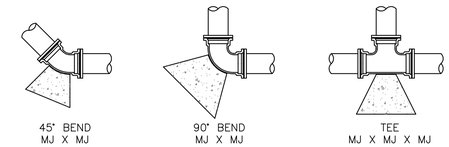
PERMANENT TRENCH WIDTH PAVEMENT
SCALE: NONE

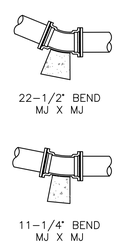
MAXIMUM PAYMENT LIMITS						
DIAMETER OF PIPE D IN INCHES	TRENCH WIDTH IN FEET		TEMPORARY TRENCH PAVEMENT WIDTH IN FEET		PERMANENT TRENCH PAVEMENT WIDTH IN FEET*	
	TRENCH DEPTH		TRENCH DEPTH		TRENCH DEPTH	
	< OR = 10'	> 10' TO 20'	< OR = 10'	> 10' TO 20'	< OR = 10'	> 10' TO 20'
12 AND SMALLER	5.00	6.00	6.00	7.00	8.00	9.00
15	5.25	6.25	6.25	7.25	8.25	9.25
18	5.50	6.50	6.50	7.50	8.50	9.50
21	5.75	6.75	6.75	7.75	8.75	9.75
24	6.00	7.00	7.00	8.00	9.00	10.00
27	6.25	7.25	7.25	8.25	9.25	10.25
30	6.50	7.50	7.50	8.50	9.50	10.50
36	7.00	8.00	8.00	9.00	10.00	11.00
42	7.50	8.50	8.50	9.50	10.50	11.50
48	8.00	9.00	9.00	10.00	11.00	12.00
54	8.50	9.50	9.50	10.50	11.50	12.50
60	9.00	10.00	10.00	11.00	12.00	13.00
66	9.50	10.50	10.50	11.50	12.50	13.50
72	10.00	11.00	11.00	12.00	13.00	14.00

NOTES:

1. PERMANENT TRENCH PAVEMENT INCLUDES 1' CUT BACK OF TEMPORARY PAVEMENT ALONG EACH SIDE OF THE TRENCH.
2. TRENCH DEPTH MEASURED FROM THE EXISTING GROUND SURFACE TO 6" BELOW THE BOTTOM OF THE CONSTRUCTED PIPE.
3. QUANTITIES FOR PAYMENT SHALL BE IN ACCORDANCE WITH THE ABOVE LIMITS OR THE ACTUAL WIDTHS, WHICHEVER IS LESS.

TRENCH WIDTH TABLE





PIPE SIZE	MINIMUM SURFACE AREA (S.F.) OF CONCRETE AGAINST UNDISTURBED EARTH				
	11¼°	22½°	45°	90°	TEE
4"	0.5	0.9	1.7	3.2	2.2
6"	0.5	1.1	2.1	3.9	2.8
8"	0.9	1.8	3.6	6.6	4.7
12"	1.8	3.7	7.2	13.2	9.3

NOTE:
1. PORTLAND TYPE II CEMENT CONCRETE MEETING SPECIFICATION SECTION 03300 AND SHALL BE PLACED SO AS TO NOT INTERFERE WITH THE JOINTS OF THE FITTING. CONCRETE SHALL BE 4000 PSI.

THRUST BLOCK BEARING AREA TABLE FOR WATER AND SEWER MAIN
SCALE: NONE

8–INCH						
END	90° BEND	45° BEND	22.5° BEND	11.25° BEND	8X6 RED.	
49 FT	19 FT	13 FT	7 FT	3 FT	34 FT	

4–INCH				
END	90° BEND	45° BEND	22.5° BEND	11.25° BEND
18 FT	9 FT	4 FT	1.5 FT	1 FT

RESTRAINED JOINT LENGTHS FOR DUCTILE IRON PIPE
SCALE: NONE

PREPARED BY

BETA
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REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

CIVIL DETAILS III

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

NONE

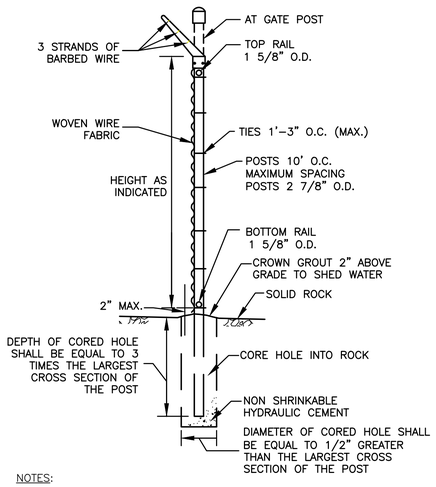
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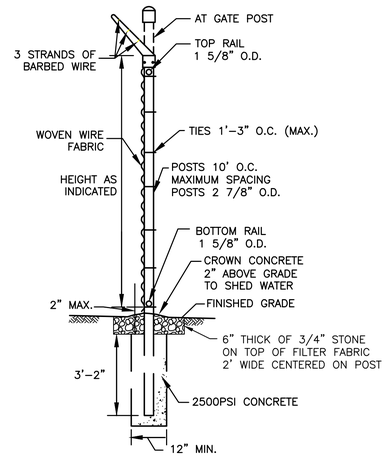


NOTES:

1. IF OVERBURDEN IS ENCOUNTERED CORE DRILLING MAY BE REQUIRED TO ACHIEVE PROPER DEPTH.

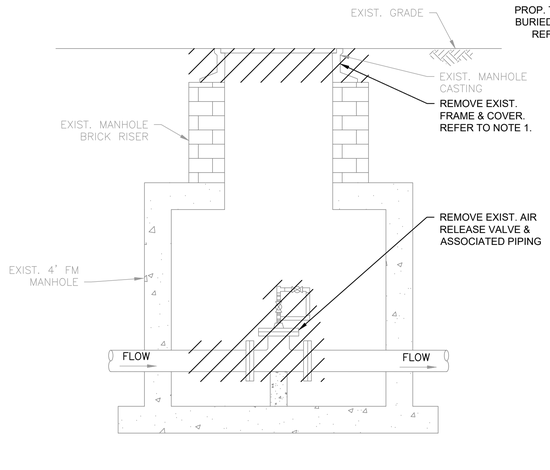
CHAIN-LINK FENCE SECTION INSTALLED IN ROCK DETAIL

SCALE: NONE

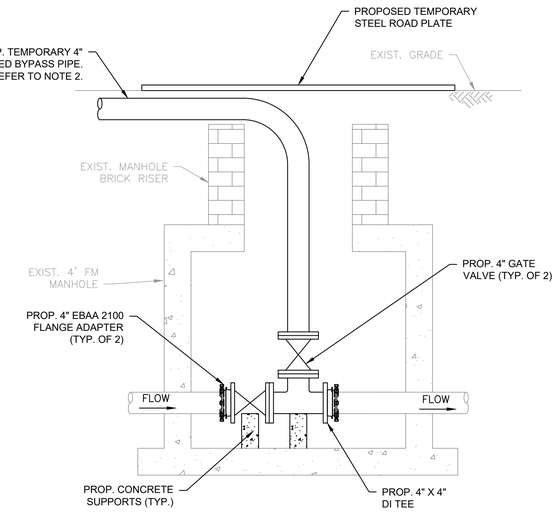


TYPICAL CHAIN-LINK FENCE SECTION DETAIL

SCALE: NONE



EXISTING CONDITIONS & DEMOLITION PLAN



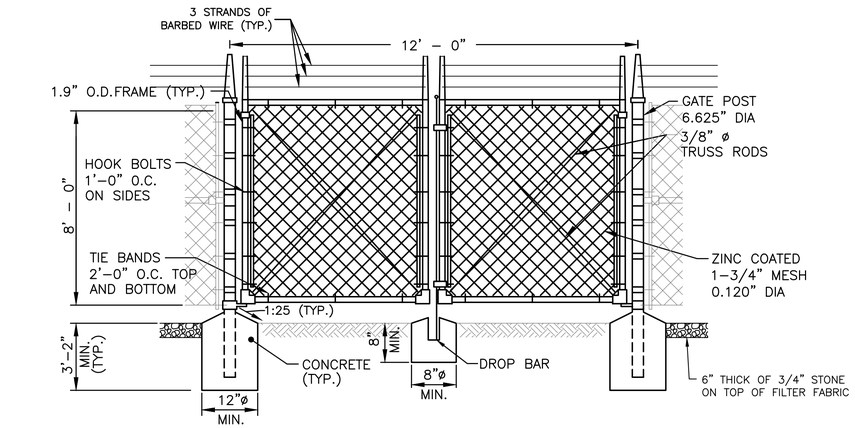
PROPOSED TEMPORARY BYPASS PLAN

NOTES:

1. THE PROPOSED SEWER BYPASS PIPE IS TO BE BURIED. CONTRACTOR TO REMOVE EXISTING FRAME AND COVER AND REINSTALL UPON REMOVAL OF TEMPORARY BYPASS PIPING.
2. CONTRACTOR TO INSTALL BLIND FLANGE ON PROPOSED GATE VALVE UPON REMOVAL OF TEMPORARY BYPASS PIPING.
3. NIGHT WORK REQUIRED TO DRAIN FORCE MAIN BACK TO WET WELL DURING LOW FLOW CONDITIONS. PUMPER TRUCK REQUIRED TO BE ON SITE TO MANAGE FLOW. CONTRACTOR TO REESTABLISH PUMP STATION FLOW UPON COMPLETION.

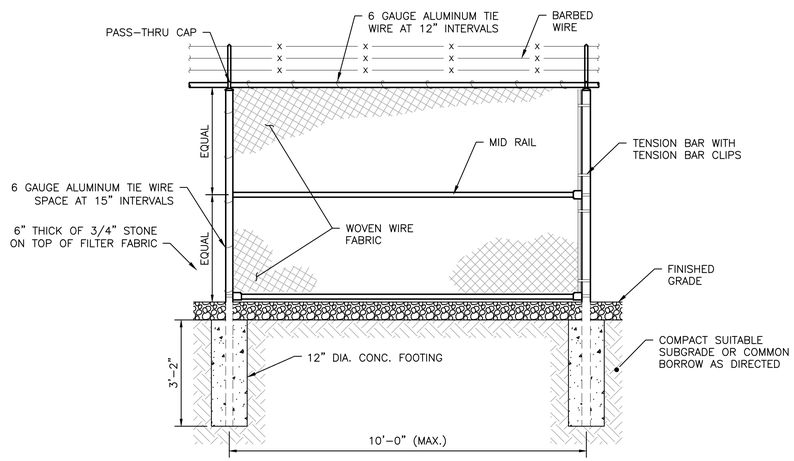
DISCHARGE BYPASS CONNECTION (PARKSIDE PS)

SCALE: NONE



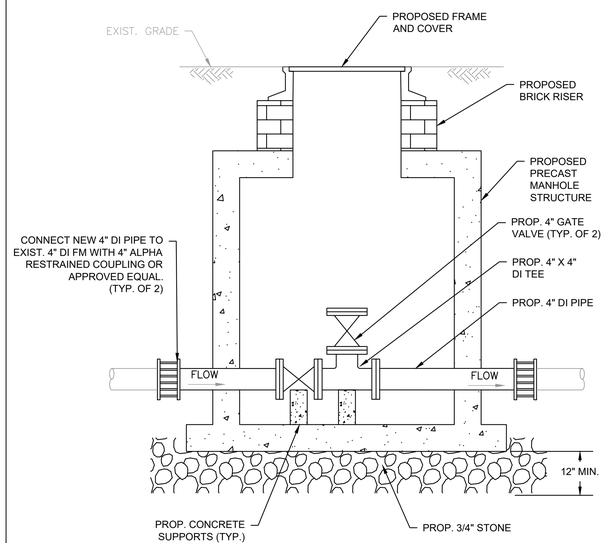
SWING GATE DETAIL

SCALE: NONE



CHAIN LINK FENCE DETAIL

SCALE: NONE

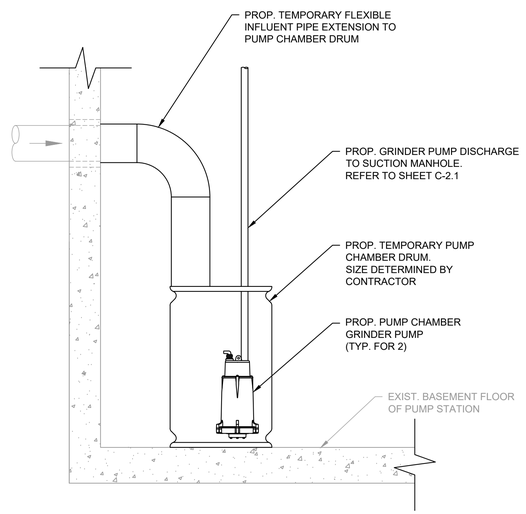


NOTES:

1. THE PROPOSED SEWER BYPASS PIPE IS TO BE PROTECTED OR BURIED. CONTRACTOR TO INSTALL FRAME AND COVER UPON REMOVAL OF TEMPORARY BYPASS PIPING.
2. CONTRACTOR TO INSTALL BLIND FLANGE ON PROPOSED GATE VALVE UPON REMOVAL OF TEMPORARY BYPASS PIPING.
3. NIGHT WORK REQUIRED TO DRAIN FORCE MAIN BACK TO WET WELL DURING LOW FLOW CONDITIONS. PUMPER TRUCK REQUIRED TO BE ON SITE TO MANAGE FLOW. CONTRACTOR TO REESTABLISH PUMP STATION FLOW UPON COMPLETION.

DISCHARGE BYPASS CONNECTION (PINECREST PS)

SCALE: NONE



NOTES:

1. THE INTENT OF THE TEMPORARY PUMPING CHAMBER IS TO MANAGE FLOW FROM APPROXIMATELY THREE SEWER SERVICES DIRECTLY CONNECTED TO THE INFLUENT LINE INTO THE PUMP STATION. CONTRACTOR IS RESPONSIBLE TO SIZE TEMPORARY PUMPING CHAMBER PUMP AS REQUIRED TO MANAGE FLOW.
2. ALL TEMPORARY ITEMS ASSOCIATED WITH THE TEMPORARY PUMPING CHAMBER IS TO BE REMOVED AND DISPOSED OF BY THE CONTRACTOR AT THE CONCLUSION OF THE PROJECT.
3. THE PUMPING CHAMBER IS REQUIRED TO HAVE A PRIMARY AND A BACKUP ELECTRIC GRINDER PUMP.

TEMPORARY PUMPING CHAMBER CONCEPT (PINECREST PS)

SCALE: NONE

PREPARED BY

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REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

CIVIL DETAILS IV

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

NONE

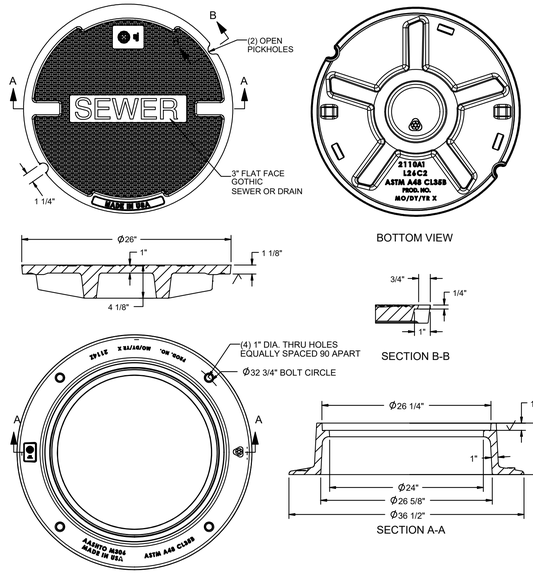
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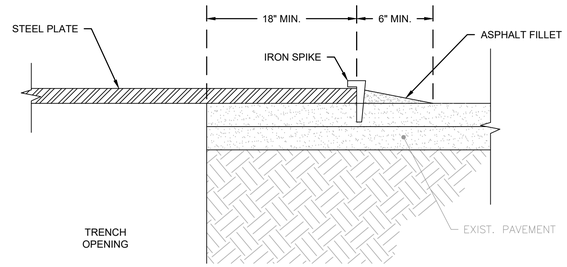


NOTES:

1. FRAME AND COVER SET FOR SEWER MANHOLES SHALL BE MODEL NO. LK110A / L26C2 AS MANUFACTURED BY EAST JORDAN IRON WORKS (FORMERLY LEBARON FOUNDRY, INC.) OR APPROVED EQUAL.
2. COVER CASTING SHALL CONFORM TO THE MUNICIPAL STANDARD (AS SHOWN) UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. COVER LETTERING DETAIL APPLIES TO ALL COVER SIZES AND WATERTIGHT MANHOLE COVERS IN ACCORDANCE WITH NOTES IN TYPICAL MANHOLE DETAIL.
4. FOR SHALLOW STRUCTURES 6" HIGH FRAMES MAY BE SUBSTITUTED FOR STANDARD 8" HIGH FRAMES FOR SHALLOW-PROFILE STRUCTURES (SEE DETAILS) AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. NO FRAMES LESS THAN 6" HIGH SHALL BE ALLOWED.
5. FRAME AND COVER SHALL BE SET IN FULL BED OF MORTAR ON A MINIMUM OF TWO COURSES OF BRICK.

SEWER MANHOLE FRAME & COVER

SCALE: NONE



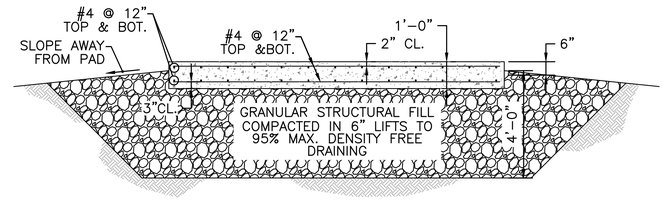
NOTES:

1. MUTCD COMPLIANT RETROREFLECTIVE ORANGE CONSTRUCTION WARNING SIGNS (48"X48") WITH WORDING "STEEL PLATE AHEAD" SHALL BE INSTALLED IN ADVANCE OF STEEL PLATE INSTALLATION.
2. THE CONTRACTOR SHALL DESIGN AND UTILIZE STEEL PLATES OF ADEQUATE DIMENSIONS AND THICKNESS FOR INTENDED USE AND VEHICLE LOADING . MAXIMUM ALLOWABLE DEFLECTION SHALL BE 0.025". IRON SPIKE FASTENERS SHALL BE INSTALLED AROUND THE PERIMETER OF THE STEEL PLATE.

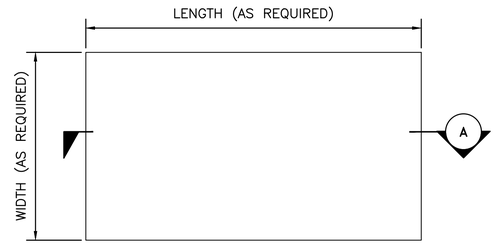
STEEL PLATES SHALL NOT BE USED BETWEEN NOVEMBER 15 AND APRIL 1 WITHOUT DPW APPROVAL, OR AT ANY TIME WHEN SNOW OR FREEZING IS FORECASTED.

STEEL PLATE INSTALLATION

SCALE: NONE



SECTION A



PLAN

NOTES:

1. LENGTH AND WIDTH OF GENERATOR PAD TO BE COORDINATED WITH GENERATOR SUPPLIER.
2. CONCRETE TO BE 3500 PSI WITH A MAX 4" SLUMP.
3. TOP SURFACE OF PAD TO BE STEEL TROWELED TO LEVEL SMOOTH FINISH.
4. REFER TO MANUFACTURERS DRAWINGS FOR GENERATOR ANCHOR REQUIREMENTS AND LOCATIONS.

GENERATOR PAD DETAIL

SCALE: NONE

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

CIVIL DETAILS V

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

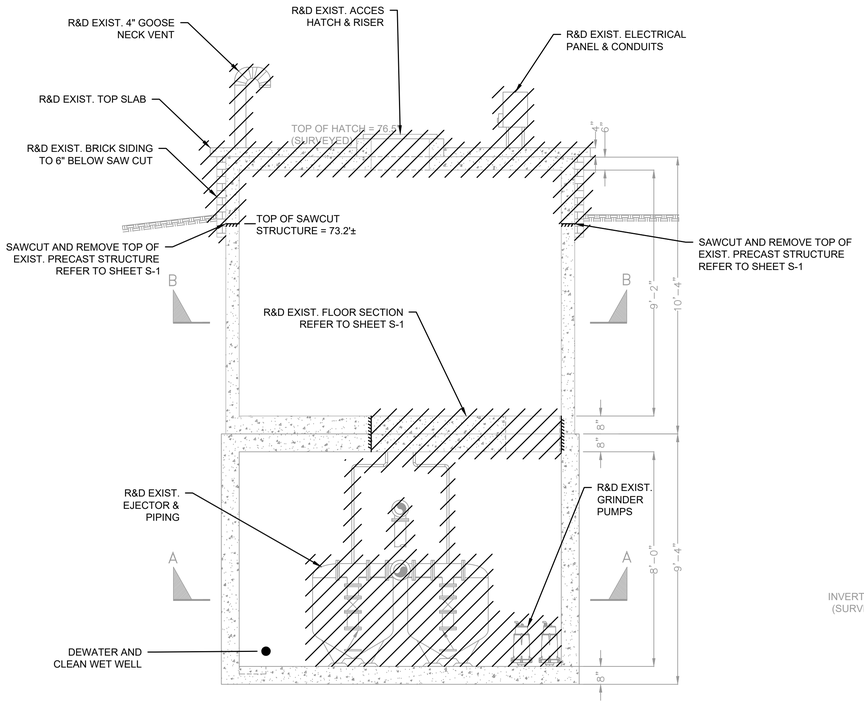
NONE

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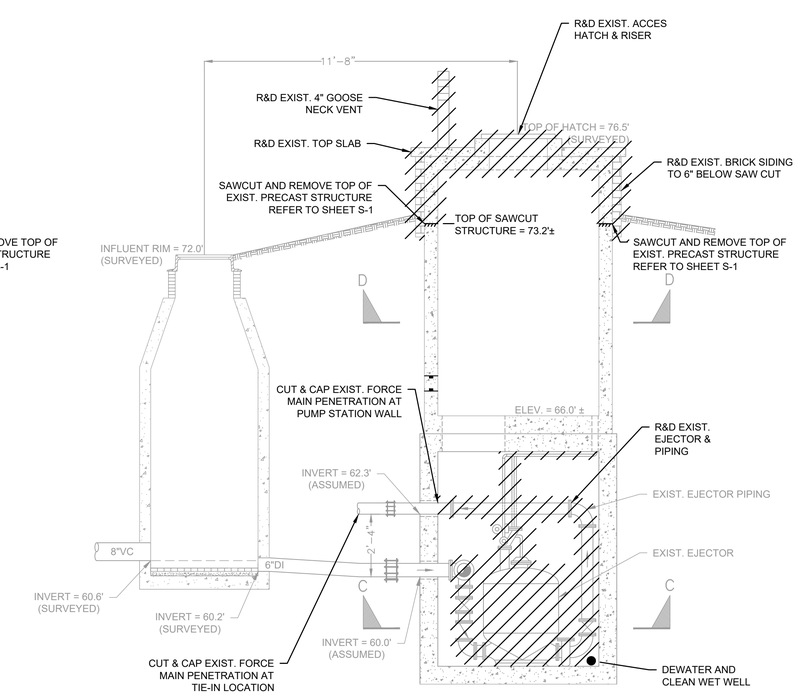
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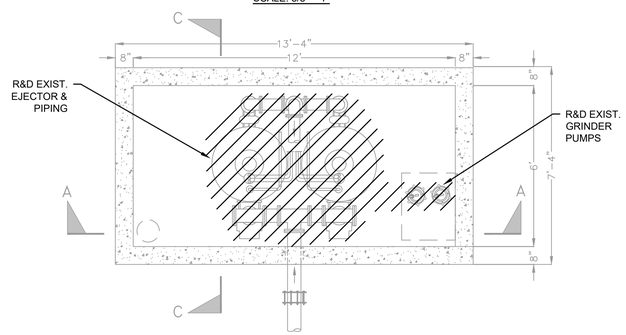
PARKSIDE PUMP STATION
SECTIONS A-A & B-B

SCALE: 3/8" = 1"



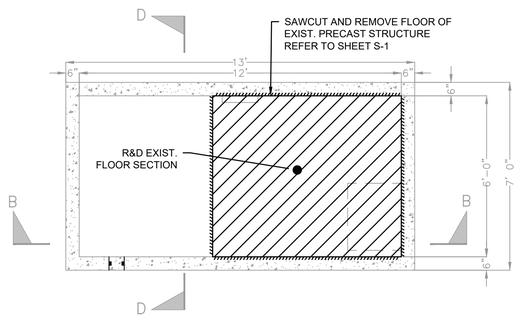
PARKSIDE PUMP STATION
SECTIONS C-C & D-D

SCALE: 3/8" = 1"



PARKSIDE PUMP STATION
BASEMENT LEVEL PLAN

SCALE: 3/8" = 1"



PARKSIDE PUMP STATION
MEZZANINE LEVEL PLAN

SCALE: 3/8" = 1"

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

CHRISTOPHER R. CRONIN
No. 8509
REGISTERED PROFESSIONAL ENGINEER (CIVIL)

SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PARKSIDE PS - EXISTING MECHANICAL

NO.	REVISIONS	DATE

DRAWN BY:	KJD
DESIGNED BY:	CRC
CHECKED BY:	CRC
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

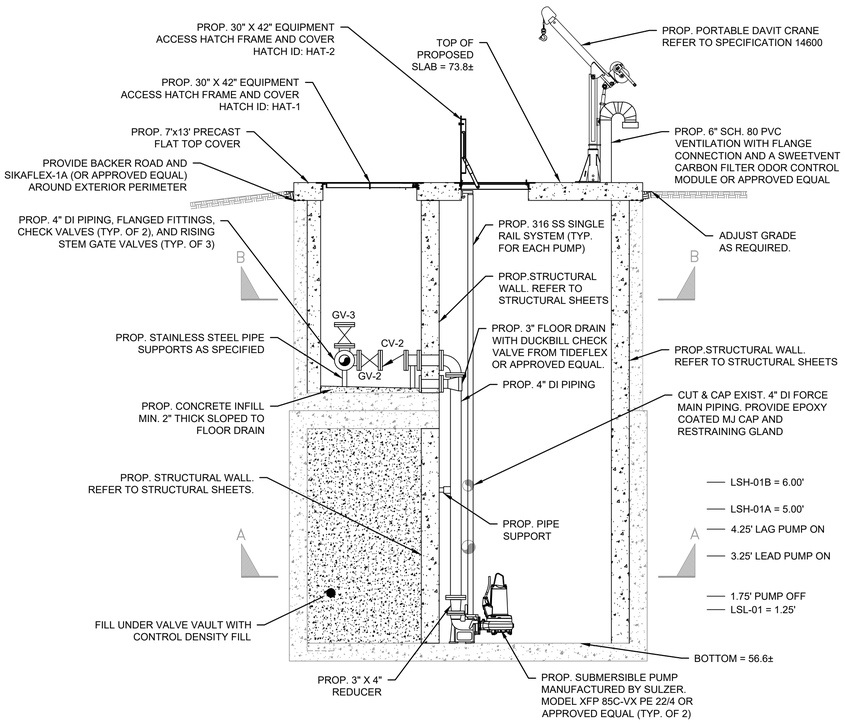
SCALE

AS SHOWN

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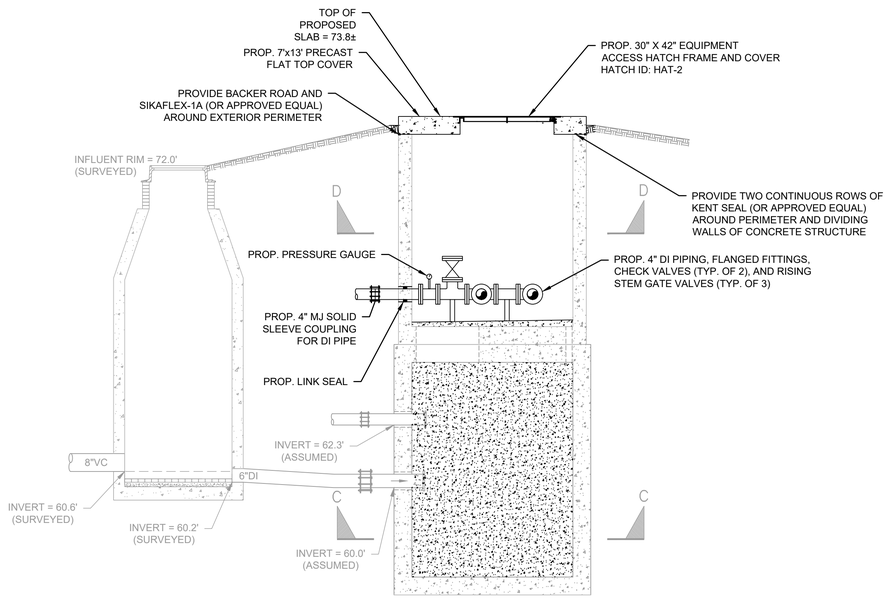
SHEET NO.

M-1.1



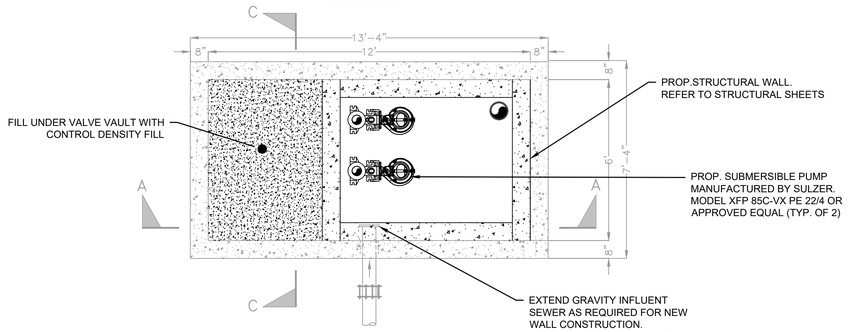
PARKSIDE PUMP STATION
SECTIONS A-A & B-B

SCALE: 3/8" = 1"



PARKSIDE PUMP STATION
SECTIONS C-C & D-D

SCALE: 3/8" = 1"



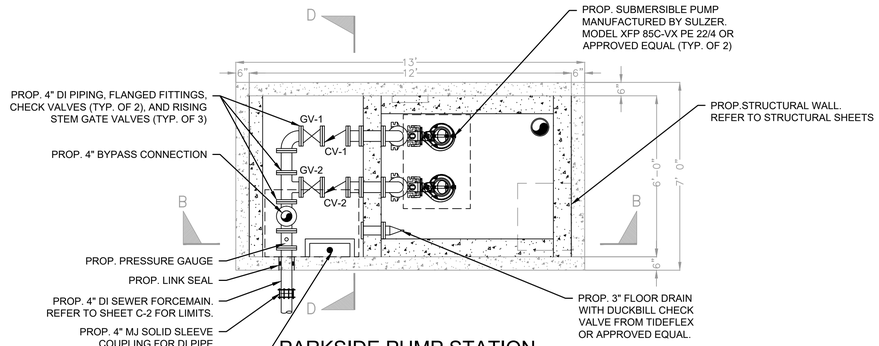
PARKSIDE PUMP STATION
BASEMENT LEVEL PLAN

SCALE: 3/8" = 1"

PARKSIDE PUMP STATION - PUMP SCHEDULE (THIS SHEET)				
TYPE	RATING POINTS	DISCHARGE (INCHES)	MAX PUMP RPM	MAX HP
SUBMERSIBLE PUMP	115 GPM 23 FT. TDH	3	1800	5.0

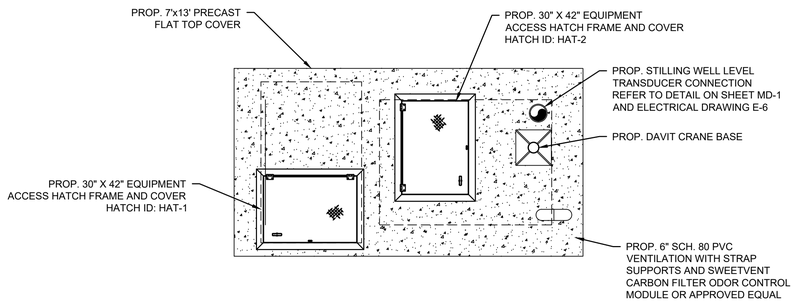
PARKSIDE PUMP STATION - HATCH SCHEDULE (THIS SHEET)				
HATCH ID	LOCATION	HATCH TYPE	SIZE	MATERIAL
HAT-1	VALVE VAULT	ACCESS W/ FALL PROTECTION	30" X 42"	ALUMINUM
HAT-2	WET WELL	ACCESS W/ FALL PROTECTION	30" X 42"	ALUMINUM

PARKSIDE PUMP STATION - VALVE SCHEDULE (THIS SHEET)						
VALVE ID	NO. REQUIRED	VALVE TYPE	SIZE (INCH)	MATERIAL	ACTUATOR	CONNECTION
GV-1 TO GV-3	3	RISING STEM GATE VALVE	4	DUCTILE IRON	MANUAL	FL X FL
CV-1 TO CV-2	2	CHECK VALVE	4	DUCTILE IRON	WEIGHTED LEVER	FL X FL



PARKSIDE PUMP STATION
MEZZANINE LEVEL PLAN

SCALE: 3/8" = 1"



PARKSIDE PUMP STATION
TOP SLAB PLAN

SCALE: 3/8" = 1"

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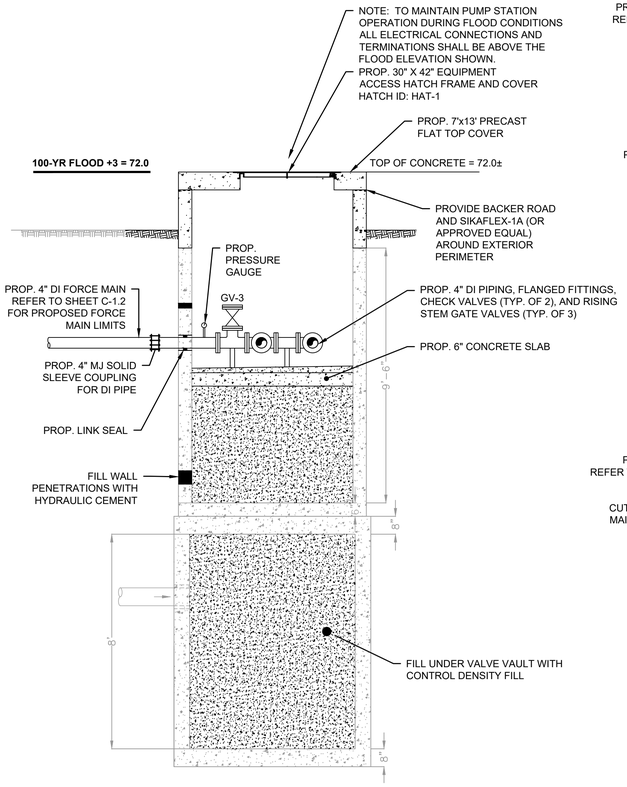
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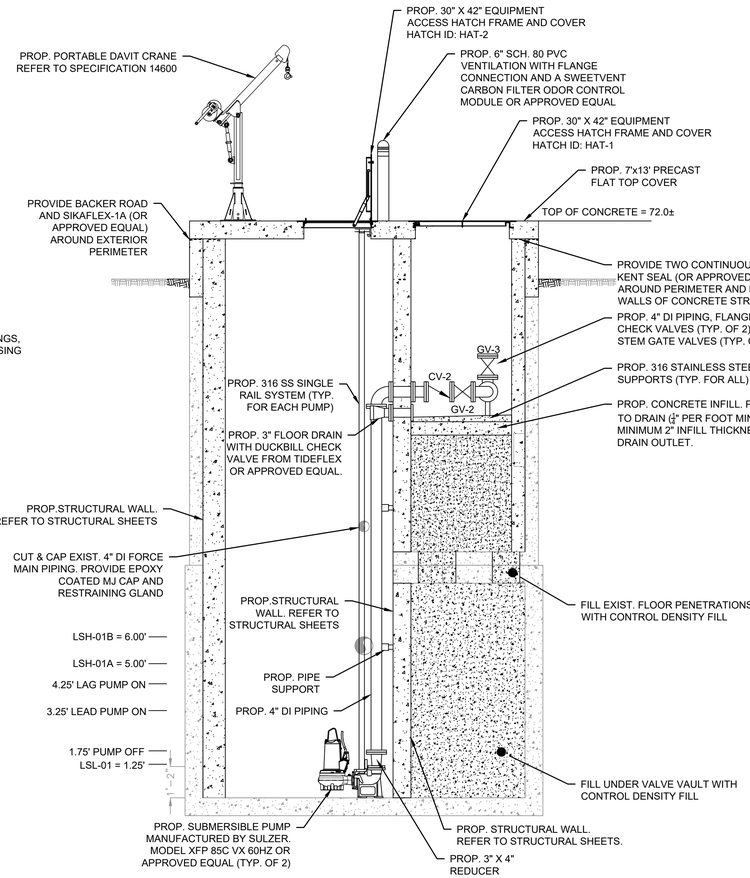
SHEET NO.

M-1.2



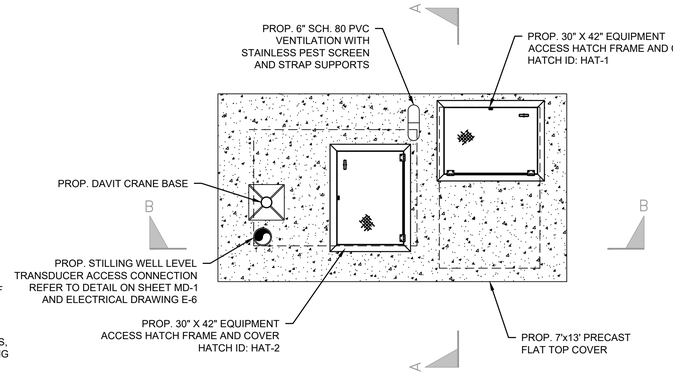
PINECREST PUMP STATION
SECTION A-A

SCALE: 3/8" = 1"



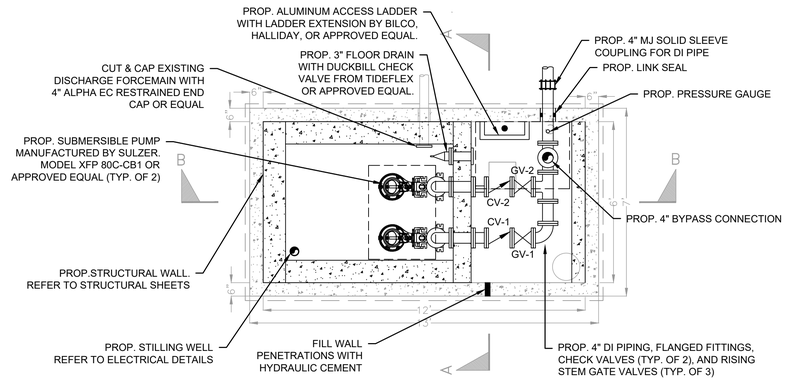
PINECREST PUMP STATION
SECTIONS B-B

SCALE: 3/8" = 1"



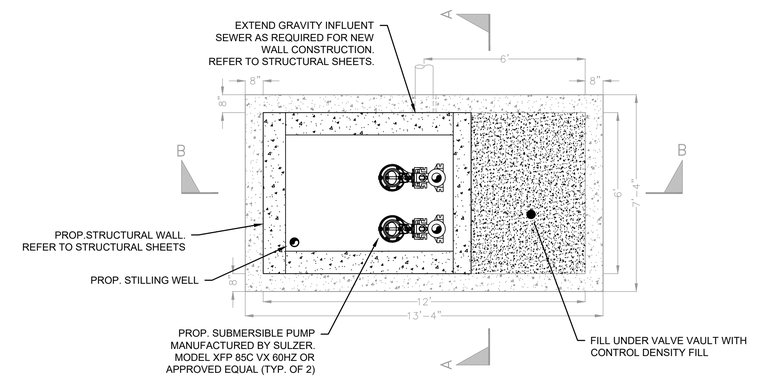
PINECREST PUMP STATION
GRADE LEVEL PLAN

SCALE: 3/8" = 1"



PINECREST PUMP STATION
MEZZANINE LEVEL PLAN

SCALE: 3/8" = 1"



PINECREST PUMP STATION
BASEMENT LEVEL PLAN

SCALE: 3/8" = 1"

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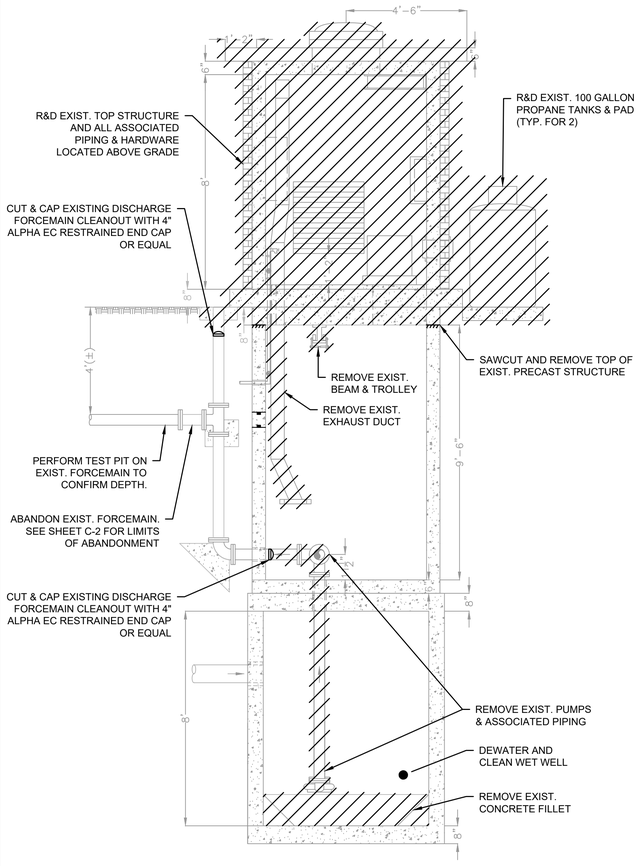
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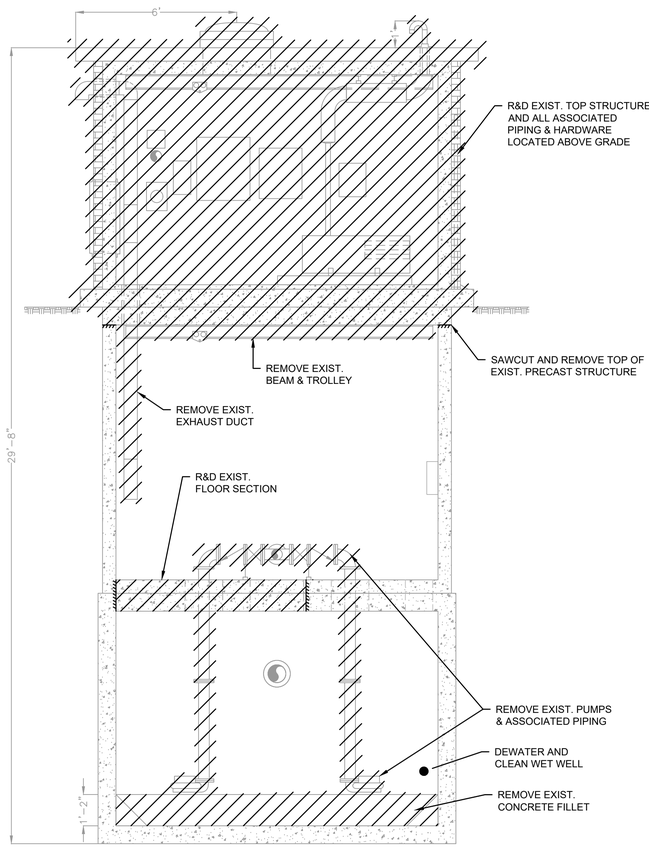
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8/4/2026 J:\26.11909_PINECREST PUMP STATION\DRAWINGFILES\PLANSET\PINECREST PS_EXIST & PROP_MECH SHTS.DWG



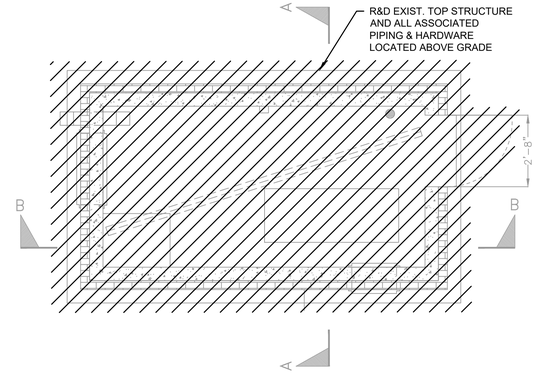
PINECREST PUMP STATION
SECTION A-A

SCALE: 3/8" = 1"



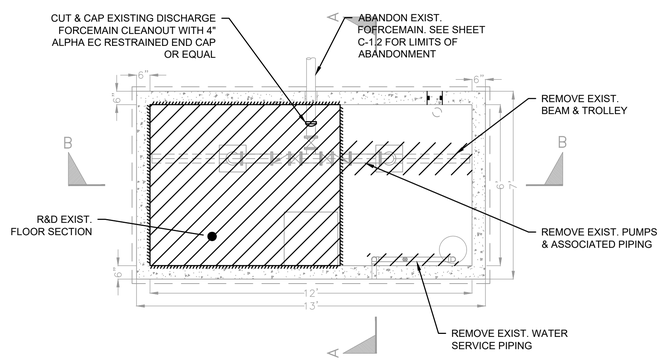
PINECREST PUMP STATION
SECTIONS B-B

SCALE: 3/8" = 1"



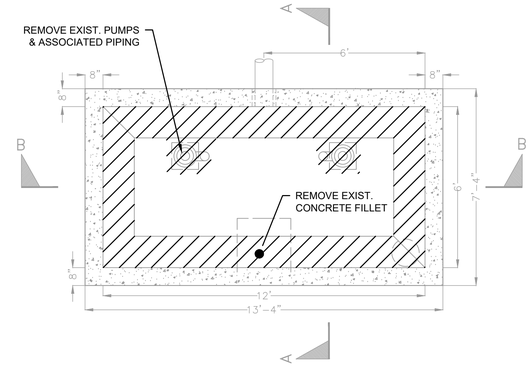
PINECREST PUMP STATION
GRADE LEVEL PLAN

SCALE: 3/8" = 1"



PINECREST PUMP STATION
MEZZANINE LEVEL PLAN

SCALE: 3/8" = 1"



PINECREST PUMP STATION
BASEMENT LEVEL PLAN

SCALE: 3/8" = 1"

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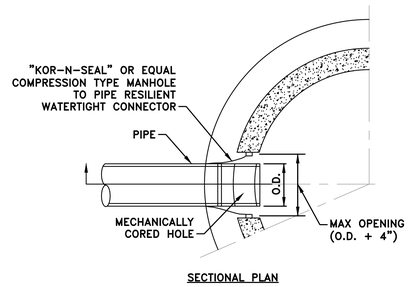
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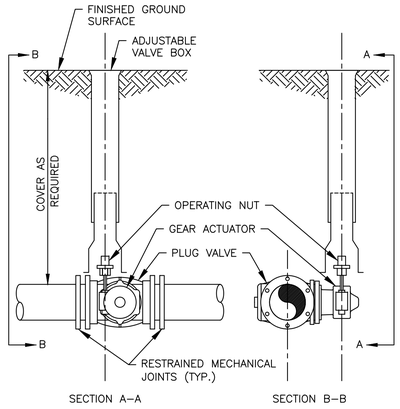
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J:\26.11909_PINECREST PUMP STATION\DRAWINGFILES\PLANSET\PINECREST PS_EXIST & PROP_MECH SHTS.DWG
8/4/2026



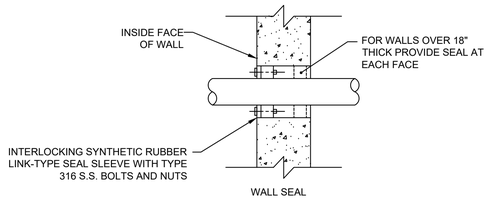
CORED HOLE AND RESILIENT SEAL FOR CONNECTING PIPES TO EXISTING MANHOLES

SCALE: NONE



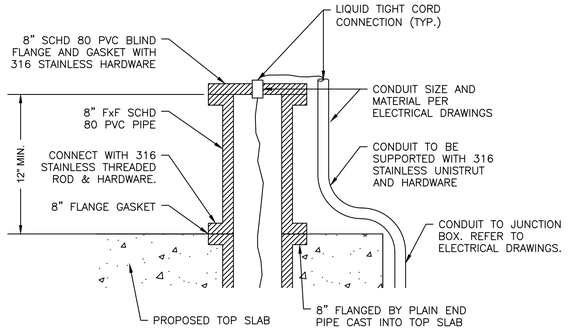
TYPICAL BURIED PLUG VALVE

SCALE: NONE



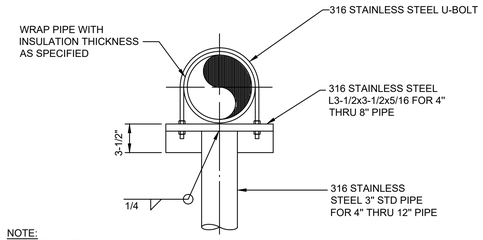
PENETRATION FOR CORED HOLES IN EXISTING WALLS OR FLOOR PENETRATIONS IN DRY AREAS

SCALE: NONE



WET WELL LEVEL TRANSDUCER CONNECTION DETAIL

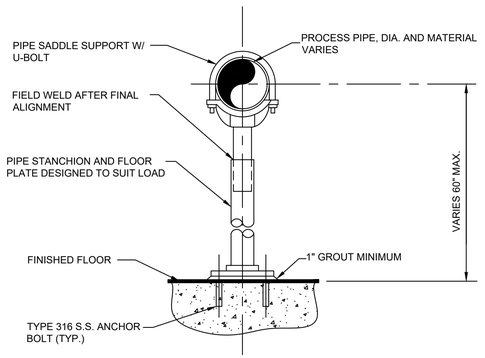
SCALE: NONE



NOTE:
USE STANDARD AWWA RING FLANGE FOR BASE.

PIPE SUPPORT

SCALE: NONE



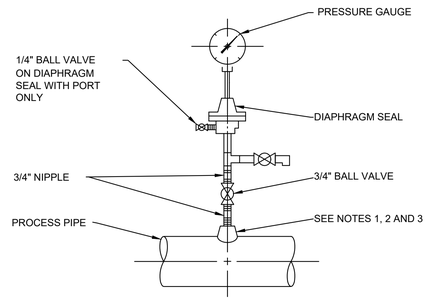
NOTES: 1. PROVIDE HALF-ROUND RIGID INSULATION WAND INSULATION SHIELD FOR INSULATED PIPING.

2. PROVIDE NEOPRENE ISOLATION PAD UNDER SUPPORT FOOT FOR ISOLATED PIPING OR WHEN SUPPORT IS ADJACENT TO MECHANICAL EQUIPMENT.

GRINNELL FIGURE 259 OR EQUAL

FLOOR PIPE SUPPORT

SCALE: NONE



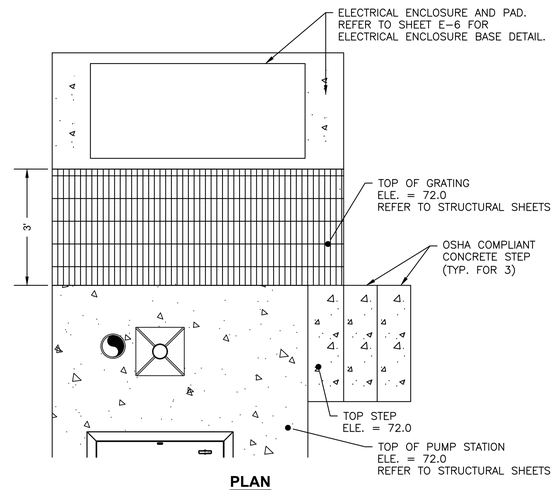
DIAPHRAGM PRESSURE GAUGE

NOTES:

1. FOR STEEL, GALVANIZED STEEL, AND PVC 2 1/2" AND SMALLER USE A BUSHING IN A TEE.
2. FOR DUCTILE IRON AND FIBERGLASS REINFORCED PLASTIC PIPE, ALL SIZES, USE PIPE SADDLE WITH BUSHING.
3. FOR STEEL AND STAINLESS STEEL PIPES 3" AND LARGER, AND PRESSURE VESSELS, USE THRED-O-LET AS SHOWN.
4. PROVIDE SNUBBER FOR POSITIVE DISPLACEMENT PUMP INSTALLATIONS.
5. FOR WASTEWATER, SLUDGE, SCUM AND GRIT PIPING UTILIZE THE DIAPHRAGM PRESSURE GAUGE.

PRESSURE GAUGE MOUNTING DETAILS

SCALE: NONE



PLAN

NOTES:

1. FOR REINFORCING REQUIREMENTS SEE STRUCTURAL SPECIFICATIONS

ELECTRICAL MAINTENANCE ACCESS DETAIL (PINECREST PS)

SCALE: NONE

PREPARED BY

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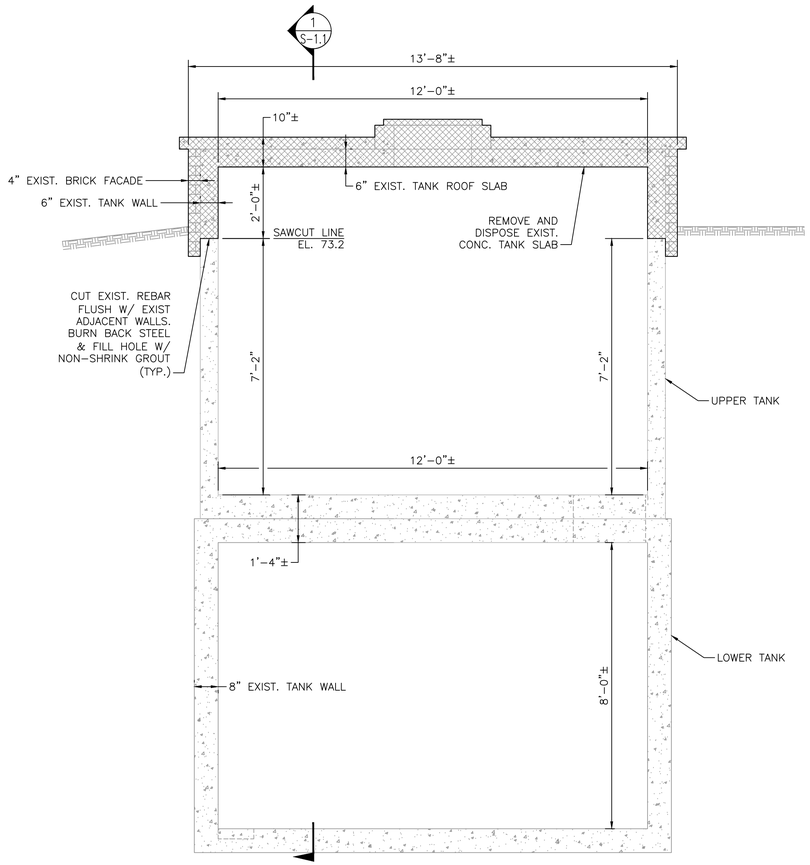
SCALE

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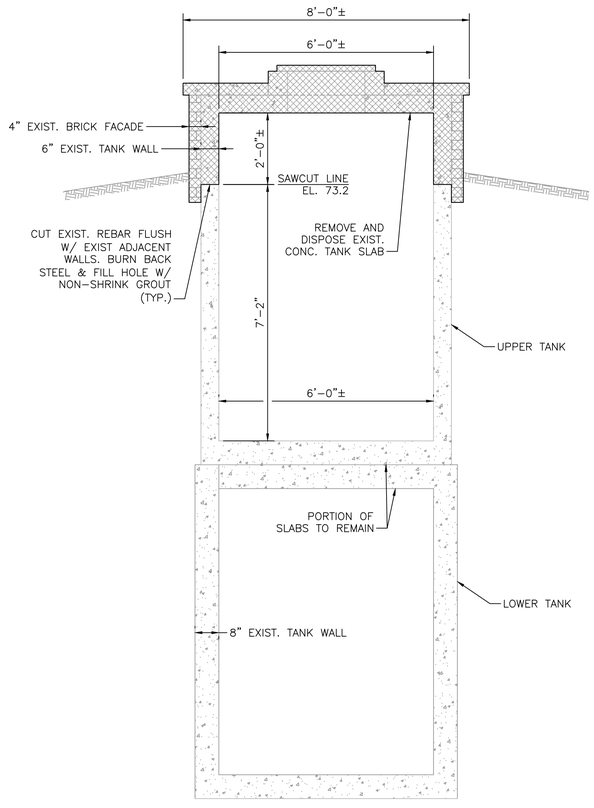
MD-1



[LOOKING EAST]

SECTION THRU EXIST. PUMP STATION

SCALE: 1/2" = 1'-0"



SECTION 1

SCALE: 1/2" = 1'-0"

SUGGESTED CONSTRUCTION SEQUENCE:

1. TANK ROOF SLAB DEMOLITION: REMOVE AND DISPOSE EXIST. BRICK FACADE & CONCRETE TANK ROOF SLAB. SAWCUT EXISTING UPPER TANK WALLS AT ELEVATION SHOWN ON PLANS.
2. LOWER TANK WALLS: CONSTRUCT NEW LOWER TANK WALLS TO LIMITS SHOWN IN PHASE 1 SECTIONS.
3. LOWER TANK CENTER WALL: CONSTRUCT NEW LOWER CENTER WALL TO LIMITS SHOWN IN PHASE 1 SECTIONS.
4. CONTROLLED LOW STRENGTH MATERIAL: AFTER LOWER CENTER WALL IS CONSTRUCTED, FILL VOID ON NORTH SIDE OF CENTER WALL WITH CONTROLLED LOW STRENGTH MATERIAL.
5. PARTIAL TANK SLAB DEMOLITION: SAWCUT AND PARTIALLY REMOVE AND DISPOSE EXISTING UPPER TANK BASE SLAB AND LOWER TANK ROOF SLAB TO THE LIMITS SHOWN IN THE PHASE 1 SECTIONS.
6. UPPER TANK SOUTH & SIDE WALLS: CONSTRUCT NEW UPPER TANK SOUTH AND SIDE WALLS TO LIMITS SHOWN IN PHASE 2 SECTIONS.
7. UPPER TANK NORTH WALL: CONSTRUCT NEW UPPER TANK NORTH WALL TO LIMITS SHOWN IN PHASE 2 SECTIONS.
8. UPPER TANK CENTER WALL: CONSTRUCT NEW UPPER TANK CENTER WALL TO LIMITS SHOWN IN PHASE 2 SECTIONS.

DEMOLITION NOTES:

9. INDICATES AREA TO BE DEMOLISHED
10. ANY DAMAGE TO EXIST. TANK WALLS OR SLABS, DESIGNATED TO REMAIN, DURING DEMOLITION SHALL BE THE CONTRACTORS RESPONSIBILITY AND REPAIRED AT NO ADDITIONAL COST TO THE CONTRACT.
11. CONTRACTOR SHALL CONFIRM SIZES OF EXISTING TANK WALLS AND SLABS PRIOR TO DEMOLITION.
12. MECHANICAL EQUIPMENT AND PIPE PENETRATIONS NOT SHOWN FOR CLARITY. SEE MECHANICAL DRAWINGS.

GENERAL NOTES:

13. THE SURFACE OF THE EXIST. CONCRETE WALL/SLAB IN WHICH NEW CONCRETE WILL BE CAST AGAINST SHALL BE BLAST CLEANED AND ROUGHENED TO $\frac{1}{4}$" AMPLITUDE. AFTER PLACING REBAR AND FORMS, BUT BEFORE NEW CONCRETE IS PLACED, PRODUCE SATURATED SURFACE DRY CONDITION TO EXISTING CONCRETE PRIOR TO POURING NEW CONCRETE. NEW CONCRETE SHALL NOT BE POURED AGAINST DRY CONCRETE, OR IF PUDDLING IS EVIDENT.
14. EMBEDMENT DEPTH INTO EXIST. CONC. SHALL NOT EXCEED ONE-HALF OF EXIST. WALL THICKNESS. CONTRACTOR SHALL CONFIRM THICKNESS OF EXIST. WALLS PRIOR TO DRILLING & GROUTING BENT BARS.
15. CONCRETE WORK SHALL CONFORM TO BUILDING CODE REQUIREMENTS FOR STRUTURAL CONCRETE (ACI 350) AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).
16. UNLESS NOTED OTHERWISE, CONCRETE SHALL BE 5000 P.S.I. (NORMAL WEIGHT), WITH A MAXIMUM WATER/CEMENT RATIO OF 0.40.
17. CONSTRUCTION JOINTS SHOWN ON THE DRAWINGS ARE MANDATORY.
18. SIZE OF CONCRETE PLACEMENTS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO ACI GUIDELINES AND RECOMMENDATIONS.
19. REINFORCEMENT SHALL CONFORM TO BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 350), ACI DETAILING MANUAL (SP-66), CRSI MANUAL OF STANDARD PRACTICE (MSP), AND THE STRUCTURAL WELDING CODE-REINFORCING STEEL (AWS D1).
20. STEEL REINFORCEMENT SHALL CONFORM TO ASTM A615 GRADE 60.
21. PROVIDE SUPPLEMENTAL BARS AND ACCESSORIES AS REQUIRED TO HOLD REINFORCEMENT SECURELY IN POSITION.
22. MINIMUM CONCRETE PROTECTIVE COVER, UNLESS NOTED OTHERWISE, SHALL BE 2 INCHES.
23. ALL CONTINUOUS REINFORCEMENT SHALL BE EXTENDED AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS.
24. LAPS SHALL BE CLASS B TENSION LAP SPLICES, UNLESS NOTED OTHERWISE.
25. REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.
26. CONTRACTOR SHALL TAKE CARE TO AVOID EXISTING WALL AND SLAB REINFORCEMENT WHEN DRILLING AND GROUTING DOWELS.
27. PIPE PENETRATIONS LOCATION AND ELEVATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY INVERT IN FIELD TO MATCH EXISTING PIPE PENETRATIONS.
28. CONTROL DENSITY FILL SHALL BE PLACED IN LAYERS OF 3 FEET MAXIMUM. SUBSEQUENT LAYERS SHOULD NOT BE PLACED UNTIL THE PREVIOUS LAYER HAS SET, ALLOWING AT LEAST 2 HOURS BETWEEN LAYERS.
29. CONTRACTOR TO COORDINATE SIZE AND DESIGN OF PRECAST CONCRETE TANK COVER WITH PRECAST MANUFACTURER. PRECAST COVER SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

PREPARED BY

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REGISTERED PROFESSIONAL

TODD M. WARZECKI
8/31/26
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CIVIL

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PARKSIDE PS - EXISTING STRUCTURAL PLANS & SECTIONS

NO.	REVISIONS	DATE

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CHECKED BY:	TMW
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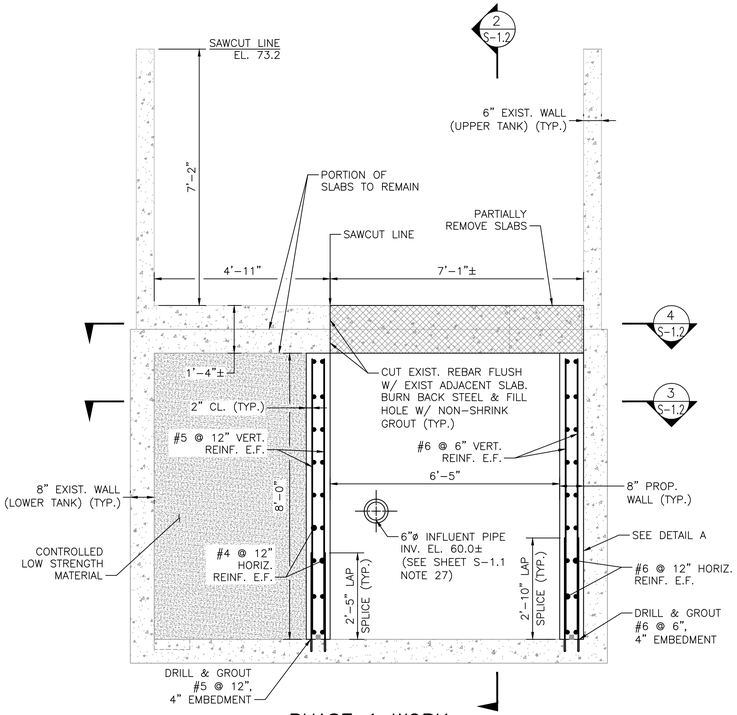
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SHEET NO.

S-1.1

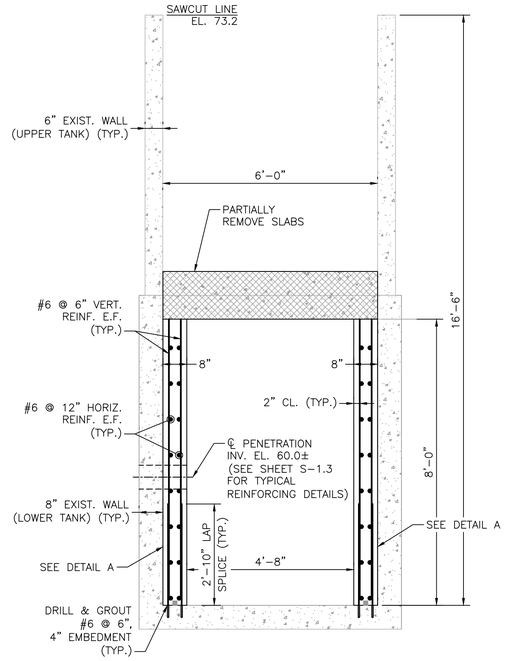
NOTES:

1. SEE SUGGESTED CONSTRUCTION SEQUENCE, DEMOLITION NOTES & GENERAL NOTES ON SHEET S-1.1



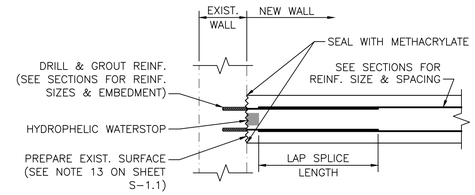
PHASE 1 WORK

SCALE: 1/2" = 1'-0"



SECTION 2

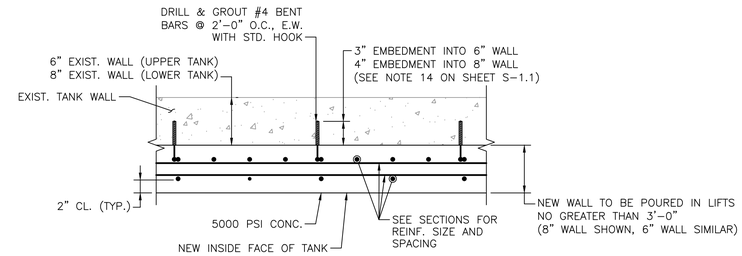
SCALE: 1/2" = 1'-0"



[FOR EXIST/NEW CONCRETE INTERFACE]

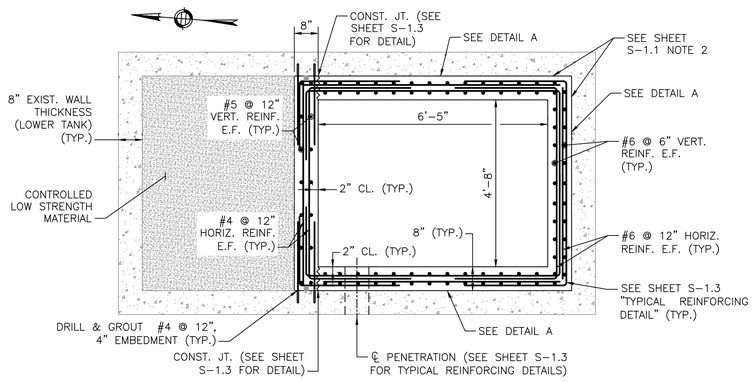
TYPICAL CONST. JOINT/ HYDROPHELIC WATERSTOP DETAIL

NOT TO SCALE



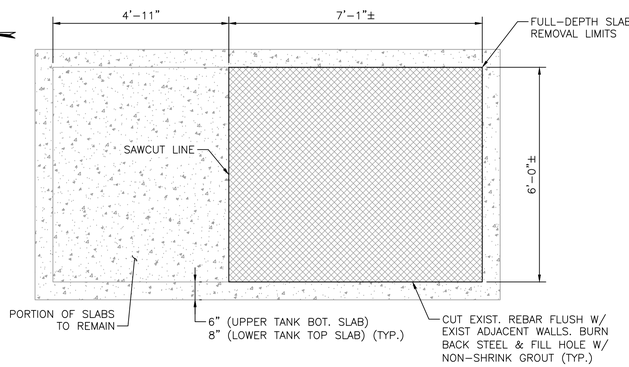
DETAIL A

SCALE: 1" = 1'-0"



SECTION 3

SCALE: 1/2" = 1'-0"



SECTION 4

SCALE: 1/2" = 1'-0"

PREPARED BY

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SUBCONSULTANT

PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PARKSIDE PS - PROPOSED STRUCTURAL PHASE 1 PLANS & SECTIONS

NO.	REVISIONS	DATE

DRAWN BY:	JMR
DESIGNED BY:	JMR
CHECKED BY:	TMW
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

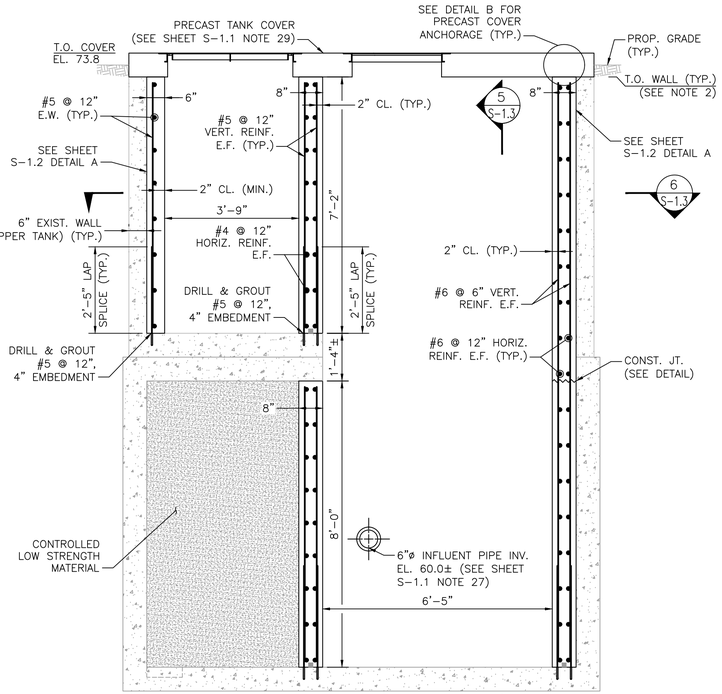
SCALE

AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

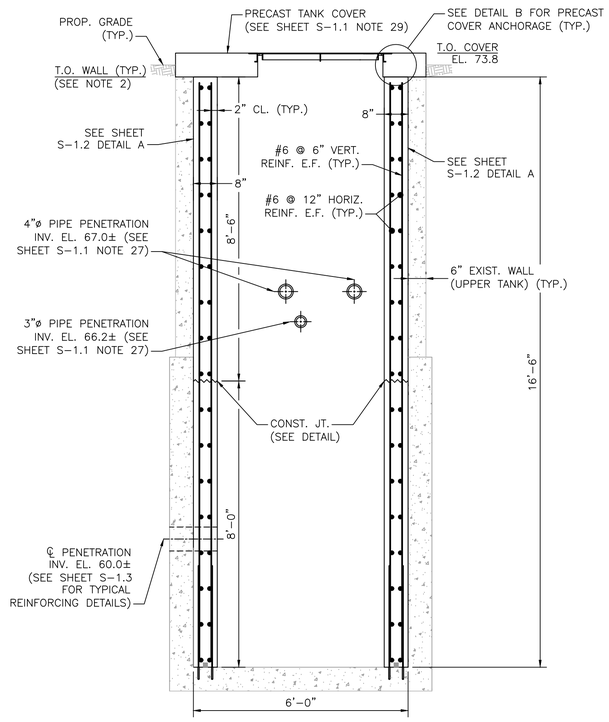
SHEET NO.

S-1.2



PHASE 2 WORK

SCALE: 1/2" = 1'-0"

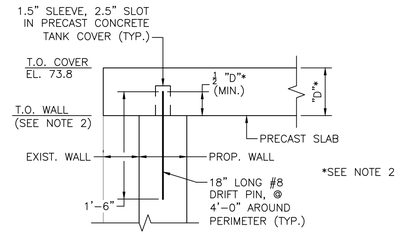


SECTION 5

SCALE: 1/2" = 1'-0"

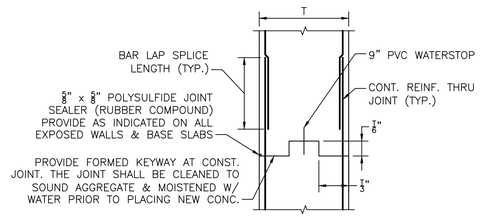
NOTES:

1. SEE SUGGESTED CONSTRUCTION SEQUENCE & GENERAL NOTES ON SHEET S-1.1
2. CONTRACTOR TO COORDINATE DEPTH OF PRECAST CONCRETE TANK COVER WITH PRECAST MANUFACTURER PRIOR TO CONSTRUCTING CONCRETE TANK WALLS. CONTRACTOR TO DETERMINE T.O. WALL ELEVATION IN ORDER TO MAINTAIN THE T.O. PRECAST COVER ELEVATIONS LISTED ON THE PLANS.



DETAIL B

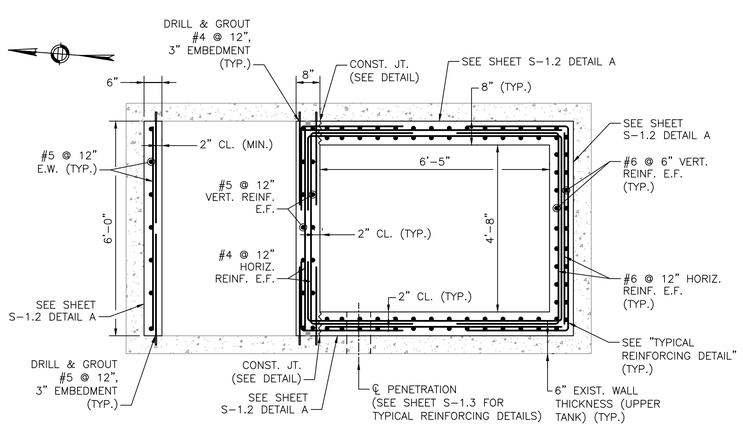
SCALE: 1" = 1'-0"



[FOR NEW/NEW CONCRETE INTERFACE]

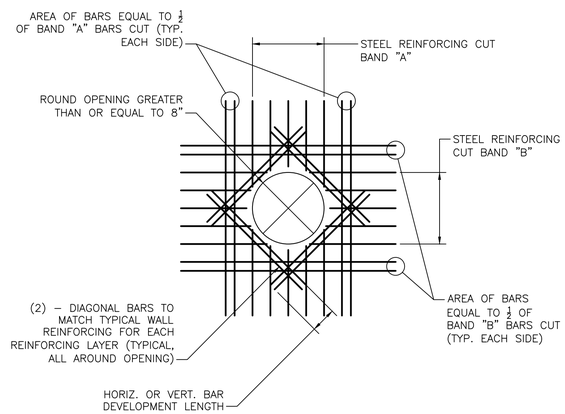
TYPICAL CONST. JOINT / PVC WATERSTOP DETAIL

NOT TO SCALE

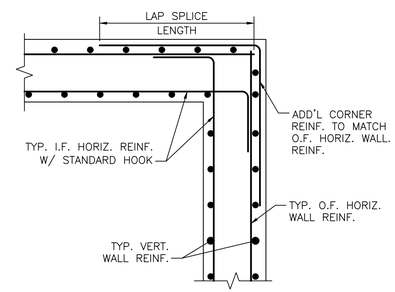


SECTION 6

SCALE: 1/2" = 1'-0"



[TYP. ROUND PENETRATION]



[TYP. "L" INTERSECTION]

TYPICAL REINFORCING DETAILS

NOT TO SCALE

PREPARED BY

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PARKSIDE PS - PROPOSED STRUCTURAL PHASE 2 PLANS & SECTIONS

NO.	REVISIONS	DATE

DRAWN BY:	JMR
DESIGNED BY:	JMR
CHECKED BY:	TMW
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

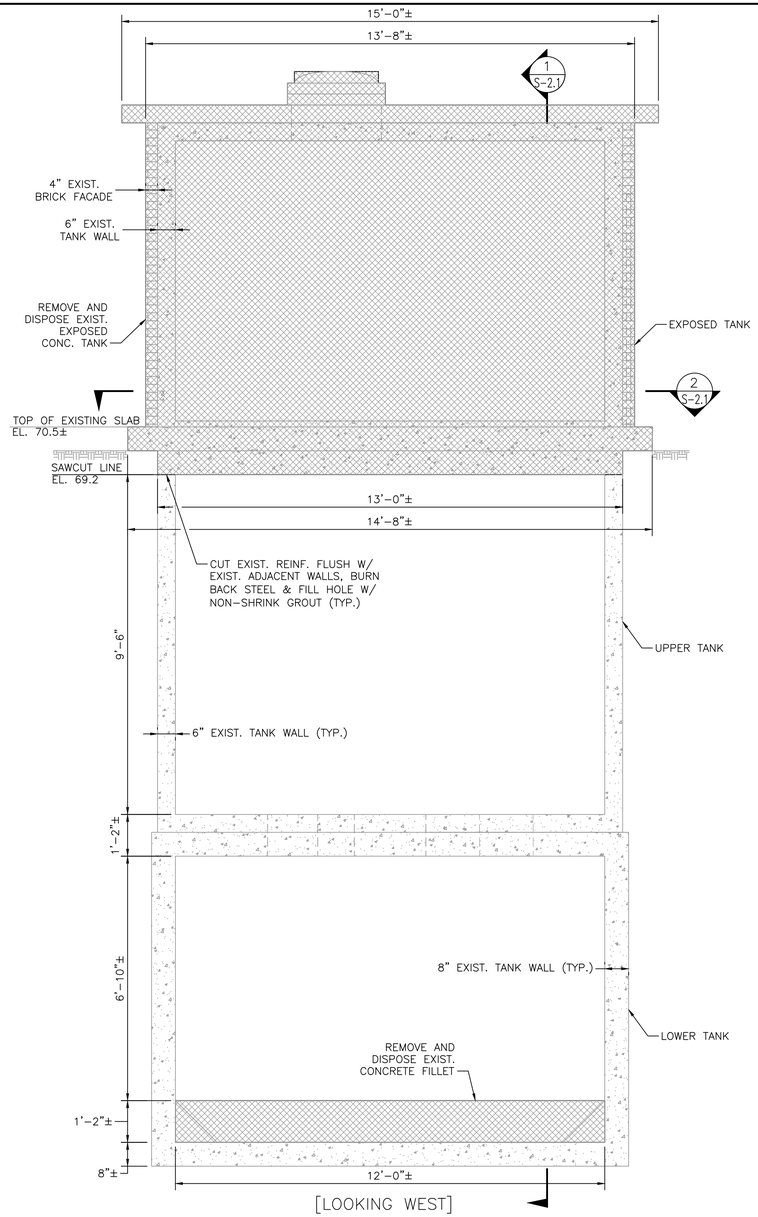
SCALE

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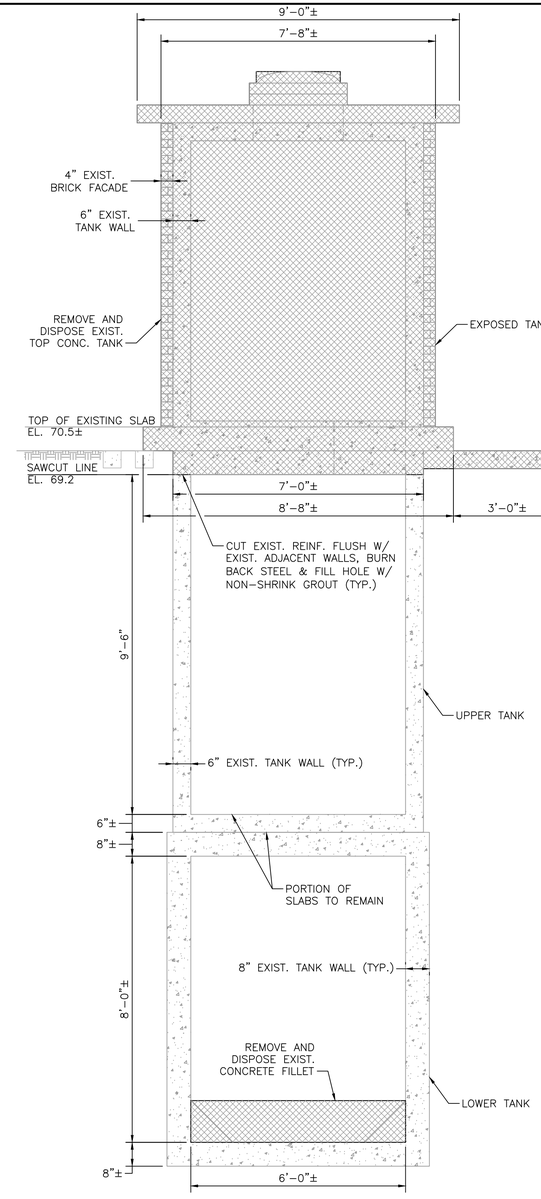
SHEET NO.

S-1.3



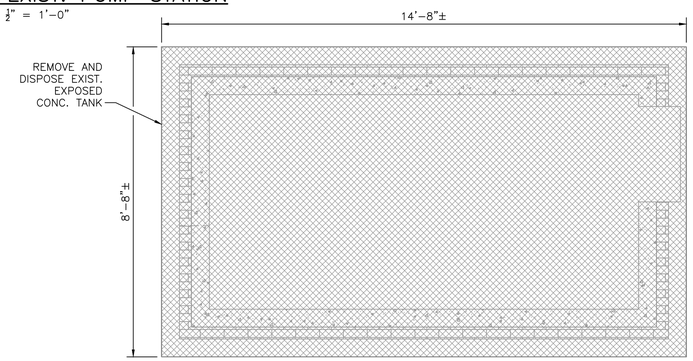
SECTION THROUGH EXIST. PUMP STATION

SCALE: ½" = 1'-0"



SECTION 1

SCALE: ½" = 1'-0"



SECTION 2

SCALE: ½" = 1'-0"

SUGGESTED CONSTRUCTION SEQUENCE:

1. EXPOSED TANK DEMOLITION: REMOVE AND DISPOSE EXPOSED CONCRETE TANK IN ITS ENTIRETY. SAWCUT EXISTING UPPER TANK TO ELEVATION SHOWN ON THIS SHEET AND REMOVE TOP SLAB.
2. LOWER TANK CONCRETE FILLET DEMOLITION: REMOVE AND DISPOSE CONCRETE FILLET.
3. LOWER TANK WALLS: CONSTRUCT NEW LOWER TANK WALLS TO LIMITS SHOWN IN PHASE 1 SECTIONS.
4. LOWER TANK CENTER WALL: CONSTRUCT NEW LOWER CENTER WALL TO LIMITS SHOWN IN PHASE 1 SECTIONS.
5. PARTIAL TANK SLAB DEMOLITION: SAWCUT AND PARTIALLY REMOVE AND DISPOSE EXISTING UPPER TANK BASE SLAB AND LOWER TANK ROOF SLAB TO THE LIMITS SHOWN IN PHASE 1 SECTIONS.
6. LOWER TANK CONTROLLED LOW STRENGTH MATERIAL: AFTER LOWER CENTER WALL IS CONSTRUCTED, FILL VOID ON NORTH SIDE OF WALL WITH CONTROLLED LOW STRENGTH MATERIAL.
7. UPPER TANK SOUTH & SIDE WALLS: CONSTRUCT NEW UPPER TANK SOUTH AND SIDE WALLS TO LIMITS SHOWN IN PHASE 2 SECTIONS.
8. UPPER TANK NORTH WALL: CONSTRUCT NEW UPPER TANK NORTH WALL TO LIMITS SHOWN IN PHASE 2 SECTIONS.
9. UPPER TANK CENTER WALL: CONSTRUCT NEW UPPER TANK CENTER WALL TO LIMITS SHOWN IN PHASE 2 SECTIONS.
10. UPPER TANK SLAB: CONSTRUCT NEW UPPER TANK SLAB AS SHOWN IN SECTION 7 OF SHEET S-2.3.
11. UPPER CONTROLLED LOW STRENGTH MATERIAL: AFTER UPPER TANK SLAB IS CONSTRUCTED, DRILL PORT HOLE THROUGH SLAB AND FILL VOID UNDERNEATH WITH CONTROLLED LOW STRENGTH MATERIAL. FILL PORT HOLE.

DEMOLITION NOTES:

12. INDICATES AREA TO BE DEMOLISHED
13. ANY DAMAGE TO EXIST. TANK WALLS OR SLABS, DESIGNATED TO REMAIN, DURING DEMOLITION SHALL BE THE CONTRACTORS RESPONSIBILITY AND REPAIRED AT NO ADDITIONAL COST TO THE CONTRACT.
14. CONTRACTOR SHALL CONFIRM SIZES OF EXISTING TANK WALLS AND SLABS PRIOR TO DEMOLITION.
15. MECHANICAL EQUIPMENT AND PIPE PENETRATIONS NOT SHOWN FOR CLARITY. SEE MECHANICAL DRAWINGS.

GENERAL NOTES:

16. THE SURFACE OF THE EXIST. CONCRETE WALL/SLAB IN WHICH NEW CONCRETE WILL BE CAST AGAINST SHALL BE BLAST CLEANED AND ROUGHENED TO ¼" AMPLITUDE. AFTER PLACING REBAR AND FORMS, BUT BEFORE NEW CONCRETE IS PLACED, PRODUCE SATURATED SURFACE DRY CONDITION TO EXISTING CONCRETE PRIOR TO POURING NEW CONCRETE. NEW CONCRETE SHALL NOT BE POURED AGAINST DRY CONCRETE, OR IF PUDDLING IS EVIDENT.
17. EMBEDMENT DEPTH INTO EXIST. CONC. SHALL NOT EXCEED ONE-HALF OF EXIST. WALL THICKNESS. CONTRACTOR SHALL CONFIRM THICKNESS OF EXIST. WALLS PRIOR TO DRILLING & GROUTING BENT BARS.
18. CONCRETE WORK SHALL CONFORM TO BUILDING CODE REQUIREMENTS FOR STRUTURAL CONCRETE (ACI 350) AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).
19. UNLESS NOTED OTHERWISE, CONCRETE SHALL BE 5000 P.S.I. (NORMAL WEIGHT), WITH A MAXIMUM WATER/CEMENT RATIO OF 0.40.
20. CONSTRUCTION JOINTS SHOWN ON THE DRAWINGS ARE MANDATORY.
21. SIZE OF CONCRETE PLACEMENTS, UNLESS NOTED OTHERWISE, SHALL CONFORM TO ACI GUIDELINES AND RECOMMENDATIONS.
22. REINFORCEMENT SHALL CONFORM TO BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 350), ACI DETAILING MANUAL (SP-66), CRSI MANUAL OF STANDARD PRACTICE (MSP), AND THE STRUCTURAL WELDING CODE-REINFORCING STEEL (AWS D1).
23. STEEL REINFORCEMENT SHALL CONFORM TO ASTM A615 GRADE 60.
24. PROVIDE SUPPLEMENTAL BARS AND ACCESSORIES AS REQUIRED TO HOLD REINFORCEMENT SECURELY IN POSITION.
25. MINIMUM CONCRETE PROTECTIVE COVER, UNLESS NOTED OTHERWISE, SHALL BE 2 INCHES.
26. ALL CONTINUOUS REINFORCEMENT SHALL BE EXTENDED AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS.
27. LAPS SHALL BE CLASS B TENSION LAP SPLICES, UNLESS NOTED OTHERWISE.
28. REINFORCEMENT SHALL BE CONTINUOUS THROUGH CONSTRUCTION JOINTS.
29. CONTRACTOR SHALL TAKE CARE TO AVOID EXISTING WALL AND SLAB REINFORCEMENT WHEN DRILLING AND GROUTING DOWELS.
30. PIPE PENETRATIONS LOCATION AND ELEVATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY INVERT IN FIELD TO MATCH EXISTING PIPE PENETRATIONS.
31. CONTROL DENSITY FILL SHALL BE PLACED IN LAYERS OF 3 FEET MAXIMUM. SUBSEQUENT LAYERS SHOULD NOT BE PLACED UNTIL THE PREVIOUS LAYER HAS SET, ALLOWING AT LEAST 2 HOURS BETWEEN LAYERS.
32. CONTRACTOR TO COORDINATE SIZE AND DESIGN OF PRECAST CONCRETE TANK COVER WITH PRECAST MANUFACTURER. PRECAST COVER SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.

PREPARED BY

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS - EXISTING STRUCTURAL PLANS & SECTIONS

NO.	REVISIONS	DATE

DRAWN BY:	SMN
DESIGNED BY:	GKT
CHECKED BY:	TMW
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

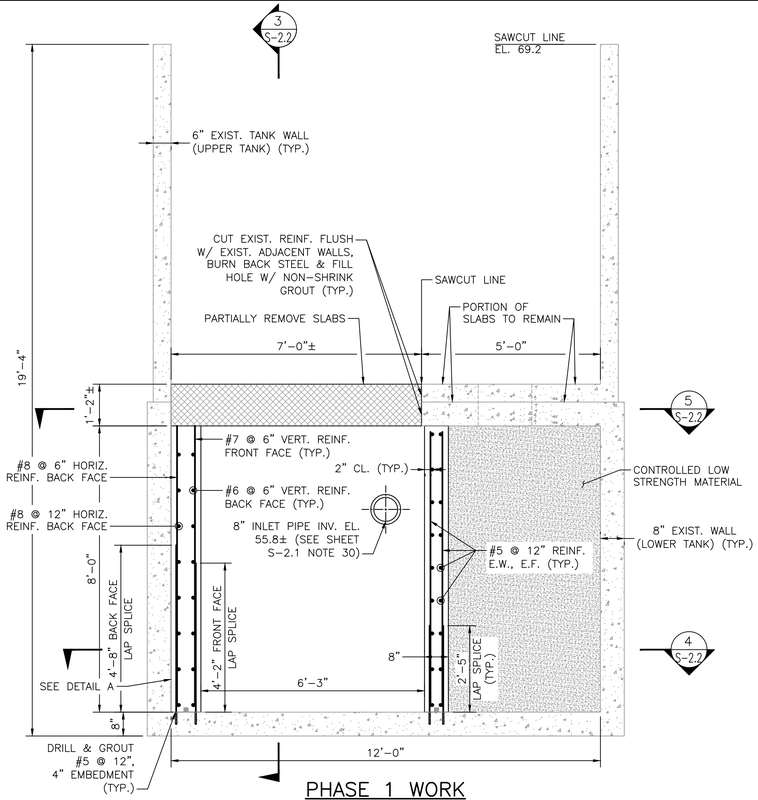
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AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

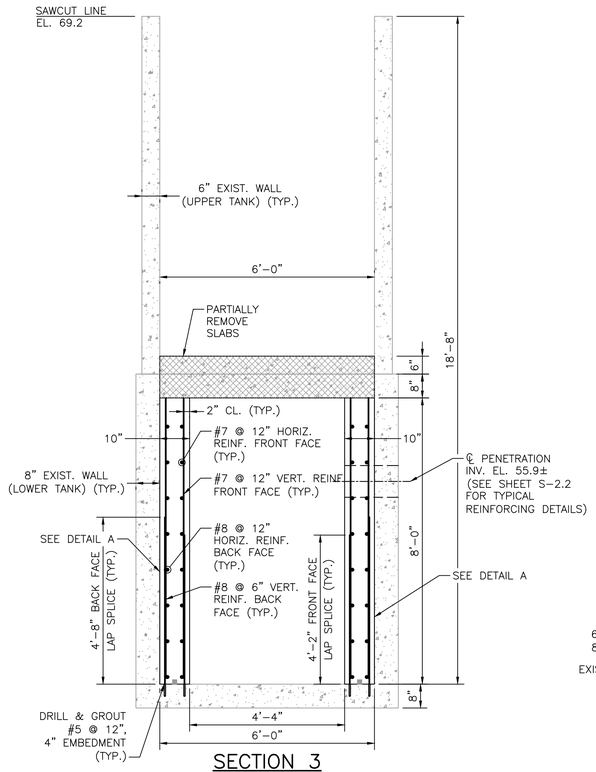
SHEET NO.

S-2.1



PHASE 1 WORK

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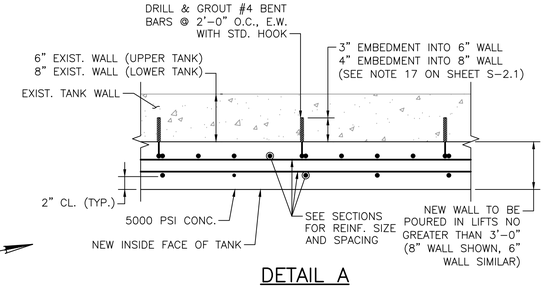


SECTION 3

SCALE: $\frac{1}{2}$" = 1'-0"

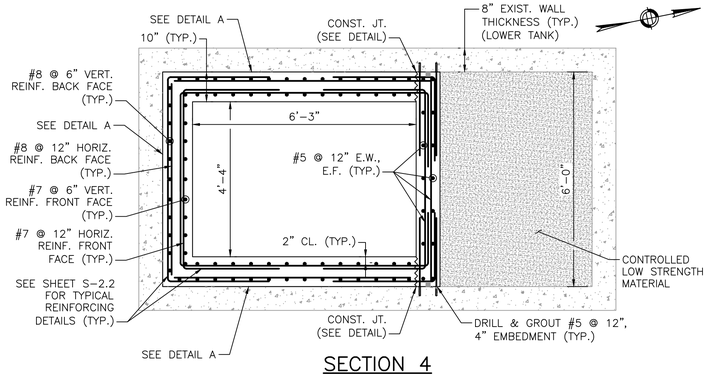
NOTES:

1. SEE SUGGESTED CONSTRUCTION SEQUENCE, DEMOLITION NOTES & GENERAL NOTES ON SHEET S-2.1
2. EXISTING PENETRATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL CONFIRM SIZE AND LOCATION PRIOR TO DEMOLITION.



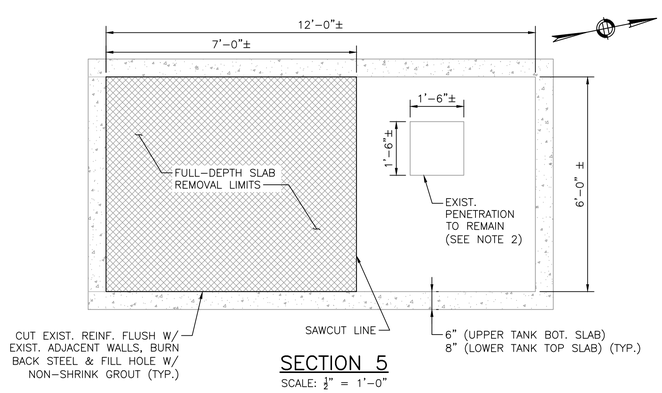
DETAIL A

SCALE: 1" = 1'-0"



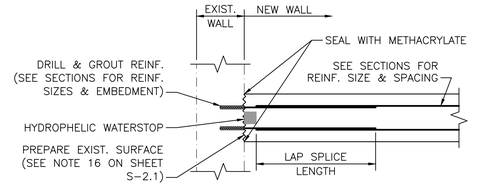
SECTION 4

SCALE: $\frac{1}{2}$" = 1'-0"



SECTION 5

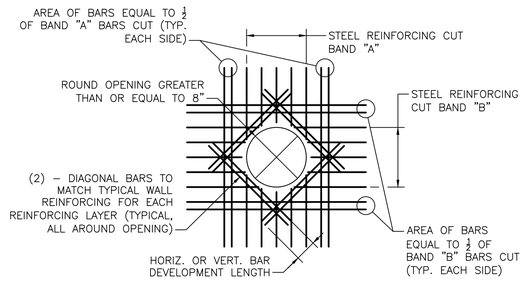
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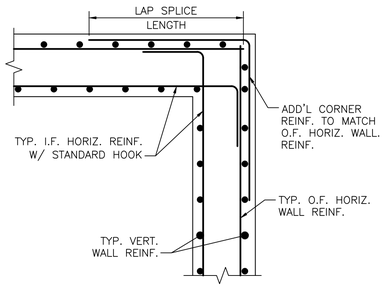
[FOR EXIST/NEW CONCRETE INTERFACE]

TYPICAL CONST. JOINT/ HYDROPHELIC WATERSTOP DETAIL

NOT TO SCALE



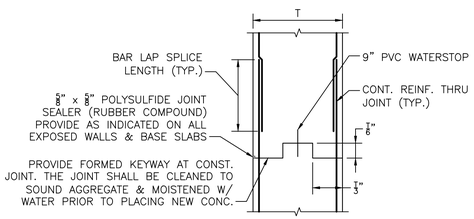
[TYP. ROUND PENETRATION]



[TYP. "L" INTERSECTION]

TYPICAL REINFORCING DETAILS

NOT TO SCALE



[FOR NEW/NEW CONCRETE INTERFACE]

TYPICAL CONST. JOINT / PVC WATERSTOP DETAIL

NOT TO SCALE

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS - PROPOSED STRUCTURAL PHASE 1 PLANS & SECTIONS

NO.	REVISIONS	DATE

DRAWN BY:	SMN
DESIGNED BY:	GKT
CHECKED BY:	TMW
ISSUE DATE:	SEPTEMBER 2026
BETA JOB NO.:	25.11884 / 26.11909

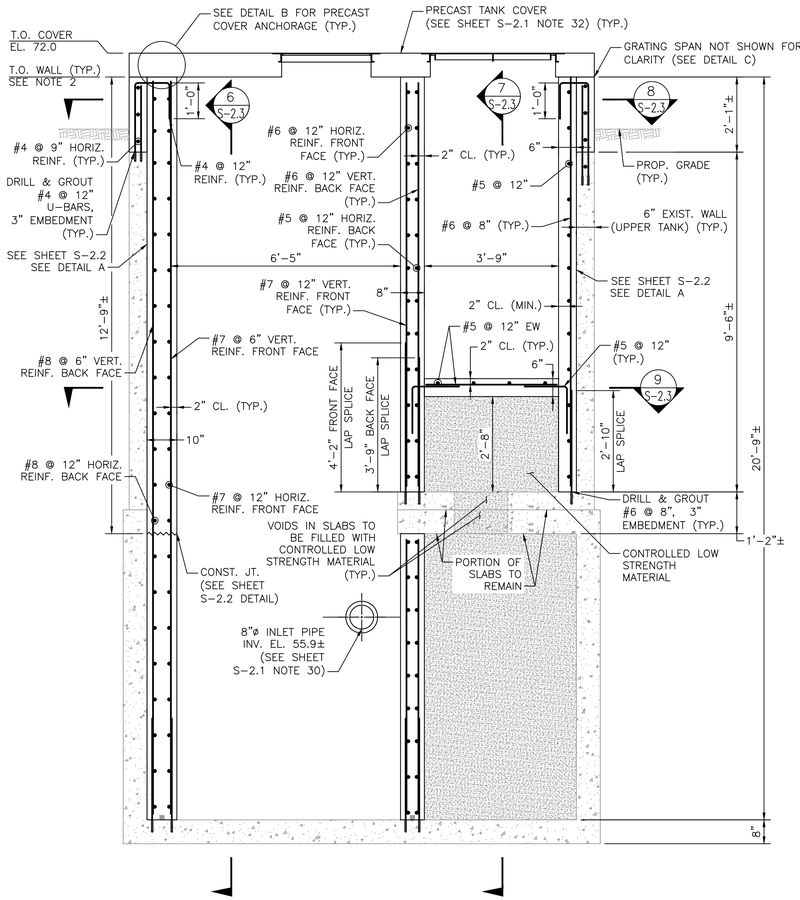
SCALE

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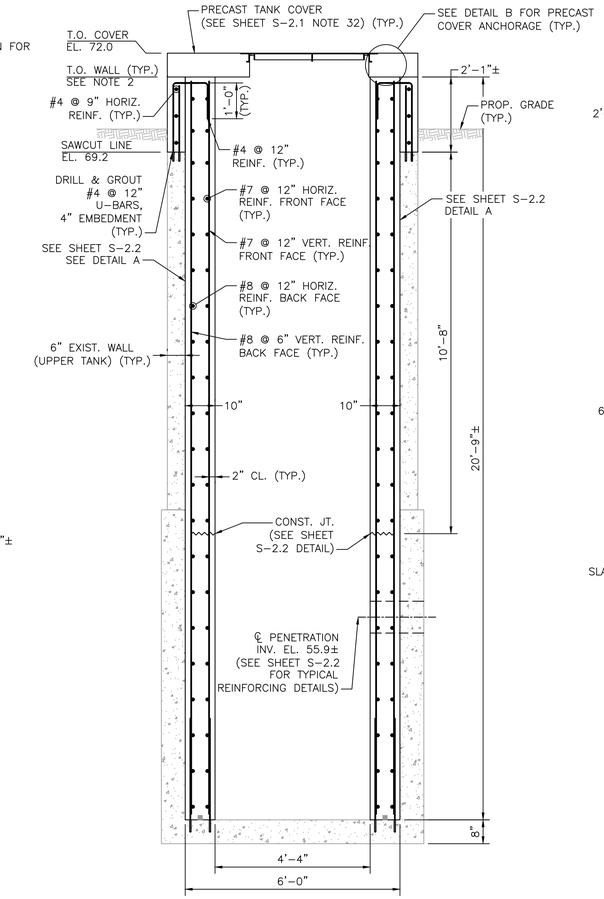
SHEET NO.

S-2.2



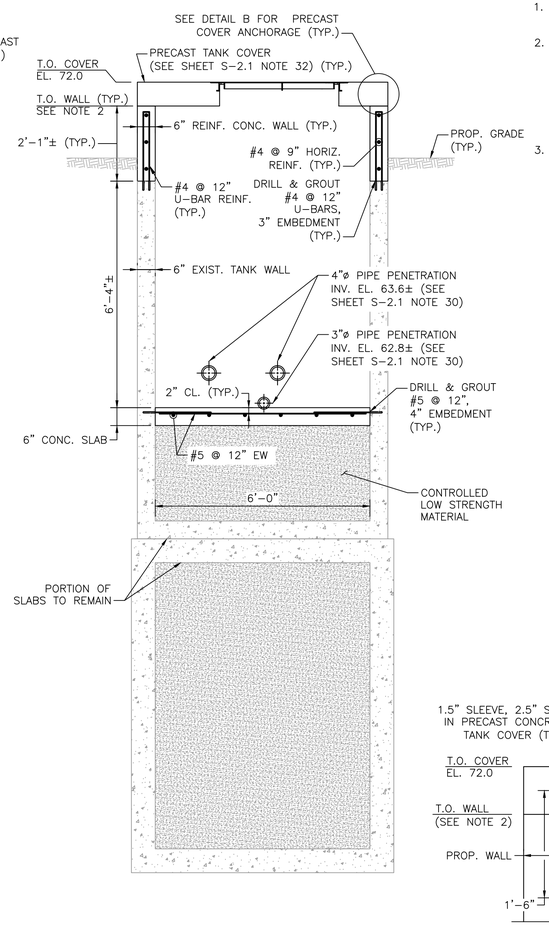
PHASE 2 WORK

SCALE: 1/2" = 1'-0"



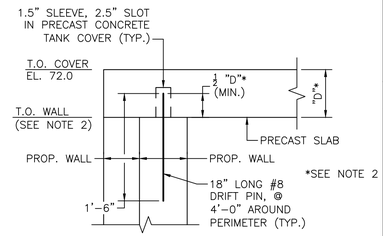
SECTION 6

SCALE: 1/2" = 1'-0"



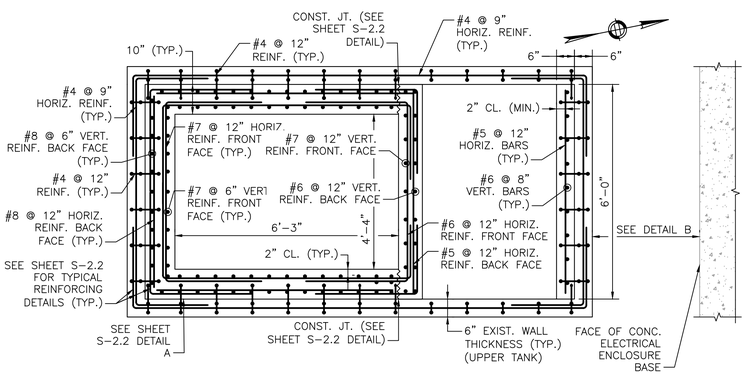
SECTION 7

SCALE: 1/2" = 1'-0"



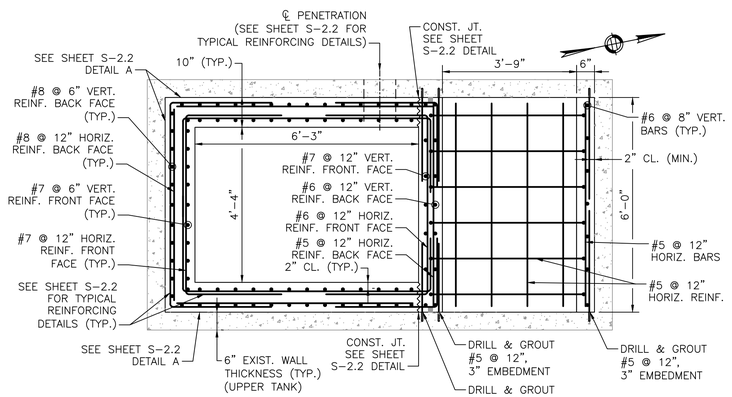
DETAIL B

SCALE: 1" = 1'-0"



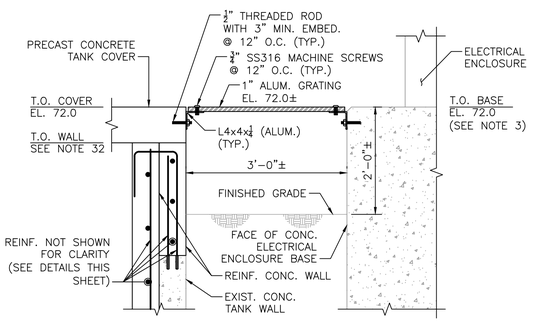
SECTION 8

SCALE: 1/2" = 1'-0"



SECTION 9

SCALE: 1/2" = 1'-0"



DETAIL C

SCALE: 3/4" = 1'-0"

NOTES:

1. SEE SUGGESTED CONSTRUCTION SEQUENCE & GENERAL NOTES ON SHEET S-2.1.
2. CONTRACTOR TO COORDINATE DEPTH OF PRECAST CONCRETE TANK COVER WITH PRECAST MANUFACTURER PRIOR TO CONSTRUCTING CONCRETE TANK WALLS. CONTRACTOR TO DETERMINE T.O. WALL ELEVATION IN ORDER TO MAINTAIN THE T.O. PRECAST COVER ELEVATIONS LISTED ON THE PLANS.
3. CONTRACTOR TO SET T.O. ELECTRICAL ENCLOSURE PAD ELEVATION TO MATCH T.O. PRECAST CONCRETE TANK COVER ELEVATION.

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ISSUE DATE:	SEPTEMBER 2026
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SCALE

AS SHOWN

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SHEET NO.

S-2.3

ELECTRICAL SYMBOLS

F1 / 1 a	LINEAR LIGHTING FIXTURES "F1" INDICATES FIXTURE TYPE – TYPICAL FOR ALL FIXTURES "1" INDICATES CIRCUIT NUMBER – TYPICAL FOR ALL FIXTURE "a" INDICATES THE SWITCH CONTROL – TYPICAL FOR ALL FIXTURES
	WALL MOUNTED LIGHTING FIXTURE.
	SURFACE OR PENDANT MOUNTED FIXTURE.
	EMERGENCY EXIT SIGN
	EMERGENCY LIGHTING BATTERY UNIT WITH TWO LIGHT HEADS
	REMOTE EMERGENCY LIGHTING UNIT WITH TWO LIGHTING HEADS PROVIDE 3/4", 2#10, 1#10GND TO NEAREST THE EMEGENCY LIGHTING BATTERY UNIT
S_a	SINGLE POLE SWITCH 120V, 20A "a" INDICATES THE SWITCH CONTROL
S_2	2–POLE SWITCH 120V, 20A 1 POLE FOR ROOM LIGHT FIXTURES, 1–POLE FOR EXHAUST FAN CONTROL
S_{3a}	3–WAY SWITCH 120V, 20A "a" INDICATES THE SWITCH CONTROL
S_{4a}	4–WAY SWITCH 120V, 20A "a" INDICATES THE SWITCH CONTROL
TC	ASTRONOMICAL TIME CLOCK SWITCH
TM	MECHANICAL TIMER SWITCH
OC	WALL MOUNTED DUAL TECHNOLOGY OCCUPANCY SENSOR/SWITCH
S	LOW VOLTAGE SWITCH
OC	CEILING MOUNTED DUAL TECHNOLOGY OCCUPANCY SENSOR
Φ_1	DUPLEX RECEPTACLE, WEATHER–RESISTANT 120V, 20A WITH WEATHERPROOF COVER "1" INDICATES CIRCUIT NUMBER – TYPICAL FOR ALL RECEPTACLES
	DUPLEX RECEPTACLE 120V, 20A
WP	(2) DUPLEX (QUAD) RECEPTACLES, 120V, 20A "WP" INDICATES WITH WEATHERPROOF COVER
WP	SIMPLEX RECEPTACLE, WP INDICATES WEATHER RESISTANT 120V, 20A "WP" INDICATES WITH WEATHERPROOF COVER
H 30	UNFUSED DISCONNECT SWITCH, "30" INDICATES 30 AMP RATING, PROVIDE 3–POLE UNLESS OTHERWISE INDICATED.
F 20	FUSED DISCONNECT SWITCH, "20" INDICATES 20 AMP FUSE RATING, PROVIDE 3–POLE UNLESS OTHERWISE INDICATED.
	GENERATOR INLET PLUG
MCP FVNR	WALL MOUNTED COMBINATION MOTOR STARTER WITH MOTOR CIRCUIT PROTECTOR, "FVNR" INDICATES TYPE OF MOTOR STARTER
RVSS	ENCLOSED REDUCED VOLTAGE SOLID STATE MOTOR STARTER
Sm	MANUAL MOTOR STARTER 120V, 20A
J	JUNCTION BOX
HH	HAND HOLE
AR1	ALARM RELAY, "AR1" REFERS TO RELAY NAME DESIGNATION
CR1	CONTROL RELAY, "CR1" REFERS TO RELAY NAME DESIGNATION
M	MOTOR START RELAY
TR1	TIMING RELAY, "TR1" REFERS TO RELAY NAME DESIGNATION
	NORMALY OPEN RELAY CONTACT
	NORMALLY CLOSED RELAY CONTACT
	OPERATOR PUSH BUTTON NORMALLY OPEN CONTACT
	OPERATOR PUSH BUTTON NORMALLY CLOSED CONTACT
	PRESSURE SWITCH – CLOSES ON HIGH PRESSURE
	PRESSURE SWITCH – CLOSES ON LOW PRESSURE

ELECTRICAL SYMBOLS

	UNDERGROUND CONDUIT DUCT BANK
PP1(1)	HOMERUN DESIGNATION TO PANEL PP1 CIRCUIT #1, WITH THE FOLOWING CONDUIT/WIRES UNLESS OTHERWISE NOTED: • 3/4"C WITH 2#12, 1#12GND FOR 20AMP SINGLE PHASE CIRCUITS. • 3/4"C WITH 3#12, 1#12GND FOR 20AMP THREE PHASE CIRCUITS. • 3/4"C WITH 2#10, 1#10GND FOR 30AMP SINGLE PHASE CIRCUITS. • 3/4"C WITH 3#10, 1#10GND FOR 30AMP THREE PHASE CIRCUITS. • 3/4"C WITH 2#8, 1#10GND FOR 40AMP & 50AMP SINGLE PHASE CIRCUITS. • 3/4"C WITH 3#8, 1#10GND FOR 40AMP & 50AMP THREE PHASE CIRCUITS.
	EYS TYPE CONDUIT SEAL, "EX" REPRESENTS PROVIDING UL LISTED EXPLOSION PROOF SEALANT IN CONDUIT SEAL, "NEX" REPRENTS PROVIDE ELECTRICAL SEALANT PUTTY IN CONDUIT SEAL.
SPD	SURGE PROTECTION DEVICE
	UTILITY POLE
20 / 100 GFCI	MOLDED CASE CIRCUIT BREAKER, 2–POLE UNLESS OTHERWISE INDICATED, "20" INDICATES TRIP AMPERE RATING, "100" INDCATES FRAME SIZE, "GFCI" INDICATES CIRCUIT BREAKER TO HAVE GROUND FAULT CIRCUIT INTERRUPT
	DRY TYPE TRANSFORMER
EH	ELECTRIC HAND HOLE (REFER TO SITE DETAILS)
	3/4"ø X 10'–0" COPPER CLAD GROUND ROD
	ELECTRICAL ENCLOSURE/MAIN SERVICE GROUNDING SYSTEM OR GROUND ROD
10	MOTOR, "10" INDICATES HORSEPOWER RATING
XX	CABLE/CONDUIT DESIGNATION, "XX" REFERS CABLE CONDUIT REFERENCE, REFER TO CABLE/CONDUIT AND DUCT/CABLE SCHEDULES.
OS–XXXX / YYY	OPERATOR STATION (SUPPLIED BY OTHER DIV. 16), "XXXX" REFERS TO TAGNAME ID, HOA REFERS TO THE "YYY" REFERS TO THE TYPE OF OPERATOR STATION
XX–XXXX	UNLESS OTHERWISE NOTED INSTRUMENATION OR PROCESS EQUIPMENT (SUPPLIED BY OTHER DIVISIONS) "XX–XXXX" REFERS TO TAGNAME ID
E	GENERATOR EMERGENCY STOP
0	OCCUPIED/UNOCCUPIED SELECTOR SWITCH. (SUPPLIED BY DIV. 16)
T	THERMOSTAT (SUPPLIED BY DIV. 15)
M	MOTOR OPERATED DAMPER (SUPPLIED BY DIV. 15)
F XKW	ELECTRIC UNIT HEATER, "X" INDICATES UNIT ELECTRIC COIL RATING (SUPPLIED BY DIV. 15)
CUH 1 P11–LP (21)	EQUIPMENT CIRCUIT NUMBER DESIGNATION TO PANEL PP1–LP CIRCUIT #21,

GENERAL NOTES

1. PROVIDE CONCRETE HOUSEKEEPING PADS ON ALL FLOOR OR GRADE MOUNTED ELECTRICAL EQUIPMENT, THE FOLLOWING EQUIPMENT IS THE MINIMUM REQUIREMENT FOR HOUSEKEEPING PADS. ADDITIONAL PADS MAYBE REQUIRED BASED ON THE MOUNTING METHODS.
   1.1. GENERATOR
2. ALL CONDUIT AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.
3. BONDING JUMPERS, CONDUIT CLAMPS AND POINTS OF ATTACHMENT ARE NOT SHOWN ON DRAWINGS. SIZE BONDING JUMPERS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. THE POINTS OF ATTACHMENT OF THE GROUND CLAMPS SHALL BE ACCESSIBLE LOCATIONS.
4. EQUIPMENT & CONDUIT INSTALLATIONS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT AND STRUCTURAL CONDITIONS. EXPOSED CONDUITS SHALL BE INSTALLED PARALLEL TO BEAMS AND WALLS.
5. CONDUITS SHALL BE TERMINATED SO AS TO PERMIT NEAT CONNECTIONS TO MOTORS AND OTHER EQUIPMENT.
6. NO CONDUIT SMALLER THAN 3/4" PIPE SIZE NOR WIRE SMALLER THAN NO. 12 A.W.G. SHALL BE USED UNLESS OTHERWISE NOTED.
7. THE WIRING AND BLOCK DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL AND PROCESS EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.

DEMOLITION NOTES

1. DISCONNECT ELECTRICAL SERVICE AND MAKE SAFE FOR COMPLETE DEMOLITION OF THE THE EXISTING PUMP STATION.
2. UNLESS OTHERWISE NOTED, ALL EXISTING ELECTRICAL SYSTEMS WITHIN HATCH MARKS (POWER, LIGHTING, LOW VOLTAGE, CONTROLS, ETC) AND ASSOCIATED EQUIPMENT IS TO BE DEMOLISHED OR SALVAGED. DISCONNECT AND DE–ENERGIZE THE EQUIPMENT. REMOVE THE EQUIPMENT TO BE DEMOLISHED OR SALVAGED PER SECTION 02050. ALL CONTROL DEVICES, CONDUIT, CABLING, BOXES, SUPPORTS, ETC, ASSOCIATED WITH THE DEMOLISHED EQUIPMENT SHALL BE REMOVED. THE CONDUIT AND CABLING SHALL BE REMOVED BACK TO SOURCE.
3. NO DEVICE OR EQUIPMENT INDICATED FOR DEMOLITION WILL BE REUSED OR SALVAGED UNLESS SPECIFICALLY NOTED AS SUCH. ALL EQUIPMENT REMOVED SHALL BE REMOVED FROM SITE AND PROPERLY DISPOSED OF, PRIOR TO REMOVAL OF EQUIPMENT COORDINATE WITH OWNER FOR ANY EQUIPMENT THE OWNER WILL KEEP.
4. EXISTING EQUIPMENT INDICATED ON THE DEMOLITION PLANS ARE BASED ON SITE OBSERVATIONS AND IT IS NOT THE INTENTION OF THESE DRAWINGS TO SHOW ALL EQUIPMENT AND MATERIALS TO BE DISCONNECTED AND/OR REMOVED.
5. EXISTING UNDERGROUND CONDUITS CAN REMAIN BURIED. REMOVE WIRING, CUT BACK CONDUIT BELOW GRADE, CAP, AND COVER WITH MATCHING GRADE MATERIALS.

ABBREVIATIONS

(2)1"C, 3#8, #10GND	2, 1–INCH CONDUITS EACH CONDUIT CONTAINING 3–#8 AWG WIRES AND 1–#10 GROUND CONDUCTOR
3/4" CE	EMPTY CONDUIT. NUMERAL DENOTES SIZE
ABL	ALARM BEACON LIGHT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AR	ALARM RELAY
ATS	AUTOMATIC TRANSFER SWITCH
CR	CONTROL RELAY
CP	CONTROL PANEL
DRG. DWG.	DRAWING
EAN	EXCEPT AS NOTED
EC	ELECTRICAL CONTRACTOR
ETM	ELAPSED TIME METER
FE	FLOW ELEMENT
FIT	FLOW INDICATOR TRANSMITTER
FS	FLOW SWITCH
FT	FLOW TRANSMITTER
FVNR	FULL VOLTAGE NON–REVERSING
GND, GRD	GROUNDING CONDUCTOR (EQUIPMENT)
HOA	HAND–OFF–AUTOMATIC
HH	HANDHOLE
ISP	INTRINSICALLY SAFE PANEL
J OR JB	JUNCTION BOX
JPB	JOG PUSHBUTTON
LE	LEVEL ELEMENT
LIT	LEVEL INDICATOR TRANSMITTER
LL	LOW LEVEL
LS	LEVEL SWITCH
LT	LEVEL TRANSMITTER
MC	MOTOR CONTROLLER (STARTER)
MCC	MOTOR CONTROL CENTER
MH	MANHOLE
MFR	MANUFACTURER
NTS	NOT TO SCALE
OH	OVERHEAD
OL	MOTOR OVERLOAD HEATER
PB	PUSHBUTTON CONTROL STATION MOMENTARY CONTACT TYPE, STOP START
PBE	PUSHBUTTON CONTROL STATION MAINTAINED EMERGENCY STOP TYPE, TWIST TO RELEASE
PBL	PUSHBUTTON CONTROL STATION MOMENTARY TYPE WITH LOCK–OUT DEVICE, STOP–START
PBM	PUSHBUTTON CONTROL STATION MAINTAINED CONTACT TYPE, STOP START
PIT	PRESSURE INDICATOR TRANSMITTER
PL	PUSHBUTTON CONTROL STATION MOMENTARY TYPE WITH LOCK–OUT DEVICE, STOP
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
RGS	RIGID GALVANIZED STEEL
RVNR	REDUCED VOLTAGE NON–REVERSING
SPD	SURGE SUPPRESSOR DEVICE
SOV	SOLENOID VALVE
S/S	SOFT STARTER
TB	TERMINAL BOX
TD	MOTOR TEMPERATURE DETECTOR
TR	TIMING RELAY
TS	TEMPERATURE SWITCH
TSP	TWISTED SHEILDED PAIR
TSTW	TWO SPEED TWO WINDING
TYP	TYPICAL
UG	UNDERGROUND
UNO	UNLESS OTHERWISE NOTED
VFD	VARIABLE FREQUENCY DRIVE
WP	WATER PROOF
WSH	HIGH TORQUE SWITCH

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

ELECTRICAL LEGEND AND NOTES

NO.	REVISIONS	DATE

DRAWN BY:	RB
DESIGNED BY:	MC
CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

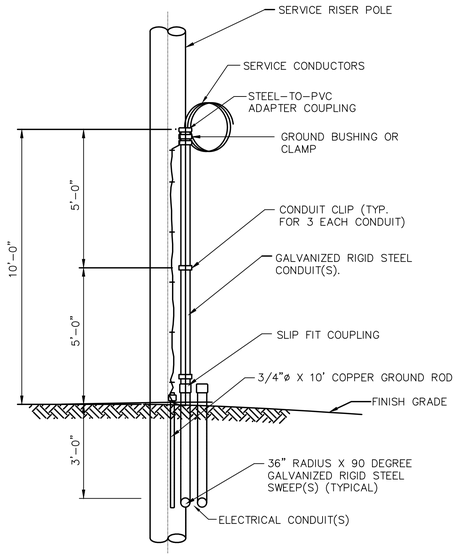
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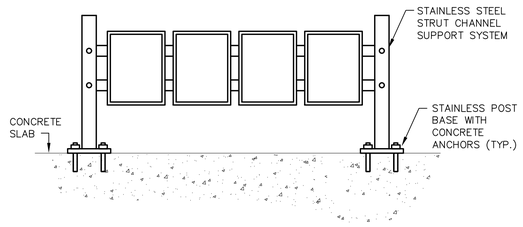
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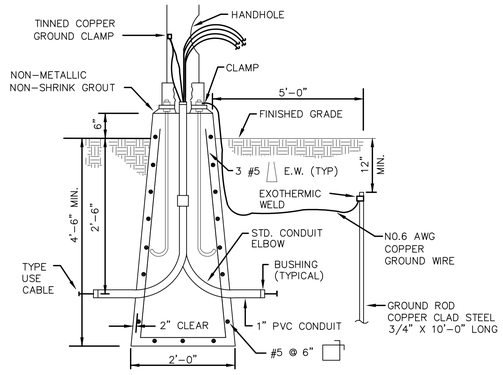
UTILITY POLE SERVICE RISER DETAIL

NOT TO SCALE



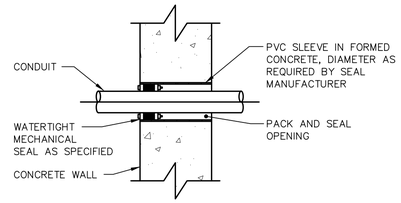
JUNCTION BOXES AT WET WELL MOUNTING DETAIL

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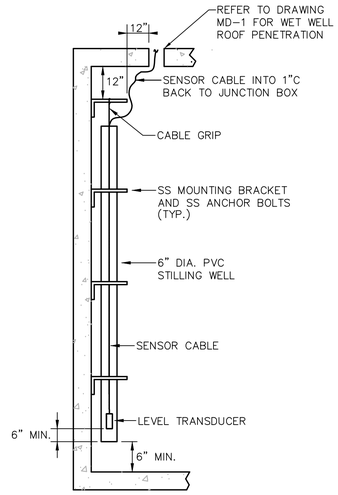
LIGHT POLE BASE DETAIL

NOT TO SCALE



CONDUIT PENETRATION THROUGH CONCRETE WALL

NOT TO SCALE



NOTES:

1. ALL MOUNTING BRACKETS, SUPPORTS, FASTENERS, AND ECT. WITHIN THE WET WELL SHALL BE STAINLESS STEEL.

SUBMERSIBLE LEVEL TRANSDUCER IN WET WELL

NOT TO SCALE

NOTES:

1. ALL MOUNTING BRACKETS, SUPPORTS, FASTENERS, AND ECT. WITHIN THE WET WELL SHALL BE STAINLESS STEEL.

FLOAT LEVEL SWITCH IN WET WELL

NOT TO SCALE

POWER CABLE/CONDUIT SCHEDULE

SYMBOL	CONDUIT SIZE*	CONDUCTORS*	GND*
P22	3/4"	(2)#12	(1)#12
P23	3/4"	(3)#12	(1)#12
P26	3/4"	(6)#12	(1)#12
P32	3/4"	(2)#10	(1)#10
P33	3/4"	(3)#10	(1)#10
P53	3/4"	(3)#8	(1)#10
P54	3/4"	(4)#8	(1)#10
P63	1"	(3)#6	(1)#8
P64	1"	(4)#6	(1)#8
P83	1 1/4"	(3)#4	(1)#8
P84	1 1/4"	(4)#4	(1)#8
P103	1 1/2"	(3)#3	(1)#6
P104	1 1/2"	(4)#3	(1)#6

TELE/DATA CABLE/CONDUIT SCHEDULE

SYMBOL	CONDUIT SIZE	CABLES
TD1	1"	1–CAT6
TD2	1"	2–CAT6

SIGNAL CABLE/CONDUIT SCHEDULE

SYMBOL	CONDUIT SIZE	CONDUCTORS
S	1"	VENDER PROVIDED
S1	3/4"	1–2/C#16 TSP
S13	3/4"	1–3/C#16 TSP
S2	3/4"	2–2/C#16 TSP

CONTROL CABLE/CONDUIT SCHEDULE

SYMBOL	CONDUIT SIZE	CONDUCTORS
C2	3/4"	2#14
C4	3/4"	4#14
C5	3/4"	5#14
C6	3/4"	6#14
C7	3/4"	7#14
C8	3/4"	8#14
C9	3/4"	9#14
C10	3/4"	10#14
C12	3/4"	12#14
C16	1"	16#14
C20	1"	20#14
C30	1"	30#14

NOTE: CONDUIT AND CONDUCTOR SIZES ARE TO BE PER THE ABOVE SCHEDULES UNLESS OTHERWISE NOTED.

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER & CATALOG SERIES	LAMPS		VOLTS	WATTS	MOUNTING		REMARKS
			TYPE	LUMENS			TYPE	HEIGHT	
F1	24" LED OPEN STRIP LIGHT FIXTURE	HUBBELL LCS2–35LW–EU	LED 3500K	2753lm	120	19	SURFACE	–	–
F2	POLE MOUNTED LED FLOOD LIGHT FIXTURE, BLACK, WITH 20' LONG, 5" DIAMETER POLE	CREE OSQ–MB–6L–40K–UL–DA–BK	LED 4000K	6900lm	120	48	POLE	–	PROVIDE MOUNTING POLE AND BASE COVER, CREE #SRS–5–11–20–SW–BS–1D–C–BK

LIGHTING FIXTURE SCHEDULES NOTES:

1. THE CATALOG NUMBERS LISTED ARE GIVEN AS A GUIDE TO THE DESIGN AND QUALITY OF FIXTURE DESIRED. EQUIVALENT DESIGNS, MATERIALS, DIMENSIONS, COEFFICIENT OF UTILIZATIONS AND EQUAL QUALITY FIXTURES OF OTHER MANUFACTURERS WILL BE ACCEPTABLE.

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Pawtucket, RI

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ELECTRICAL DETAILS AND SCHEDULES

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DRAWN BY: RB
DESIGNED BY: MC
CHECKED BY: MC
ISSUE DATE: JUNE 2026
BETA JOB NO.: 25.11884 / 26.11909

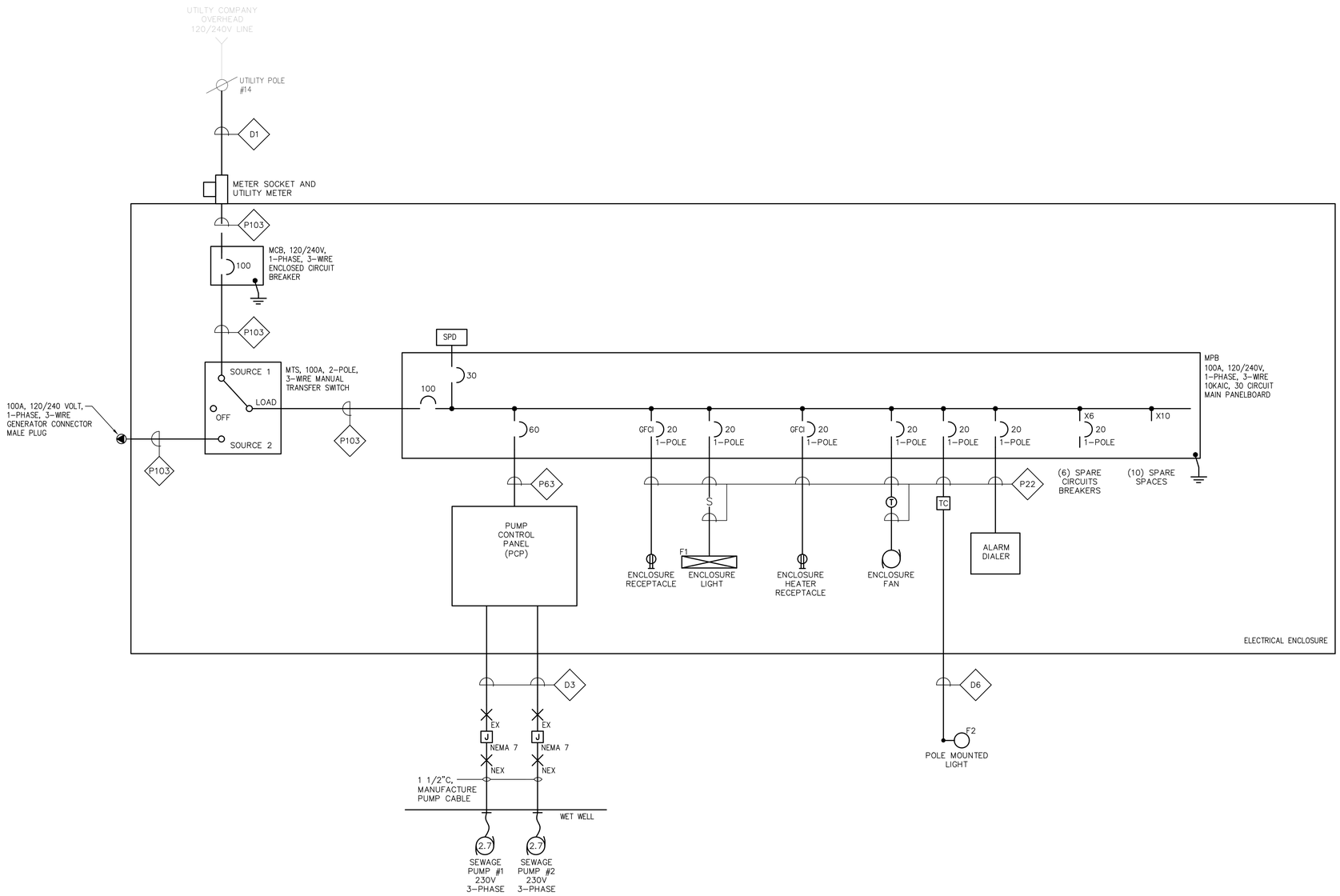
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E-0.2



PARKSIDE PS ONE LINE DIAGRAM

NOT TO SCALE

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Pawtucket, RI

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PARKSIDE PS ELECTRICAL ONE LINE DIAGRAM

NO.	REVISIONS	DATE

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CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

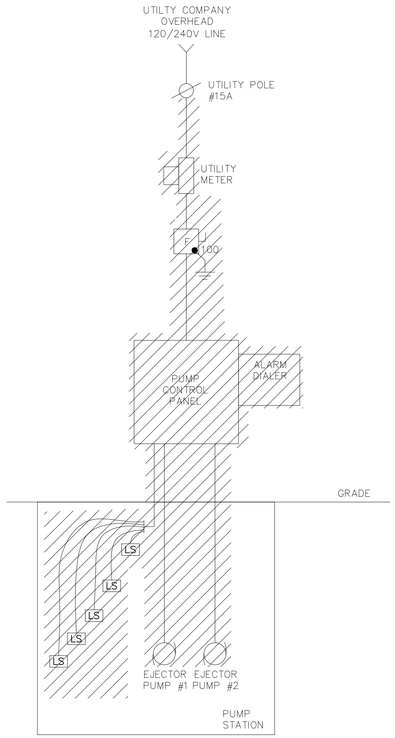
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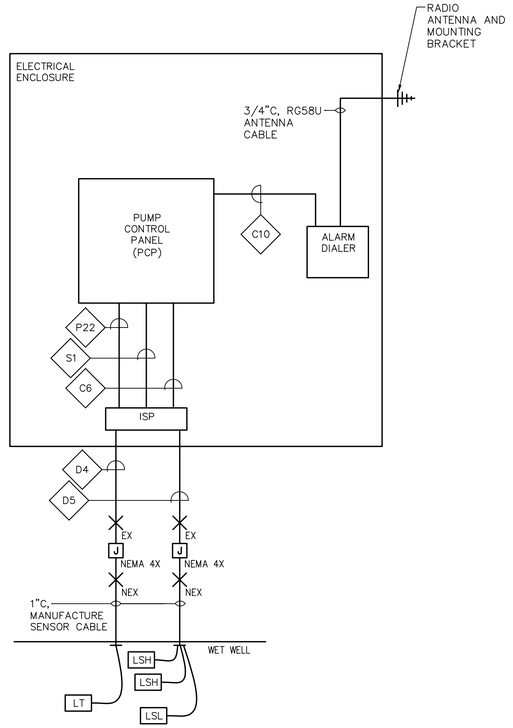
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E-1.1



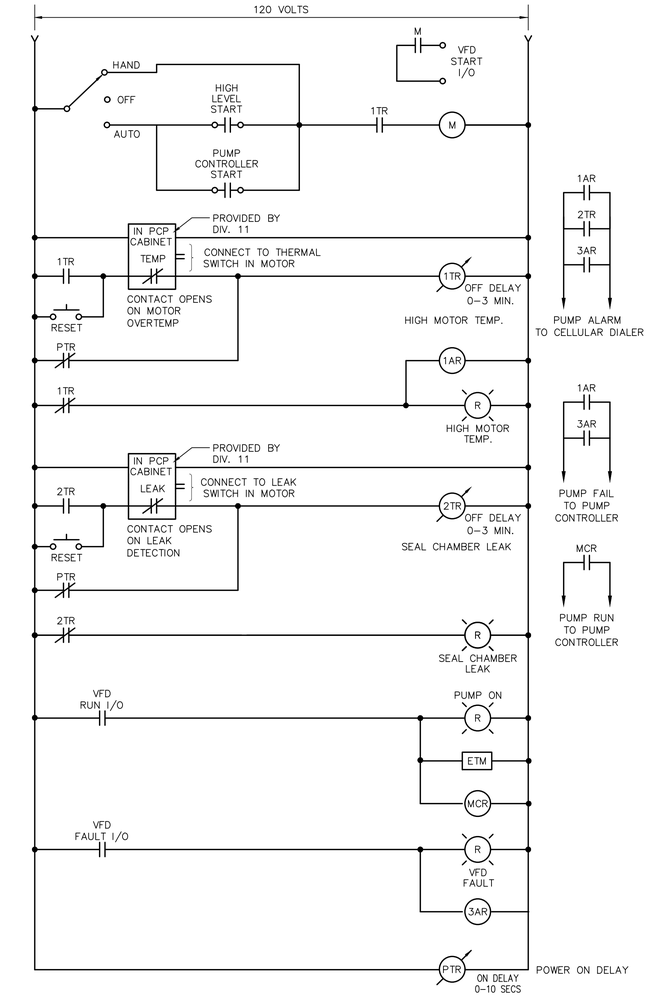
PARKSIDE PS ONE LINE DIAGRAM - DEMOLITION

NOT TO SCALE



PARKSIDE PS CONTROL BLOCK WIRING DIAGRAM

NOT TO SCALE



PARKSIDE PS CONTROL WIRING DIAGRAM
SEWAGE PUMPS

NOT TO SCALE

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PARKSIDE PS
ELECTRICAL
ONE LINE DEMOLITION
& WIRING DIAGRAMS

NO.	REVISIONS	DATE

DRAWN BY:	RB
DESIGNED BY:	MC
CHECKED BY:	MC
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BETA JOB NO.:	25.11884 / 26.11909

SCALE

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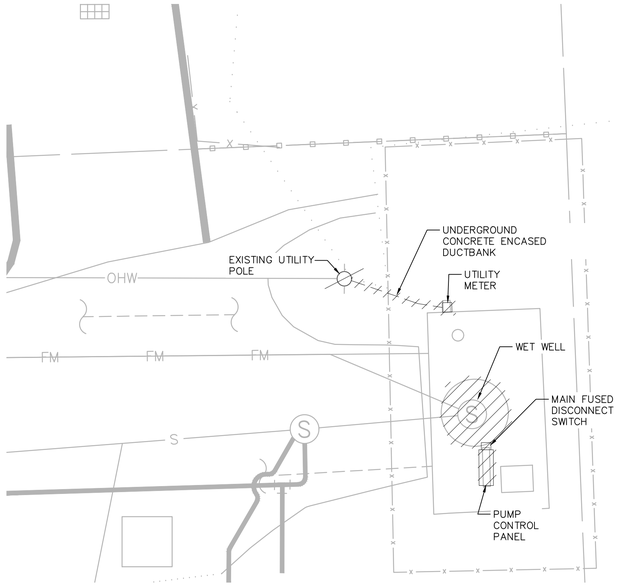
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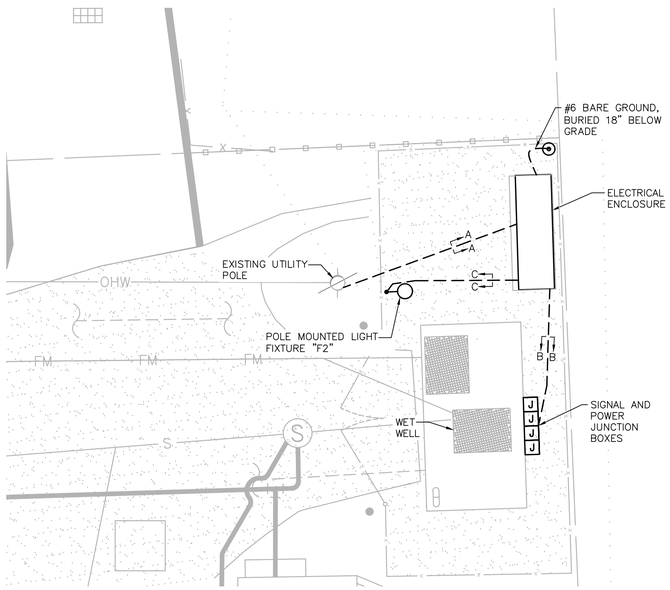
E-1.2

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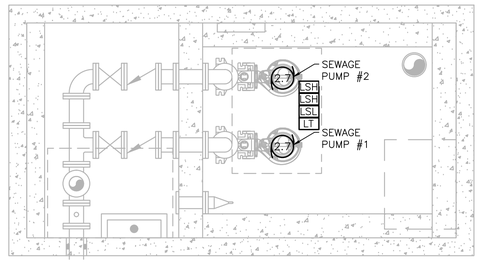
1. REFER TO DRAWING E-1.4 FOR DUCTBANK SECTIONS.



PARKSIDE PS ELECTRICAL SITE DEMOLITION PLAN
SCALE: 1" = 5'-0"



PARKSIDE PS ELECTRICAL SITE PLAN
SCALE: 1" = 5'-0"



PARKSIDE PS WET WELL PLAN
SCALE: 1/2" = 1'-0"

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NO.	REVISIONS	DATE

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SCALE

AS SHOWN

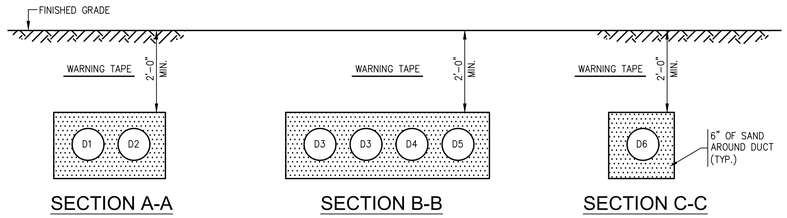
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SHEET NO.

E-1.3

DUCT / CABLE SCHEDULE

DUCT NO.	SIZE	CONDUCTORS	FROM	TO
D1	2"	(3)#1/0	UTILITY POLE	UTILITY METER
D2	2"	PULL STRING	UTILITY POLE	STUB UP AND CAP BELOW UTILITY METER
D3	1"	(3)#12, #12GND, (4)#14	PUMP CONTROL PANEL	WET WELL PUMP JUNCTION BOX
D4	1"	#16TSP	PUMP CONTROL PANEL	WET WELL LEVEL TRANSMITTER JUNCTION BOX
D5	1"	(6)#14	PUMP CONTROL PANEL	WET WELL FLOAT SWITCH JUNCTION BOX
D6	1"	(2)#12, #12GND	MPB VIA LIGHT SWITCH	POLE MOUNTED LIGHT

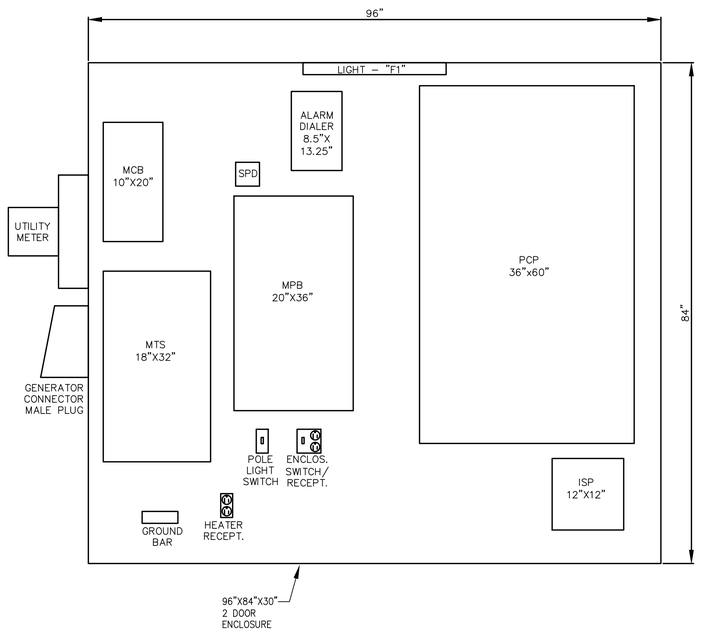


NOTES:

1. BACKFILL DUCT BANK IN LAYERS AND MANUALLY TAMP SAND FILL. PROVIDE RED DUCT BANK MARKER TAPES, READING "CAUTION – ELECTRICAL LINES BELOW", OVER ENTIRE LENGTH OF DUCTLINE. LOCATE TAPES 12 INCHES BELOW GRADE. PROVIDE A TAPE FOR EVERY 12 INCHES OF WIDTH OF DUCTLINE.
2. A MINIMUM OF 12" SEPARATION SHALL BE KEPT BETWEEN DUCT BANK SECTIONS WITHIN SAME TRENCH.

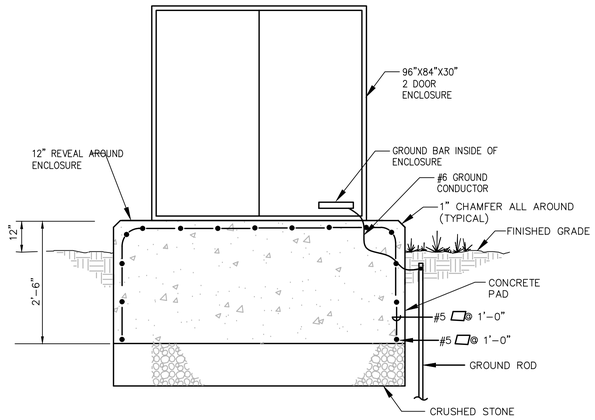
PARKSIDE PS DUCTBANK SECTIONS

NO SCALE



PARKSIDE PS ELECTRICAL ENCLOSURE - EQUIPMENT LAYOUT

SCALE: 1" = 1'-0"



NOTES:

1. FOR REINFORCING REQUIREMENTS SEE STRUCTURAL SPECIFICATIONS.

PARKSIDE PS ELECTRICAL ENCLOSURE BASE DETAIL

NOT TO SCALE

PREPARED BY

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

ELECTRICAL DUCTBANK SECTIONS & ENCLOSURE DETAILS

NO.	REVISIONS	DATE

DRAWN BY:	RB
DESIGNED BY:	MC
CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

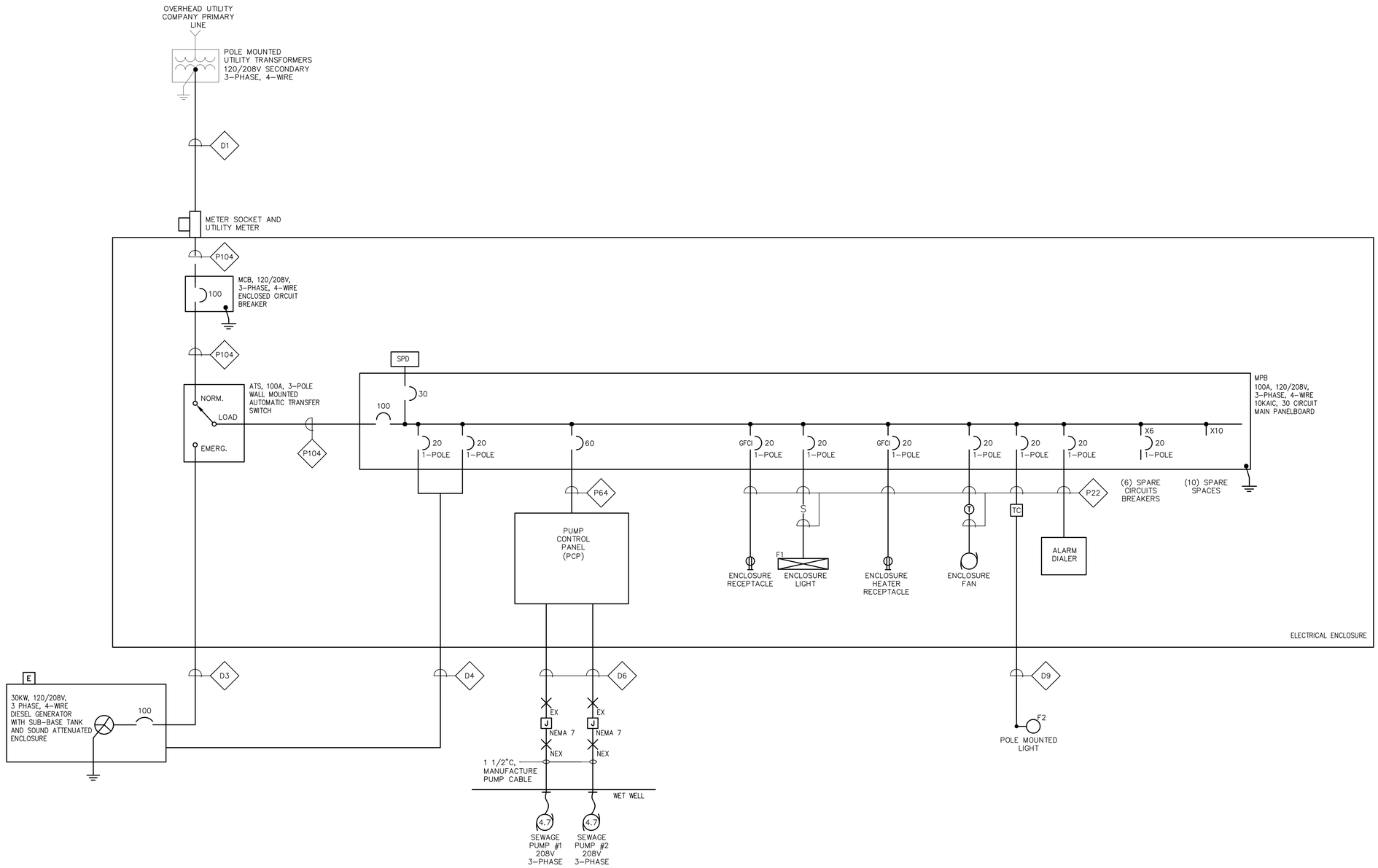
SCALE

NONE

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

E-1.4



PINECREST PS ONE LINE DIAGRAM

NOT TO SCALE

PREPARED BY

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Pawtucket, RI

TITLE

PINECREST PS ELECTRICAL ONE LINE DIAGRAM

NO.	REVISIONS	DATE

DRAWN BY:	RB
DESIGNED BY:	MC
CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

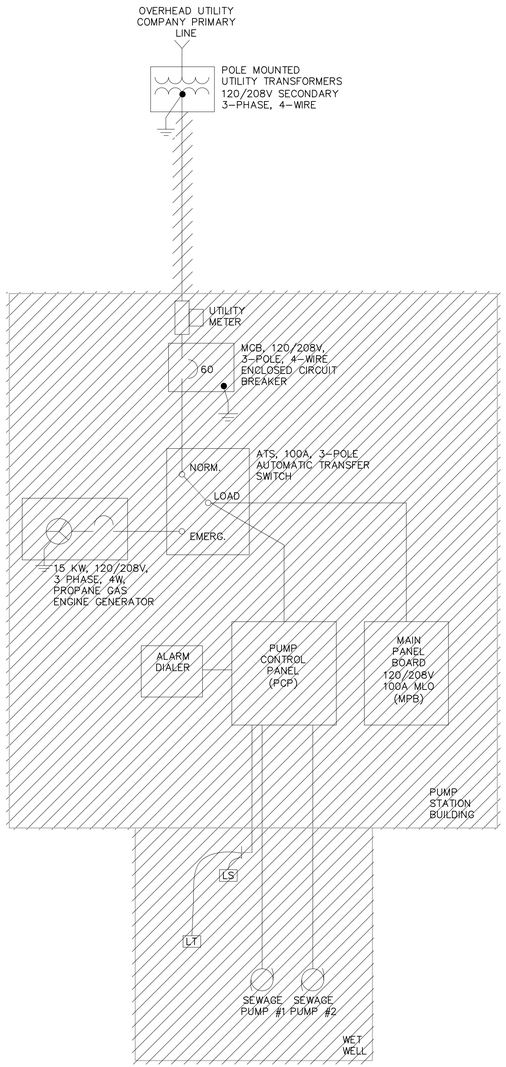
SCALE

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UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

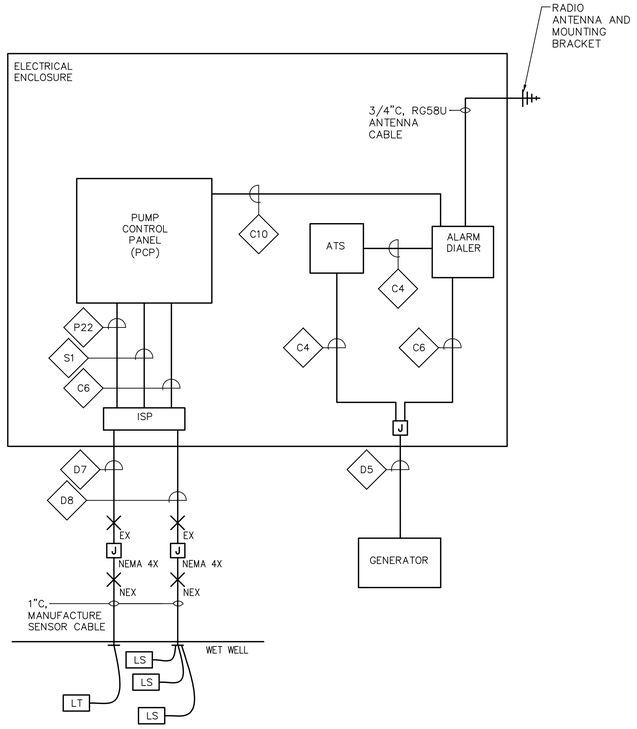
SHEET NO.

E-2.1



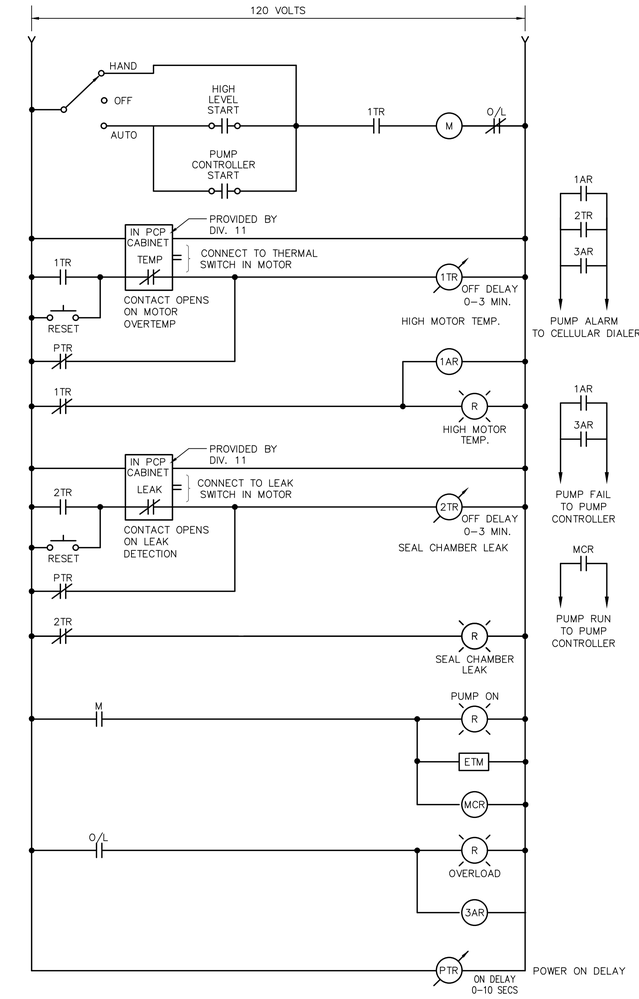
PINCREST PS ONE LINE DIAGRAM - DEMOLITION

NOT TO SCALE



PINECREST PS CONTROL BLOCK WIRING DIAGRAM

NOT TO SCALE



PINECREST PS CONTROL WIRING DIAGRAM
SEWAGE PUMPS

NOT TO SCALE

PREPARED BY

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS
ELECTRICAL
ONE LINE DEMOLITION
& WIRING DIAGRAMS

NO.	REVISIONS	DATE

DRAWN BY:	RB
DESIGNED BY:	MC
CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

NONE

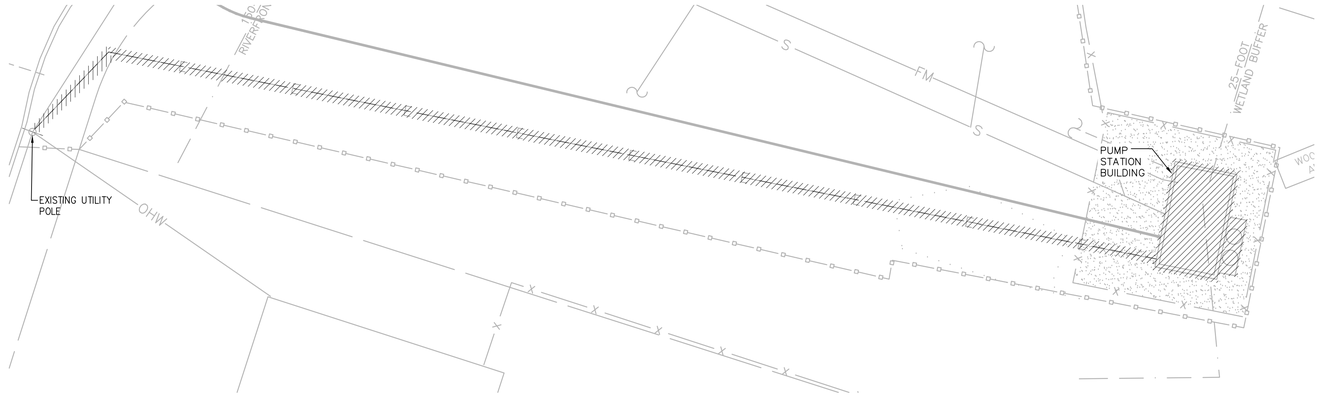
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SHEET NO.

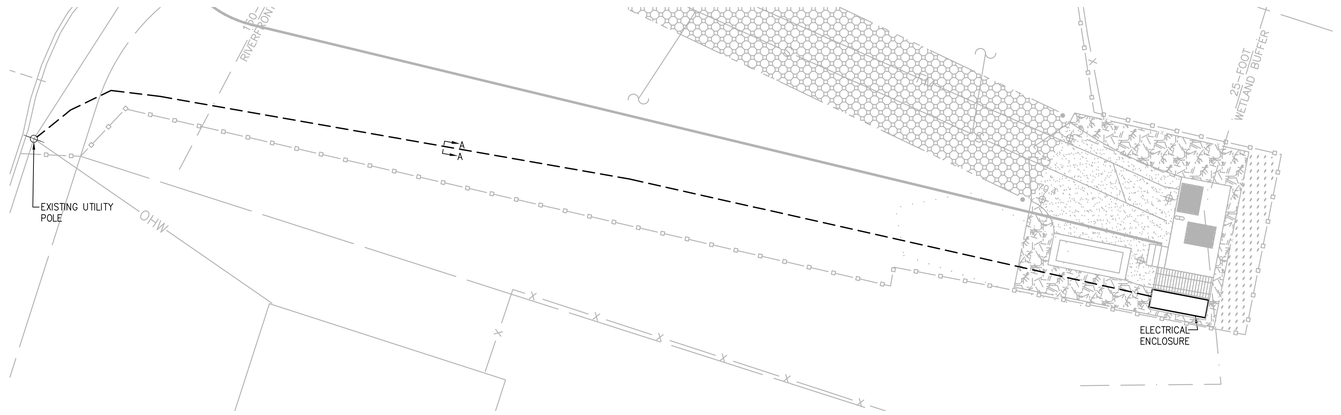
E-2.2

NOTES:

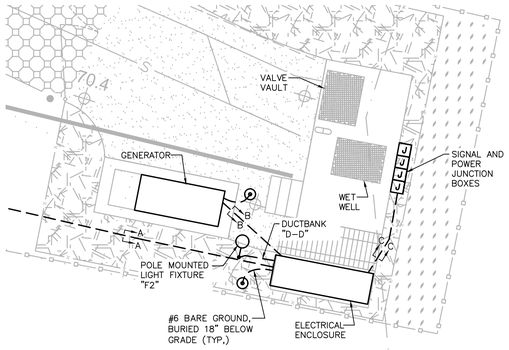
1. REFER TO DRAWING E-2.4 FOR DUCTBANK SECTIONS.



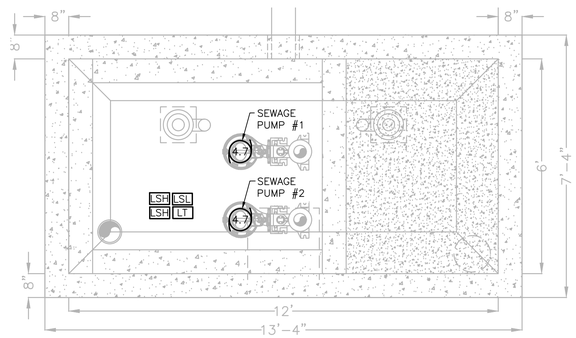
PINECREST PS ELECTRICAL SITE DEMOLITION PLAN
SCALE: 1" = 10'-0"



PINECREST PS ELECTRICAL SITE PLAN
SCALE: 1" = 5'-0"



PINECREST PS PUMP STATION PLAN
SCALE: 1" = 5'-0"



PINECREST PS WET WELL PLAN
SCALE: 1/2" = 1'-0"

PREPARED BY

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PROJECT

Parkside Pump Station & Pinecrest Pump Station Improvements

Pawtucket, RI

TITLE

PINECREST PS ELECTRICAL PLANS

NO.	REVISIONS	DATE

DRAWN BY:	RB
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CHECKED BY:	MC
ISSUE DATE:	JUNE 2026
BETA JOB NO.:	25.11884 / 26.11909

SCALE

AS SHOWN

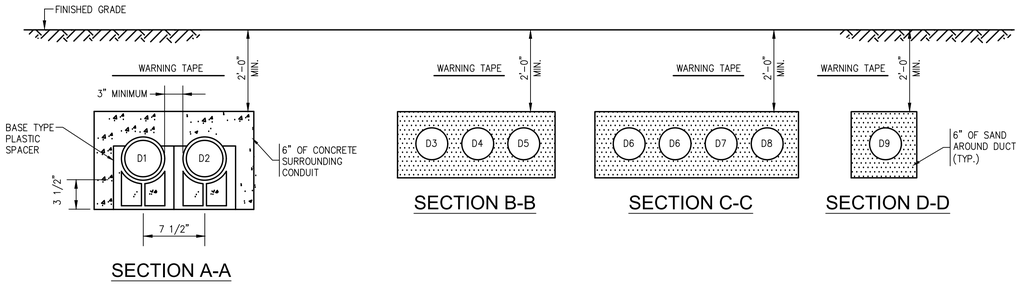
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

SHEET NO.

E-2.3

DUCT / CABLE SCHEDULE

DUCT NO.	SIZE	CONDUCTORS	FROM	TO
D1	2"	(4)#1/0	UTILITY POLE	UTILITY METER
D2	2"	PULL STRING	UTILITY POLE	STUB UP AND CAP BELOW UTILITY METER
D3	2"	(4)#1/0, #6 GND	GENERATOR	ATS
D4	1"	(4)#12, #12GND	MPB	GENERATOR BLOCK HEATER, GENERATOR CONTROL PANEL & STATOR HEATER
D5	1"	(10)#14	GENERATOR	ATS, ALARM DIALER
D6	1"	(3)#12, #12GND, (4)#14	PUMP CONTROL PANEL	WET WELL PUMP JUNCTION BOX
D7	1"	#16TSP	PUMP CONTROL PANEL	WET WELL LEVEL TRANSMITTER JUNCTION BOX
D8	1"	(6)#14	PUMP CONTROL PANEL	WET WELL FLOAT SWITCH JUNCTION BOX
D9	1"	(2)#12, #12GND	MPB VIA LIGHT SWITCH	POLE MOUNTED LIGHT



SECTION A-A

SECTION B-B

SECTION C-C

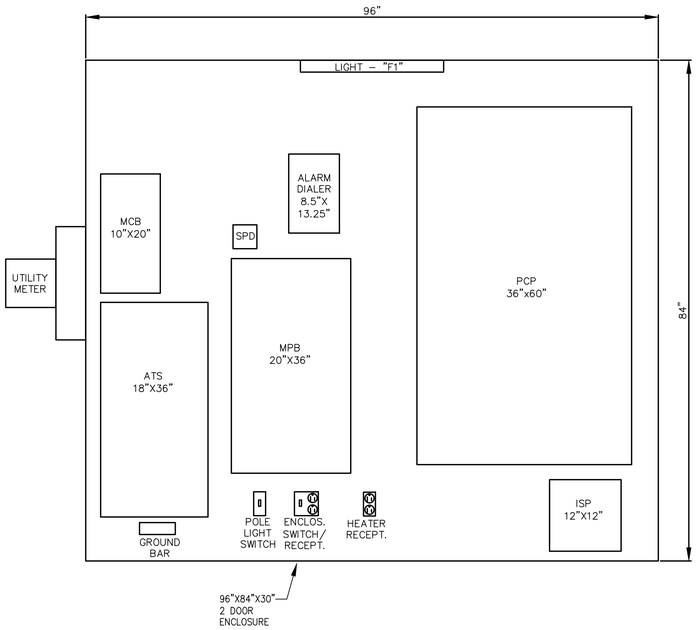
SECTION D-D

NOTES:

1. BACKFILL DUCT BANK IN LAYERS AND MANUALLY TAMP SAND BACKFILL OR "PUDDLE" CONCRETE FILL. PROVIDE RED DUCT BANK MARKER TAPES, READING "CAUTION – ELECTRICAL LINES BELOW", OVER ENTIRE LENGTH OF DUCTLINE. LOCATE TAPES 12 INCHES BELOW GRADE. PROVIDE A TAPE FOR EVERY 12 INCHES OF WIDTH OF DUCTLINE.
2. A MINIMUM OF 12" SEPARATION SHALL BE KEPT BETWEEN DUCT BANK SECTIONS WITHIN SAME TRENCH.

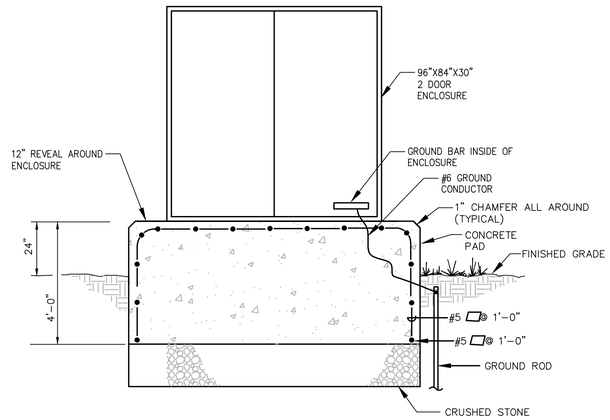
PINECREST PS DUCTBANK SECTIONS

NO SCALE



PINECREST PS ELECTRICAL ENCLOSURE - EQUIPMENT LAYOUT

SCALE: 1" = 1'-0"



NOTES:

1. FOR REINFORCING REQUIREMENTS SEE STRUCTURAL SPECIFICATIONS.

PINECREST PS ELECTRICAL ENCLOSURE BASE DETAIL

NOT TO SCALE

PREPARED BY

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PINECREST PS ELECTRICAL DUCTBANK SECTIONS & ENCLOSURE DETAILS

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SCALE

NONE

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SHEET NO.

E-2.4

Appendix H – Prevailing Wage Requirements

MUNICIPAL CONTRACT ADDENDUM

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING

PREVAILING WAGE REQUIREMENTS
(37-13-1 ET SEQ.)

The prevailing wage requirements are generally set forth in RIGL 37-13-1 et seq. These requirements refer to the prevailing rate of pay for regular, holiday, and overtime wages to be paid to each craftsman, mechanic, teamster, laborer, or other type of worker performing work on public works projects when state or municipal funds exceed one thousand dollars ($1,000).

All Prevailing Wage Contractors and Subcontractors are required to:

1. Submit to the Awarding Authority a list of the contractor's subcontractors for any part or all of the prevailing wage work in accordance with RIGL § 37-13-4;

2. Pay all prevailing wage employees at least once per week and in accordance with RIGL §37-13-7;

3. Post the prevailing wage rate scale and the Department of Labor and Training's prevailing wage poster in a prominent and easily accessible place on the work site in accordance with RIGL §37-13-11; posters may be downloaded at https://dlt.ri.gov/requiredposters or obtained from the Department of Labor and Training, Center General Complex, 1511 Pontiac Avenue, Cranston, Rhode Island;

4. Visit Sam.Gov or scan the QR Code below on or before July 1st of each year, until such time as the contract is completed, to ascertain the current prevailing wage rates and the amount of payment or contributions for each covered prevailing wage employee and make any necessary adjustments to the covered employee's prevailing wage rates effective July 1st of each year in compliance with RIGL§37-13-8;

5. Attach a copy of this CONTRACT ADDENDUM and its attachments as a binding obligation to any and all contracts between the contractor and any subcontractors and their assignees for prevailing wage work performed pursuant to this contract;

6. Provide for the payment of overtime for prevailing wage employees who work in excess of eight (8) hours in any one day or forty (40) hours in any one week as provided by RIGL §37-13-10;

7. Maintain accurate prevailing wage employee payroll records on a Rhode Island Certified Weekly Payroll form available for download at https://dlt.ri.gov/wrs/prevailingwage/ as required by RIGL §37-13-13, and make those records available to the Department of Labor and Training upon request;

8. Furnish the fully executed RI Certified Weekly Payroll Form to the awarding authority on a monthly basis for all work completed in the preceding month.

Scan with Phone for Prevailing Wage Rates

9. For general or primary contracts one million dollars ($1,000,000) or more, shall maintain on the work site a fully executed RI Certified Prevailing Wage Daily Log listing the contractor's employees employed each day on the public works site; the RI Certified Prevailing Wage Daily Log shall be available for inspection on the public works site at all times; this rule shall not apply to road, highway, or bridge public works projects. Where applicable, furnish both the Rhode Island Certified Prevailing Wage Daily Log together with the Rhode Island Weekly Certified Payroll to the awarding authority.

10. Any violation of RIGL 37-13-13 of Certified Weekly Payroll Forms and Daily Logs will result in the department imposing a penalty on the contractor of a minimum of one hundred dollars ($100) for each calendar day of noncompliance.

11. Assure that all covered prevailing wage employees on construction projects with a total project cost of one hundred thousand dollars ($100,000) or more have an OSHA ten (10) hour construction safety certification in compliance with RIGL §37-23-1;

12. Provide a healthcare benefit for the prevailing wage employee(s) for the covered period of time from a licensed third-party healthcare provider. Employees exempt from this requirement would be any employee currently receiving a healthcare benefit because of their relationship as a child, spouse, or domestic partner of a covered person, any employee that is the recipient of healthcare coverage in connection with active military service or through Veterans Affairs, and any employee who is employed on a "short term basis," which, for purposes of this section shall mean a period of ninety (90) days or less.

13. For contractors who work more than 90 days on a project, the contractor shall provide all hourly fringe benefits made payable to a bona fide fringe benefit to satisfy the hourly Prevailing Wage rate. As of July 1, 2025, a contractor cannot take a credit against the hourly fringe benefit in the form of a "Cash Payment."

14. Assure that all prevailing wage employees who perform work which requires a Rhode Island trade license possess the appropriate Rhode Island trade license in compliance with Rhode Island law; and

15. Comply with all applicable provisions of RIGL §37-13-1, et. seq;

MUNICIPAL CONTRACT ADDENDUM

RHODE ISLAND DEPARTMENT OF LABOR AND TRAINING

PREVAILING WAGE REQUIREMENTS
(37-13-1 ET SEQ.)

CERTIFICATION

I hereby certify that I have reviewed this CONTRACT ADDENDUM and understand my obligations as stated above.

By: _____

Title:_____

Subscribed and sworn before me this ____ day of _____, 20___.

_____
Notary Public
My commission expires:_____