VENUE AT HOPEWELL SP
HOPEWELL TOWNSHIP PUMP STATION
MERCER COUNTY, NEW JERSEY

Technical Specifications

June 2025
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Project No. 081391-01-001

PREPARED BY:

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All project specifications shall be in accordance with Township of Hopewell, Mercer County, New Jersey's **Sanitary Sewer Design Standards and Construction Details.** Where the following project specifications are in conflict with the Township Standards, the more stringent requirement shall be met, as determined by the Township:

SECTION 01010
SUMMARY OF THE WORK

PART 1 - GENERAL

1.01 PROJECT/WORK IDENTIFICATION

A. General: Project name is Venue at Hopewell as shown on Contract Documents prepared by Bowman Consulting Group, Ltd. Drawings and Specifications are dated May 2025.

B. Summary of Work by Reference: Work of the Contract (as well as the bidding requirements) can be generally summarized by reference to the Table of Contents contained in the Project Manual. The Work of the Contract includes, but is not necessarily limited to, the following Contract Documents:

1. Contractual Legal Requirements.

2. Drawings as listed in the Schedule of Drawings.

3. Technical Specifications.

C. Addenda and Modifications: The Work of the Contract also includes addenda and modifications to the Contract Documents issued subsequent to the initial printing of the Contract Documents and include, but are not necessarily limited to, printed matter referenced by any of these.

1.02 DRAWINGS

A. The general character and scope of the work is illustrated by the drawings listed at the end of this section. Any additional detail drawings and other information deemed necessary by the Engineer will be furnished to the Contractor when required.

DRAWING NO.	DRAWING TITLE
3A	PUMP STATION 1 – LAYOUT PLAN
3B	PUMP STATION 2 – LAYOUT PLAN
3C	PUMP STATION 3 – LAYOUT PLAN
3D	PUMP STATION 1 – PIPING PLAN
3E	PUMP STATION 2 – PIPING PLAN
3F	PUMP STATION 3 – PIPING PLAN
3G	PUMP STATION 1 – SECTION VIEW
3H	PUMP STATION 2 – SECTION VIEW
3I	PUMP STATION 3 – SECTION VIEW
3J	CONTROL BLDG. FLOOR PLAN
3K	CONTROL BLDG. ELEVATIONS
3L	PUMP STATION DETAILS – 1
3M	PUMP STATION DETAILS – 2
3N	HOPEWELL TOWNSHIP DETAILS

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01204
PROGRESS SCHEDULES

PART 1 - GENERAL

1.01 GENERAL

A. Section includes:

1. Format.
2. Content.
3. Revisions to schedules.
4. Submittals.

1.02 FORMAT

A. Prepare bar chart schedule using the critical path method.

B. Sequence of Listings: Group items by Division and Specification Section.

C. Scale and Spacing: Provide adequate space for notations and revisions.

1.03 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify work of separate stages and other logically grouped activities.

C. Provide sub-schedules to define critical portions of the entire Schedule.

D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

E. Show schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Owner.

1.04 REVISIONS TO SCHEDULES

A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

C. Provide narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect, including the effect of changes on schedules of separate contractors.

D. Float or slack is defined as the amount of time between the early start date and the late start date or the early finish date and the late finish date of any of the activities in the Construction Schedule. Float or slack is not time for the exclusive use or benefit of the Contractor. Extensions of time for performance as described in the Contract Documents shall be granted only to the extent that time adjustments for the activity or activities affected exceed the total float or slack along the path of activities affected at the time of Notice to Proceed of a Change Order or the commencement of any delay or condition for which and adjustment is warranted under the Contract Documents.

1.05 SUBMITTALS

A. Submit initial Schedules within 15 days after Notice to Proceed. After review, resubmit required revised data within 5 days. No progress payments will be made until the Owner has approved the schedule.

B. Submit revised Progress Schedules with each Application for Payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300
SHOP DRAWING AND PRODUCT DATA SUBMITTALS

PART 1 - GENERAL

1.01 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. Shop Drawings and Product Data.

1. Shop drawings and product data are generally defined as all drawings, diagrams, illustrations, brochures, schedules, bills of materials and other data which are prepared by the Contractor, his subcontractors, suppliers or distributors, or equipment manufacturers and fabricators, which illustrate the manufacture, fabrication, construction, installation of the work or a portion thereof, under this contract. Shop drawings and product data are required and shall be submitted for every element of the work, including, but not limited to, mechanical equipment, piping arrangements, reinforcing steel, miscellaneous metals, and other items as required in the specifications. If the Contractor proposes to deviate from any detail indicated on the drawings, he shall submit detailed drawings and descriptions of this work for approval.

2. Product data, including materials reproduced from manufacturer's product catalogs, shall be no larger than 81/2 inches by 11 inches. Catalog data shall be explicit with regard to details of the products being furnished and complete enough to enable the Engineer to determine that the products submitted conform to the requirements of the specifications. If a submittal indicates more than one style, size, capacity, etc. of a product on a sheet, the Contractor shall clearly indicate by "highlighting" or otherwise specifically marking exactly which product type is being submitted for approval. Failure to indicate exactly which product is being submitted shall be cause for rejection of the submittal. Catalog data shall bear the name of the manufacturer of the product.

3. The Contractor shall submit drawings and product data certified correct for construction for the approval of the Owner, the Township, and Engineer, as soon as possible after approval of the Materials List prepared by the Contractor and with due regard to the sequence in which such information will be required for construction. It is the Contractor's responsibility to provide finished drawings for approval, based on field measurements of actual conditions, indicating how he proposes to install the work and the materials being furnished under the contract. Single line drawings will not be acceptable. Copies of the plans will not be accepted for submission as drawings, nor will catalog numbers alone of materials.

4. Each submittal shall be assigned a sequential number by the Contractor, for purposes of easy identification, and shall retain its assigned number with appropriate subscript, on required resubmissions. The assigned number shall consist of the specification section number where the item is specified, followed by a sequential number indicating the number of submittals in that section (e.g., 0330011 is the 11th separate submittal for items specified in Section 03300).

Resubmittals shall be identified with the same number as the original submittal, followed by A, B, C etc. All products and materials submitted shall be clearly identified with the appropriate equipment name and equipment tag number as it appears in the Contract Documents.

5. Shop drawings and product data shall be submitted in proper sequence and time with due regard to the time required for the review approval and transmittal.

6. Shop drawings and product data shall be coordinated by the Contractor with drawings previously submitted by him, with drawings being prepared by him, and with drawings and data previously approved under this contract. Submissions shall be made to the Engineer by the Contractor only. Any data prepared by subcontractors and suppliers and all correspondence originating with subcontractors and suppliers shall be submitted through the Contractor.

7. All shop drawings and product data covering related items integrated systems of equipment or material shall be submitted at the same time in order that their complete installation can be adequately reviewed. No partial submissions will be considered.

8. No materials or equipment for which shop drawings and product data have been submitted for approval shall be delivered to the job site or incorporated into the work until the Contractor has received copies of such approved drawings and data or until the Engineer has authorized him in writing to do so. Work shall not be done upon any part of the contract, until such approval has been received from the Engineer.

9. After the Owner, Engineer and the Township have reviewed a submittal, it will be returned to the Contractor with the comments, if any. The approval of the Contractor's submittal is for general conformance only, but subject to the detailed requirements of the Contract documents. Although the Owner, Engineer, and the Township may review submittals in more or less detail, such reviewing is an effort to discover errors and omissions in the Contractor's submittals and to assist the Contractor in coordinating and expediting his work. The Owner's, Engineer's and the Township's review shall in no way relieve the Contractor of his obligation and responsibility to coordinate the work and plan the details of the work or to relieve him of his responsibility in fulfilling the purpose and intent of the contract. Review by the Owner, Engineer, and the Township shall not be construed as placing on him or on the Township any responsibility for the accuracy, proper fit, functioning, or performance of any phase of the work included in the contract. The Owner, Engineer, and the Township reserve the right to require written confirmation from the Contractor that the comments placed on submittals stamped "APPROVED AS NOTED" will actually be followed in the prosecution of the work.

10. All submittals must bear the stamp of approval of the Contractor as evidence that he has checked them. Submittals without this stamp of approval will not be considered and will be returned to the Contractor for resubmission. If the

drawings or other data show variations from the requirements of the Contract documents because of standard practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for prior adjustment; otherwise, the Contractor will not be relieved of the responsibility for executing the work in full conformance with the Contract documents even though such submittals have been approved.

11. After checking and verifying all field measurements and coordinating with other submittals, the Contractor shall submit to the Owner for approval, two sepia paper transparencies of good reproducible quality and one white print of all working drawings, which shall have been checked by and stamped with the approval of the Contractor and identified as the Owner may require. The Contractor shall correct the original sepia paper transparency when required, and resubmit two sepia paper transparencies and one white print for approval by the Owner. The Owner will retain one sepia paper transparency and the white print for record purposes. Manufacturer's catalog cuts shall be submitted at a quantity of six of which three will be retained and the remaining returned with comments and/or approval to the Contractor. The data shown on the Working Drawings shall be complete with respect to dimensions, design criteria, material of construction and the like to enable the Owner to review the information as required. At the time of each submission, the Contractor shall in writing call the Owner's attention to any deviations that the Working Drawings may have from the requirements of the Contract documents.

12. The Owner will make every reasonable effort to process and return each submittal within 21 calendar days after its receipt in the Owner's office. The need for resubmissions or any delay in obtaining the Owner's review or approval of submittals will not entitle the Contractor to an extension of time for Final Acceptance.

B. Samples. The Contractor shall furnish samples of items and materials as required in the specification. Samples, unless otherwise required by the specification, shall be submitted to the Owner in duplicate, and each sample shall be properly labeled and identified, giving the date, the job for which it is offered, section and paragraph numbers of the specifications, the Contractor, the supplier, and trade name, and shall be accompanied by; specifications, and such other pertinent data as will help in determining that the material conforms to the specification.

C. Certificates and Affidavits.

1. Where specified in the Contract documents that a certificate and affidavit shall be submitted to the Owner for approval of a particular product, or component of a product, such submittals shall be made in accordance with the following.

2. A certificate submitted for a product, or component of a product, shall indicate test results providing that product, or component of a product, meets the requirements of the standard specified in the Contract documents. An affidavit

consisting of a sworn statement by an official of the company manufacturing the product indicating that the information on the certificate is true and accurate shall accompany the certificate.

3. A statement originating from the Contractor, or any of his subcontractors, suppliers, or any other agent which merely indicates that a particular product, or component of a product, meets the requirements of the standard specified in the contract documents shall not be considered a certificate. Any such submittal made in this manner will not be approved and the corresponding product, or component of the product, shall not be incorporated into the work.

D. Mix Designs. Mix designs shall be submitted for concrete, grout, and asphalt paving. Mix designs shall indicate all materials used in the product and their respective relative quantities. In any one-mix design all quantities shall be expressed either by weight or volume as long as it is practical to do so.

E. Design Calculations. Design calculations shall be presented in a neat, legible manner and shall bear the stamp and signature of a registered professional engineer, registered in the State of New Jersey.

F. Mill Test Reports. Mill test reports shall be submitted for concrete reinforcement steel. Reports shall be on the mill's standard report form.

G. Manufacturer's Warranties. The Contractor shall provide the Owner with all Manufacturers' warranties.

1.02 MANUFACTURER'S LIST

A. Within 15 days after receipt of a Notice to Proceed, and before ordering any equipment or materials, the Contractor shall submit to the Owner for approval a complete list of proposed manufacturers and fabricators for all materials and equipment to be used in this contract. The purpose of this submittal is to allow the Owner and the Township to predetermine the acceptability of proposed suppliers before issuance of purchase orders by the Contractor. Submission and acceptance of the manufacturer's list shall neither relieve the Contractor from submitting detailed shop drawings and product data for all materials and equipment nor shall it constitute prior acceptance of any specific item of equipment prior to submittal of shop drawings. After submission and acceptance of the manufacturer's list, the Contractor shall not deviate from the named suppliers and manufacturers without written approval from the Owner.

1.03 OPERATION AND MAINTENANCE MANUALS

A. Two (2) copies of operation and maintenance manuals for mechanical equipment shall be submitted. All O&M material shall be submitted in electronic pdf format in addition to two (2) hard copies. Electronic copies shall be submitted on Labeled CD RW disks or flash drives.

1.04 MANUFACTURER'S CERTIFICATES

A. General.

1. The Contractor shall furnish the Owner with manufacturer's certificates for all items of equipment and products listed in the various sections of these specifications stating that the equipment and products have been installed under either the continuous or periodic supervision of the manufacturer's field representative.

2. A certificate submitted for material, equipment, a product, or component of a product, shall indicate test results providing that the material, equipment, product, or component of a product, meet the requirements of the Contract documents. An affidavit consisting of a sworn statement by an official of the company manufacturing the equipment or product indicating that the information on the certificate is true and accurate shall accompany the certificate.

3. A statement originating from the Contractor, or any of his subcontractors, suppliers, or any other agent which merely indicates that a particular item of equipment, product, or component of a product, meets the requirements of the Contract documents shall not be considered a certificate. Any such submittal made in this manner will not be approved and the corresponding equipment, product, or component of a product, shall not be finally accepted.

B. Manufacturer's Representative.

1. The definition of "manufacturer's representative" shall be as follows: a representative from the manufacturer's plant, familiar with the actual problems of manufacturing, installing and operating the particular product and with enough years of experience in this field to determine the successful operation of the equipment or product. Sales representatives or agents of the manufacturers will not be acceptable.

2. As related to his obtaining the manufacturer's certificates, the Contractor shall include in this contract price the cost of furnishing competent and experienced manufacturer's representatives who shall represent the manufacturer on products furnished and installed under this contract, to assist the Contractor to install products in conformity with the Contract documents.

1.05 RECORD DOCUMENT SUBMITTALS

A. Do not use record documents for construction purposes; protect from deterioration and loss in a secure fire resistive location; provide access to record documents for the Owner's inspection during normal working hours.

B. Record Drawings: Maintain a whiteprint set (blackline) of Contract drawings and shop drawings in clean, undamaged condition, with markup of actual installations that vary

from the work as originally shown. Mark each drawing with a red erasable pencil, showing the as-built condition fully and accurately. Mark up new information that is recognized to be of importance, but was for some reason not shown on either the Contract drawings or shop drawings. Give particular attention to concealed work that would be difficult to measure and record at a later date. Note related change order numbers where applicable. Record drawings must be determined by actual field survey and sealed by a registered, responsible surveyor.

C. Record Specifications: During the progress of the work, maintain one copy of the specifications, including addenda, change orders, and similar modifications issued in printed form during construction. Mark up variations in the actual work comparison with the text of specifications and modifications, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Note related record drawing information and product data where applicable. Upon completion of markup, submit to the Owner for record.

D. Record Product Data: During the progress of the work, maintain one copy of each product data submittal, and mark up significant variations in the actual work in comparison with the submitted information. Include both variations from the manufacturer's instructions and recommendations for installation. Give particular attention to concealed products and portions of the work that cannot otherwise be readily discerned at a later date by direct observation. Note related change orders and markup of record drawings and specifications. Upon completion of markup, submit complete set to Owner for record.

E. Record Sample Submittals: Immediately prior to the time of Substantial Completion, the Owner will meet with the Contractor at the site, and will determine which of the submitted samples maintained by the Contractor during the progress of the work are to be transmitted for record purposes.

F. Miscellaneous Record Submittals: Immediately prior to the time of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner for record.

1.06 PROCEDURES FOR SELECTING PRODUCTS

A. Provide products that comply with the specific performances indicated or specified, and that are recommended the manufacturer in writing for the application indicated.

1.07 PRODUCT REQUIREMENTS

A. Where available, provide standard products of types that have been produced and used previously and successfully on other projects and in similar applications.

B. Material and Workmanship:

1. Except as otherwise specifically provided for in the specifications, workmanship, material and articles incorporated in the work covered by this Contract are to be

of the best grade of their respective kinds for the purpose. Supervision of the respective skills will be by individuals experienced in the types of work undertaken.

2. Where equipment, material, or articles are referred to in the specifications as "approved" or "equal to" any particular standard, the Engineer shall decide the question of equality.

3. When required by the specifications, or when called for by the Engineer, the Contractor shall furnish the required information for approval of the material or articles that he contemplates incorporating in the work. Samples of material shall be submitted for approval when and as directed. Materials and articles installed or used without such approval shall be at the risk of subsequent rejection.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400
PROCEDURES AND QUALITY CONTROL

PART 1 - GENERAL

1.01 PRECONSTRUCTION CONFERENCE

A. Following the award of Contract, but prior to start of construction, a preconstruction conference will be held for the purpose of reviewing the Contract drawings and specifications and administrative procedures.

B. The Contractor shall be represented at the conference by a responsible officer of the firm, the field representative, subcontractors, and such other personnel as the Contractor and Owner may deem necessary.

1.02 PROTECTION OF PROPERTY

A. Existing Surfaces and Facilities:

1. Take positive action to protect existing surfaces and facilities from any damage resulting from construction operations.

2. Protect paving, landscaping, and utility facilities from damage caused by mobile and stationary equipment, including vehicles delivering materials to the site.

B. Utilities:

1. Known utility facilities are shown on the drawings. The locations of these facilities are not guaranteed, nor is there any guarantee that other utility facilities are not present. Unless otherwise specifically provided, protect utility facilities from damage and cause no interruption of service.

2. Establish and maintain direct contact with the owner or operator of each utility facility that may be affected by the work, and proceed with work that may affect a utility facility only with the cooperation and approval of the operator of the utility. Immediately inform the Owner of any agreement with the utility operator concerning the work under this Contract.

3. Before commencing construction, verify the location of all utility facilities in the vicinity of the work. Prior to beginning construction affecting any utility facility, submit to the Owner for approval a plan for performing the work, with evidence of approval by the utility operator.

C. Repair of Damages:

1. Replace in kind significantly damaged shrubs, cultivated vegetation, and trees outside the clearing limits that are damaged by construction operations. Replace trees larger than 3 inches caliper size measured at a height 3 feet above ground

swell with trees of 3 inches caliper size. Replace all other vegetation with the same species and size as that damaged, unless otherwise approved by the Engineer and/or landscape architect.

1.03 SAFETY AND FIRE PROTECTION ASSURANCE

A. The Contractor shall comply with Federal, State, and local safety and fire codes and regulations and the applicable provisions of the Occupational Safety and Health Standards issued by the Secretary of Labor pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and as amended.

B. The requirements specified apply only to work within the staging area and the project site.

C. The Contractor shall take other precautions directed by the Engineer that are necessary to protect persons and property against injury and fire at the site of the work.

D. Where there may be conflicting requirements, the more stringent one will apply.

E. Submittals:

1. Safety and Fire Protection Plan: The Contractor shall submit to the Owner and Engineer within 15 calendar days from the date of notice of award a plan for implementing and enforcing accident and fire protection for this project. Specific requirements for this plan are described below. The Contractor shall update and submit the plan periodically, as necessary, to include any new requirement not included in the first submission.

2. Accident Report: The Contractor shall maintain an accurate record of and shall immediately report to the Owner orally and within 7 days in writing to the Owner, accidents resulting in death, traumatic injury, occupational disease, or damage of property, materials, supplies, and equipment incident to work performed under this Contract.

3. Contractor's Representative: The Contractor shall submit with the safety and fire protection plan the name, address, telephone number, and signature of the Contractor's representatives who will be responsible for enforcing the provisions of that plan.

F. Safety and Fire Protection Plan:

1. The Contractor shall develop a plan describing the manner and procedure by which the Contractor shall implement and enforce the safety and fire protection requirements associated with this project. The plan shall include, but not be limited to, emergency plans; access and evacuation routes; watchman requirements; safety training; protection of the workmen; warning signs; traffic control; fire protection; noise and atmosphere monitoring; personnel protective devices and apparel; performance of required inspection of fire protection

equipment; scaffolding, hazardous materials, excavation, trenching, and shoring; general site inspections; medical services; nearest medical facilities; reporting of accident injury and illness data; drinking water; toilets and sanitary facilities.

G. Fire Protection:

1. Adequate precautions against fire shall be taken throughout all operations. Flammable material shall be kept at an absolute minimum and shall be properly handled and stored. Except as otherwise provided herein, do not permit fires to be built or open salamanders to be used in any part of the work.

2. Construction practices, including cutting and welding and protection during construction, shall be in accordance with the published standards of the National Fire Protection Association. Provide a sufficient number of approved non-freeze portable fire extinguishers distributed about the project.

3. Store gasoline and other flammable liquids in Underwriters Laboratories-listed safety containers in conformance with the National Board of Fire Underwriters recommendations. Storage, however, shall not be within a building.

H. Subcontracts:

1. The Contractor shall include this entire Article 1.04 or cause it to be included, including this paragraph, in all subcontracts hereunder.

1.04 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

A. All materials provided and work performed under this Contract shall be protected from damage before and after installation. The Contractor shall be responsible for work, and materials until inspected, tested, and finally accepted.

B. During construction, the open ends work, such as pipe and valves, shall be effectively closed with temporary covers or plugs to prevent the entry of foreign material.

C. Store and protect products in accordance with the manufacturer's recommendations and the requirements specified herein and the General Conditions.

D. Contractor shall make all arrangements and provisions necessary for the storage of materials and equipment. All excavated materials, construction equipment, and materials and equipment to be incorporated into the work shall be placed so as not to injure any part of the work or existing facilities, and so that free access can be achieved at all times to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly and compactly stored in locations that will cause a minimum of inconvenience to other Contractors, public travel, adjoining owners, tenants, occupants and the Owner's personnel.

E. Areas available on the job site for storage of materials and equipment shall be as designated and approved by the Owner. All materials and equipment must be consigned

to the Contractor directly. No delivery of materials and equipment will be accepted by the Owner and all expenses incurred by the Owner in handling materials or equipment which have been consigned or directed to the Owner, will be charged to the Contractor.

F. Materials and equipment which are to become the property of the Owner shall be stored to facilitate their inspection and ensure preservation of the quality and fitness of the work, including proper protection against damage by freezing and moisture. They shall be placed inside storage areas, unless otherwise shown, specified or accepted to the Owner.

G. Materials and equipment whether installed or being stored prior to installation shall be protected in full accordance with the manufacturer's recommendations for safeguarding the items. Upon delivery of equipment, the Contractor shall furnish the Owner a copy of the manufacturer's recommendations for the proper storage and protection of the equipment.

H. Lawns, grass plots or other private property shall not be used for storage purposes without written permission of the County or other person in possession or control of such premises.

I. Contractor shall be fully responsible for loss or damage to stored materials.

1.05 EQUIPMENT

A. Equipment and tools used in the performance of the work shall be in a safe operating condition and shall be suitable for the intended use. Mobile equipment shall be prominently marked with the Contractor's name and a unique vehicle number.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 UTILITY CONNECTIONS

A. Provide and maintain temporary and interim utility services necessary for the performance of the work. At the completion of the work, remove temporary utility services.

B. Electrical Service: Contractor shall make arrangements with PSE & G, the local electric company for temporary electrical service to the construction site and provide equipment and installation thereof. The electrical service shall be of adequate capacity for construction tools and equipment without overloading the temporary facilities.

C. Water Service: Contractor shall make arrangements with the New Jersey American Water Company for temporary connections and pay costs for water, as required for the work.

D. The Contractor shall pay all costs for utility connections, utilities used and disconnected.

1.02 TEMPORARY ELECTRICAL SERVICE

A. Provide power distribution as required to facilitate construction operations. Terminations shall be provided for each voltage supply complete with circuit breakers, disconnect switches, and other electrical devices as required to protect the power supply system.

B. A temporary lighting system shall be furnished, installed, and maintained by the Contractor as required to satisfy minimum requirements of safety and security. The temporary lighting system shall afford illumination in all areas of the work.

C. Temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the governing codes. Temporary wiring shall be maintained in a safe manner and utilized so as not to constitute a hazard to persons or property.

D. At the completion of the construction work temporary electrical service equipment shall be removed, including restoration of existing source of supply.

1.03 TEMPORARY WATER SERVICE

A. The Contractor shall furnish water necessary for construction purposes; make temporary connections to existing mains; provide temporary meter; and make arrangements and pay charges for the temporary water service including cost of installation and maintenance thereof.

B. At the completion of the construction work, temporary water service equipment and piping shall be removed by the Contractor, including restoration of the existing source of supply.

1.04 TEMPORARY SANITARY FACILITIES

A. The Contractor shall provide chemical toilets, or comparably effective device for use by all construction personnel.

B. The Contractor shall routinely dispose of wastes.

C. The Contractor shall make provisions, as necessary, for pest and odor control.

1.05 MATERIAL HOIST

A. Provide material hoists as required for normal use by trades and employ skilled operators. Provide necessary guards, signals, and safety devices required for safe operations, and runways from the hoists to each level where work is being done. The construction and operation of the material hoist shall conform to applicable codes and regulations.

1.06 TEMPORARY BARRICADES

A. Erect temporary barricades to prevent unauthorized persons from entering construction sites. Maintain the barricades for the duration of construction operations and then remove them completely from the site unless otherwise directed.

B. Barriers shall be installed before the work necessitating the barriers has begun. Barriers shall be placed to ensure safe vehicular flow and protection of pedestrians. Traffic through project area shall be routed for maximum convenience and safety. Barriers shall not be placed where they will obstruct vision.

1.07 ROADS

A. Unless otherwise specified, use established roads for site access. If temporary roads are required, build them only after approval by the Owner of both the location and the construction methods.

1.08 CONTRACTOR'S FACILITY

A. Submit working drawings showing the proposed locations and size of offices, shops, storage areas, security fencing, stationary equipment, and similar facilities.

1.09 SITE SECURITY

A. The Contractor shall provide site-specific security as the Contractor deems appropriate to protect the materials and work.

1.10 MAINTENANCE OF TRAFFIC

A. Review with authorities having jurisdiction and receive approval for any restrictions to traffic caused by the execution of this Contract.

B. Obtain and pay for permits and post bonds and sureties when required by public authorities having jurisdiction for Work located on public property, streets, and highways. Furnish, maintain, and relocate traffic control devices complying with Burlington County, and the New Jersey Department of Transportation, unless otherwise required by law of public authorities. Furnish, maintain, and relocate signs, barriers, flares, lights, and other safety devices to control traffic around and through the Work and to protect against damage or injury. Furnish flagman service wherever the Work impedes the safe flow of two-way traffic. Except where detours are specifically authorized by public authorities having jurisdiction, maintain all streets and intersections open to the safe and unrestricted passage of public, emergency, and utility vehicles at all times in both directions. The Contractor shall not block a commercial driveway except if he is actually working in front of the driveway. Where water lines cross private driveways, or single commercial driveways to parking lots, the owners shall be personally notified by the Contractor the day before. Private driveways shall be provided with access at night by steel plates or backfilling. Contractor shall prepare and submit a traffic control plan for approval.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DEFINITION

A. Project closeout requirements are defined to include those general requirements in preparation for Substantial Completion, Final Acceptance: e.g., final payment, Final Completion, and normal termination of the Contract, and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in the technical specifications.

1.02 PREREQUISITES FOR SUBSTANTIAL COMPLETION

A. The requirements hereinafter specified are in addition to the General Conditions.

B. Prior to requesting inspection for Certification of Substantial Completion, complete the following and list known exceptions in the request:

1. Provide Substantial Completion notification with list of items yet to be completed or corrected.
2. Submit final certifications and similar documents.
3. Discontinue and remove from the project site temporary facilities and services, along with construction tools and facilities, mockups and similar elements.
4. Submit a list of deviations or nonconformances currently in effect for which closeout action is required. Prepare and submit a detailed plan to close out open deviations or nonconformances.
5. Certified tabulation of tests specified.

1.03 FINAL ACCEPTANCE

A. The requirements hereinafter specified are in addition to the General Conditions.

B. The warranty period specified hereinafter shall commence with Issuance of the Certificate of Final Acceptance.

C. Prior to requesting final inspection for Certification of Final Acceptance and Final Payment, complete the following and list known exceptions in request:

1. Submit last progress payment request, complete with associated releases, consents, and supports, stating that each item has been completed or otherwise resolved for acceptance.
2. Submit final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
3. Submit final meter readings for utilities, and similar data as of the time of Final Acceptance.
4. Complete submittal of record documents.

5. Complete submittal of Operation and Maintenance Manuals.
6. Complete final cleaning as specified hereinafter.

D. Within a reasonable time after request of the Certificate, the Owner, the Contractor, the Engineer, and the Township will make an inspection of the Work to determine the status of completion. If the Owner and the Engineer do not consider the work to be complete, the Owner will notify the Contractor in writing of this fact and will include the reasons why the project is not considered complete.

E. If the Owner, the Engineer, and the Township consider the Work to be complete, the Owner will prepare and deliver to the Contractor a Certificate of Final Acceptance.

F. After the date of Final Acceptance, the Owner, or the Township will operate the Work completed in accordance with operating instructions provided by the Contractor. Unless stated otherwise in the Certificate of Final Acceptance, the Owner will perform maintenance work.

G. The Owner shall have the right to exclude the Contractor from the project after the date of Final Acceptance, but the Owner will allow the Contractor reasonable access to perform punch list work and work required by the guarantee.

H. Inspection of the work leading to Final Acceptance and commencement of the guarantee herein stipulated will not be made on any interim or partial basis, nor will guarantee obligations of the Contractor relate to, or bear upon in any manner, the warranty or warranty limits arranged between the Contractor and his suppliers. The Owner will not commence maintenance of the Work until Final Acceptance of the entire Work has been made. It is, therefore, incumbent upon the Contractor to arrange for service contracts and extended warranties or guarantees of the extent and duration he deems necessary and requisite, to protect his interests through the date of Final Completion and to include the cost of the same in the price bid under this Contract.

1.04 FINAL COMPLETION

A. Prior to the end of the warranty and guarantee period specified below, the Owner and the Engineer will make a final inspection of the entire work, to determine the status of all work in regard to warranty and guarantee provisions. The Contractor will be notified in writing of all repairs, and renewals required, and will be given a specified time in which to perform such work. Upon successful completion of all such repairs and renewals, as determined by the Engineer, the Owner or the Township will issue a Certificate of Final Completion of the entire work.

1.05 FINAL CLEANING

A. Except as otherwise indicated or requested by the Engineer and/or the Township, remove temporary protective devices and facilities that were installed during the course of the work to protect previously completed work during the remainder of the construction period.

B. Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at the site, nor bury debris or excess materials on the property, or discharge volatile or other harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose.

1.06 WARRANTY AND GUARANTEES

A. The Contractor warrants and guarantees to the Owner for a period of one year after the date of Final Acceptance the following:

1. That the guaranteed obligations assumed by the Contractor under these Contract Documents shall not be held or taken to be impaired because of the Specifications, indication or approval by or on behalf of the Owner of any articles, materials, means, combinations or things used or to be used in the construction, performance and completion of the work, or any part thereof.
2. That no use or acceptance by the Owner of the work or any part thereof, nor any failure to use the same, nor any repairs, adjustments or corrections made by the Owner due to the Contractor's failure to comply with any of his obligations under the Contract Documents, shall impair in any way the guaranteed obligations assumed by the Contract or under these Contract Documents.

B. If the Contractor neglects to make such repairs during the guarantee period, the Owner may cause such damage or defective work to be repaired and made good at the cost and expense of the Contractor, including compensation required for additional professional services. The Contractor shall also bear the expenses of making good all work of others destroyed or damaged by his correction, removal or replacement of his defective work.

C. The Contractor shall maintain the Performance Bond for the project in full force throughout the entire guarantee period, until the Certificate of Final Completion is issued. The Contractor shall furnish proof upon request of the Owner that the Bond is in full force, including proof of premium payments.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02200
EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the requirements for the earthwork necessary to complete this project.

PART 2 - PRODUCTS

2.01 SOIL AND AGGREGATE MATERIALS

A. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups SM, SC, or better.

B. Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GC, ML, MH, CL, CH, OL, OH, and PT.

C. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, and natural or crushed sand.

D. Backfill and Fill Materials: Satisfactory soil materials free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. The moisture content of fill soils shall be maintained within ±2 percentage points of optimum moisture content determined from the Proctor density test.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation Classifications: The following classifications of excavation will be made when rock is encountered:

1. All excavation necessary for the completion of the Work shall be deemed unclassified. No allowances or extras shall be made for the presence of rock encountered in any excavation. The Engineer and the Owner make no representations or warranties as to the surface, subsurface or underground site conditions. As a result, no claim, amendment, change order or contract time extension will be made or awarded for concealed, unknown, different or unexpected subgrade composition encountered during or in any excavation.

3.02 STABILITY OF EXCAVATIONS

A. Local codes, ordinances, and requirements of agencies having jurisdiction shall be complied with.

B. Sides of excavations shall be sloped to comply with local codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

C. Materials for shoring and bracing shall be provided, such as sheet piling, uprights, stringers, and cross braces, in good serviceable condition. Shoring and bracing in excavations shall be maintained regardless of time period excavations will be open. Shoring and bracing shall be extended as excavation progresses.

3.03 DEWATERING

A. Surface water and subsurface or ground water shall be prevented from flowing into excavations and from project site and surrounding area.

B. Water shall not be allowed to accumulate in excavations. Pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations shall be provided and maintained.

C. Temporary drainage ditches and other diversions to convey rainwater and water removed from excavations to areas outside the excavation limits shall be established and maintained. Trench excavations shall not be used as temporary drainage ditches.

3.04 STORAGE OF EXCAVATED MATERIALS

A. Excavated materials acceptable for backfilling and fill shall be stockpiled where directed.

B. Soil materials shall be located and retained away from edge of excavations.

C. Excess excavated soil material and materials not acceptable for use as backfill or fill shall be disposed of off-site.

3.05 TRENCH EXCAVATION FOR PIPES AND CONDUIT

A. Trenches shall be excavated to uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches of clearance on both sides of pipe or conduit.

B. Trenches shall be excavated to depth indicated or required to establish indicated slope and invert elevations and to support bottom of pipe or conduit on undisturbed soil. Beyond building perimeter, trenches shall be excavated to allow installation of top of pipe below frost line.

C. For pipes 6 inches or larger in nominal size, the bottom of trench shall be shaped to fit bottom of pipe for 90 degrees (bottom 1/4 of the circumference). Bell holes shall be dug at each pipe joint to relieve pipe bell of loads to ensure continuous bearing of pipe barrel on bearing surface.

3.06 COLD WEATHER PROTECTION

A. Excavation bottoms shall be protected against freezing when atmospheric temperature is less than 35 degrees F.

3.07 TRENCH BACKFILL AND FILL

A. Soil material shall be placed in layers to required subgrade elevations, for each area classification listed below, using materials specified in Part 2 of this Section.

B. Trenches shall not be backfilled until tests and inspections have been made and backfilling is authorized by Engineer. Care shall be used in backfilling to avoid damage or displacement of pipe systems.

3.08 FILL UNDER SLABS ON GRADE

A. Samples on all materials that the contractor proposes to use for compacted fill shall be approved by the geotechnical engineer.

B. Compacted fill shall consist of local material free of deleterious matter and classified CL, SC, GC, GM, or SM per ATSM D2487.

C. The control of moisture for placing the fill will be based on the results of compaction tests per ASTM D-1557.

D. All compacted fill shall have a density of at least 95% for cohesionless soils and 90% for cohesive soils of the modified proctor maximum dry density as determined by ASTM D1557.

E. Prior to placement of any fills, the site shall be stripped of all topsoil, vegetation, rocks, and organic materials and the exposed subgrade shall be compacted in place to a confirmed density of 95% of the modified proctor maximum dry density.

F. Fill material shall be placed in loose lifts not exceeding 8” in thickness and shall be mixed, spread and placed in such a way as to produce a uniform thickness of material after placing.

G. Each layer of fill shall be compacted with a minimum of 6 complete passes on all portions of the surface of each lift of fill by rubber-tired rollers, sheepsfoot rollers or other mechanical equipment approved by the geotechnical engineer.

H. Compacted fill placed within 4 feet of substructures should be placed in horizontal lifts not to exceed 4 inches thickness and compacted with hand tampers or light compaction equipment to the same standards.

I. Whenever in place densities are found below acceptable limits, additional rolling to produce the specified densities shall be required.

3.09 PLACEMENT AND COMPACTION

A. Vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials shall be removed from ground surface prior to placement of fills. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be broken up so that fill material will bond with existing surface.

B. When existing ground surface has a density less than that specified under "Compaction" for particular area classification, the ground surface shall be broken up, pulverized and moisture conditioned to within $\pm$ 2% of optimum moisture content, and compacted to required depth and percentage of maximum density.

C. Backfill materials shall be placed in layers not more than 6 inches in loose depth of material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Before compaction, each layer shall be moistened or aerated as necessary to provide optimum moisture content. Each layer shall be compacted to required percentage of maximum dry density or relative dry density for each area classification.

E. Backfill materials shall be placed evenly adjacent to piping, or conduit to required elevations. Wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure shall be placed, piping, or conduit shall be prevented.

F. Soil compaction shall be controlled providing minimum percentage of density specified for each area classification indicated below. Improperly compacted areas or lifts shall be corrected as directed by Engineer if soil density tests indicate inadequate compaction.

G. Structural and Select Backfill is to be compacted to 95% of maximum density at optimum moisture content. Controlled Fill is to be compacted to 90% of maximum density at optimum moisture content.

H. Where subgrade or layer of soil material must be moisture conditioned before compaction, water to surface of subgrade or layer of soil material shall be uniformly applied.

I. Placing of fill containing organic matter; placing of fill with moisture content too high or too low for proper compaction; placing of fill when free water is standing on the existing fill surface; placing of fill in a frozen condition or on top of frozen matter shall not be permitted.

J. The geotechnical engineer shall supervise the placing of the compacted fill and all the material and equipment used for this purpose and shall make such soils tests as may be required for the completion of the work, performing at least 6 in place density tests during each eight-hour shift.

3.10 GRADING

A. Areas within limits of grading under this section, including adjacent transition areas shall be uniformly graded.

B. Areas to receive topsoil shall be finished to within not more than 0.10 foot above or below required subgrade elevations.

3.11 FIELD QUALITY CONTROL

A. Field density tests shall be performed in accordance with ASTM D 6938 Blue Cage Method, as applicable.

3.12 EROSION CONTROL

A. The Contractor shall be responsible for satisfying any and all erosion control and stormwater management requirements for any land disturbing activities, including but not limited to on-site or offsite borrow, on-site or offsite stockpiling or disposal of waste materials. The contractor shall refer to the erosion and sedimentation control notes provided in the formal site plans by The Bowman Consulting Group.

B. Erosion control methods shall be provided in accordance with requirements of authorities having jurisdiction.

3.13 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash, and debris, and dispose of it off Owner's property.

END OF SECTION

SECTION 02560
PIPING SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the requirements for all piping systems to be installed as part of this project.

1.02 GENERAL REQUIREMENTS

A. The drawings show the general layout and do not necessarily reflect the exact location of the various items. Accordingly, the Contractor shall not scale the plans, but shall acquaint himself with the extent and character of the work required and its relation to the work under other items. It is the intention of the drawings and specifications to provide complete and workable piping systems; any miscellaneous valves and fittings required for proper completion of the work shall be provided at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. All material shall be as noted on the Contract Drawings.

2.02 GRAVITY SEWERAGE LINES

A. Piping shall be polyvinyl chloride PVC plastic gravity sewer pipe with integral wall bell and spigot joints. Pipe shall be manufactured from an approved PVC compound conforming to ASTM F679 and wall thickness T-1.

B. Joints, Fittings, and Gaskets

1. Integral bell with elastic gasketed joint that forms a watertight seal when compressed radially on the pipe spigot inside the bell.
2. Joints shall conform to ASTM D3212.
3. Fittings shall be PVC components conforming to ASTM D1784.
4. Gaskets shall conform to ASTM F477.

2.03 FORCE MAIN PIPING AND APPURTENANCES

A. Ductile Iron Piping

1. Ductile iron pipe shall conform to American National Standard A21.51 (AWWA C151), latest revision, pressure class 350.

2. Pipe shall be lined with Protecto 401 in accordance with ANSI A21.4 (AWWA C104), latest revision and a standard bituminous exterior coating.

3. Joints shall be rubber-gasket joints of the mechanical or push-on type in accordance with ANSI A21.11 (AWWA C111), latest revision. Flanged joints shall be used above grade and mechanical or push-on joints shall be used below grade.

4. Ductile iron fittings shall be flanged and conform to ANSI A21.10 (AWWA C110), latest revision.

A. SCH 80 PIPE AND FITTINGS

1. Piping shall conform to ASTM D1785.

2. PVC fittings shall be Schedule 80 PVC in accordance with ASTM 2467.

B. PVC C-900

1. Shall be AWWA C-900 DR18 conforming to ASTM D1784.

2. Joints shall be push on type in compliances with ASTM D3139 with elastomeric gasket joints meeting ASTM F477.

3. Fittings shall be mechanical joint class 350 ductile iron fittings conforming to ANSI 21.20, coated to match ductile iron pipe.

C. Sleeve Type Couplings: Mechanical joint cast iron solid sleeves shall be used for below grade restrained coupling.

D. Hardware: All hardware, such as nuts and bolts, not specified above shall be stainless steel.

2.04 WATER SERVICE LINE PIPING AND APPURTENANCES

A. Water service piping shall be as specified above.

B. Fittings shall be compression type bronze fittings.

C. Frost-proof hydrants shall be Merrill Manufacturing Company Model Hide-Drant, or Engineer approved equal.

2.05 VALVES

A. Gate Valves

1. Gate valves shall be cast iron resilient seated gate valves as manufactured by Kennedy, Mueller, American Flow Control or approved equal. Gate valves shall be suitable for a minimum working pressure of 200 psig. Gate valves shall be in accordance with AWWA C509 or AWWA C515, latest revision. Gate valves shall have non-rising bronze stems, resilient seats, rubber encapsulated iron discs, and O-ring seals. All buried service valves shall have M.J. ends conforming to

ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53. Valves shall be capable of handling wastewater.

B. Check Valves

1. Check valves 4" and larger shall meet the requirements of AWWA C508 and shall be cushioned swing type valves constructed of cast iron or steel body with a stainless-steel resilient seat ring, non-corrosive shaft that extends through the body for attaching weight and lever, and completely non-corrosive cushion chamber. They shall have a minimum pressure rating of 200 psi with class 125 flanges. Valves shall be as manufactured by Golden-Anderson, Dezurik, or approved equal.

C. Air Release Valves

1. Air release valves shall either be 2” model VM-301 AS, Valmatic air release valve, or Model Series 34-WW Cla-Val air release valve. Air release valve shall include stainless steel backwash kit. All hardware shall be stainless steel.

2.06 RESTRAINED JOINTS AND COUPLINGS

A. Ductile iron restrained joint retainer glands shall be as manufactured by EBAA Iron Sales, Inc., “Megalug” Series 1100 or approved equal.

B. Ductile iron restrained couplings shall be as manufactured by EBAA Iron Sales, inc., Mega-Coupling Series 3800 or approved equal.

C. Restraints for C900 PVC pipes at ductile iron fittings shall be Series 15PF00 as manufactured by EBAA Iron, Inc.

2.07 PIPE SUPPORTS

A. Pipe supports shall be provided where shown on the drawings; where specified or indicated; and as required to support the weight of pipe, liquid, and any anticipated thrust.

B. The maximum distance between supports shall be 8 feet unless indicated otherwise, except the maximum distance between supports shall not exceed that recommended by the pipe manufacturer.

C. Pipe supports shall be stainless steel saddle Standon Model S92 as manufactured by Material Resources, Inc. or an approved equal.

D. The Contractor shall provide metal pipe hangers, inserts, struts, structural members, brackets, plates, anchors, and other supports as required.

2.08 PIPE SLEEVES, WALL PIPES

A. Pipe sleeves shall be installed where piping passes through walls or slabs.

B. Sleeves for pipes three inches and larger, sleeves below grade, and sleeves into tanks containing liquid shall be HDPE sleeves with a compressible rubber gasket. No sleeves shall be installed through structural beams or joints unless the installation is specifically shown or approved.

C. Sleeves shall be fastened securely in floors and walls so they will not be displaced when concrete is poured or when other construction is built around them, and shall be protected to prevent concrete, plaster, or other materials from being forced into the space between the pipe and sleeve. Wall sleeves shall finish flush with finish line. The bottom of floor sleeves shall be set flush with the underside of the slab below, the top extending 3/4 inch above the finished floor.

D. Where pipes pass through concrete slabs on grade, a mechanical joint wall pipe shall be provided. Mechanical joint bell shall terminate 8 to 12 inches above finished floor. The buried end of the pipe shall extend through the slab and may extend to the next pipefitting.

2.09 PIPE SEALS

A. Contractor shall determine the required inside diameter of each individual wall opening or sleeve before ordering, fabricating or installing. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and to assure a watertight joint.

B. Contractor shall familiarize his installing personnel with manufacturer's instruction bulletin for the proper procedure for installing and tightening the seal to provide a watertight pipe penetration.

C. Unless otherwise noted, seals shall be Link-Seal modular EPDM seal assemblies as manufactured by PSI-Thunderline/Link-Seal.

D. Seal assemblies shall be provided with stainless steel nuts and bolts.

PART 3 - EXECUTION

3.01 GENERAL

A. Handling and Storing Materials

1. The Contractor shall be responsible for the safe and proper delivery, unloading, storage and handling of materials furnished by him and intended for the work until it has been incorporated in the complete project.

2. Proper care and protection shall be exercised in handling pipe, fittings and other

accessories in unloading from delivery trucks. The pipe shall be lifted by hoists and slid or rolled on skidways in such a manner as to avoid shock. Under no circumstances shall the pipe be dropped. Pipe must not be skidded or rolled against pipe already on the ground.

3. Materials shall be stored in accordance with manufacturer's recommendations.

B. Excavating and Backfilling

1. Contractor shall remove excavating of any and all materials encountered in the course of excavating for all underground utility systems. After the work is in place, backfill with satisfactory materials as specified in Section 02200. All piping shall be entirely backfilled with suitable material.

   a. Provide all necessary pumping required to keep excavation relatively free from water from any source at all times. Provide all necessary shoring required for the protection of excavations, existing utilities and workmen.

   b. Provide sufficient barricades, etc., adjacent to excavations to safeguard against injury to workmen and the public. Provide and maintain sufficient warning lanterns at walks, roadways, and parking areas to provide safety at night.

   c. After installation and inspection of piping and equipment have been complete, back fill all excavations carefully. Place backfill in 6-inch layers and compact to not less than 95% of the maximum density at optimum moisture + 2%. Compaction under paved areas shall be not less than 95% of maximum density at optimum moisture + 2%. Maximum density shall be determined by Compaction Test ASTM D698 (Standard Proctor). Backfill materials shall meet requirements of Section 02200 - Earthwork.

   d. Exercise special care in backfilling trenches in which sewers are laid to guard against disturbing the joints. Such backfilling shall be placed evenly in 6-inch layers and carefully compacted.

   e. Remove and dispose of any material not used for backfill.

   f. Plastic marking tape shall be of plastic material with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to three feet (3') deep. The tape shall have the words "SEWER LINE BELOW" in contrasting letters repeated continuously. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion.

   g. Plastic marking tape shall be placed directly above the force main at a depth of two (2.0) feet below the normal ground elevation. The tape shall

be laid flat in a continuous manner without kinks, knots or other irregularities which may interfere with the proper performance of the tape.

2. Removal of subsurface obstructions, which are uncovered during excavation for installation of the utility systems, shall be removed by the Contractor at his expense. This shall include removal or rock, existing concrete or brick of existing building foundation, footings, abandoned utility piping, wires, structures, etc., which may not be visible from surface investigations before construction, but will interfere with new installations. If such obstructions are encountered, they shall be removed 2 feet from around the area of new manholes, catch basins, and sewer piping and backfilled with a suitable material as specified.

C. Separation of Water and Sewer Lines

1. Parallel Installation:

a. Normal Conditions: Water lines shall be at least 10 feet horizontally from a sewer or sewer manhole whenever possible, and the distance shall be measured edge-to-edge.

b. Unusual Conditions: When local conditions prevent a horizontal separation of at least 10 feet, the water line may be closer to a sewer or sewer manhole provided that the water main is in a separate trench located on one side of the sewer, and:

c. The bottom of the water line is at least 18 inches above the top of the sewer.

2. Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA C900 or C905 approved water pipe pressure-tested in place to a minimum 30 psi without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place without leakage.

3. Crossing:

a. Normal Conditions: Water lines crossing over sewers shall be at least 18 inches between the bottom of the water line and the top of the sewer.

b. Unusual Conditions: When local conditions prevent a vertical separation described in Crossing, Normal Conditions, paragraph above, the following construction shall be used:

1) Sewers passing over or under water lines shall be constructed of the materials described in Parallel Installation, Unusual Conditions, Paragraph 3.01.C.2 above.

2) Water lines passing under sewers shall, in addition, be protected

by providing:

a) A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line.

b) Adequate structure support for the sewers to prevent excessive deflection of the joints and settling on the breaking water line.

c) That the length of the water line be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.

4. Contractor shall obtain approval from Engineer prior to installation of any water line crossing under a sewer line.

D. Thrust Restraint of Pressure Piping Systems

1. All mechanical joints shall be restrained with Mega Lug restraining glands or equal. Restrained joints shall also be used on one pipe joint in both directions of each fitting. See New Jersey Department of Environmental Protection's Water and Sewer Design and Construction Standards and Township of Hopewell's Sanitary Sewer Design Standards and Construction Details for details.

3.02 GRAVITY SEWERAGE PIPING

A. Laying of sewer pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the foundation and/or bedding has been prepared. Mud, silt, gravel, and other foreign materials shall be kept out of the pipe and off the jointing surfaces.

B. Bedding shall be shaped so that the entire length of pipe will have full bearing. No blocking of any kind shall be used to adjust the pipe to grade.

C. All pipe and fittings shall be carefully lowered into the trench in such a manner as to prevent damage to pipe or coatings. Under no circumstances shall pipe materials be dropped or dumped into the trench.

D. All pipes laid shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipes shall be laid to conform to the prescribed line and grade shown on the Drawings, within the limits that follow. At least three batter boards shall be maintained in position during all pipe laying operations unless a laser beam is used.

E. Variance from established line and grade shall not be greater than 1/32 of an inch per inch of pipe diameter and not to exceed ½ inch, provided that any such variation does not result in a level or reverse sloping invert; provided also, that variation in the invert elevation between adjoining ends of pipe, due to nonconcentricity of joint surface and pipe interior surfaces, does not exceed 1/64 inch per inch of pipe diameter, or ½ inch

maximum.

F. The sewer pipe, unless otherwise approved by the engineer, shall be laid up grade from point of connection of the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress the forward end of the pipe shall be kept tightly closed with temporary plug.

G. The pipe shall be fitted and matched so that units will form a smooth, uniform invert.

H. Prior to joining the pipe, all surfaces of the pipe to be joined and surfaces of factory-made jointing materials shall be clean and dry. Lubricants, primers, adhesives, etc., shall be applied and the pipes joined as recommended by the manufacturer's specifications. Sufficient pressure shall be applied in making the joint to assure that the pipe is "home." The interior of the pipe shall be cleaned of all foreign materials as the work progresses. At the end of the workday, the last pipe laid shall be blocked to prevent creep, and closed with tight fitting cover.

I. Trenches shall be carefully filled using select backfill materials in six-inch layers to a depth of 12-inches above the top of the pipe. Each layer shall be evenly spread; the moisture content brought to nearly optimum conditions; and then compacted to a density that is not less than 95% of maximum density at optimum moisture content.

J. The remainder of the trench shall be filled using controlled fill, placed in layers not exceeding six inches, and compacted while at a moisture content near the optimum and to a density that is not less than 90% of the maximum density at optimum moisture content.

K. All sanitary sewer mains are required to pass the following tests to insure there will be neither exfiltration nor infiltration:

1. Gravity Mains

    a. Exfiltration and Lamping Tests: All gravity mains.
    b. Deflection Testing: PVC gravity mains only.

2. Force Mains:

    a. Exfiltration: All force mains.

3. No testing by the Township or Engineer shall be conducted until the requirements provided in the Record Plan Section are met.

4. All sanitary sewer mains shall be color televised (after having been flushed with water) prior to acceptance by the Township.

3.03 FORCE MAIN PIPING AND APPURTENANCES

A. Laying of force main shall be accomplished in the trench only after it has been dewatered and the foundation and/or bedding has been prepared. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off the jointing surfaces.

B. Bedding shall be shaped so that the entire length of pipe will have full bearing. No blocking of any kind shall be used to adjust the pipe to grade.

C. All pipe and fittings shall be carefully lowered into the trench in such a manner as to prevent damage to pipe or coatings. Under no circumstances shall pipe materials be dropped or dumped into the trench.

D. All pipe laid shall be retained in position so as to maintain alignment and joint closure until sufficient backfill has been completed to adequately hold the pipe in place. All pipes shall be laid to conform to the prescribed line and grade shown on the Drawings.

E. The pipe shall be fitted and matched so that when laid in the work, units will form a smooth, uniform invert.

F. Prior to joining the pipe, all surfaces of the pipe to be joined and the surfaces to factory made jointing materials shall be clean and dry. Lubricants, primers, adhesives, etc., shall be applied and the pipes joined as recommended by the manufacturer's specifications. Sufficient pressure shall be applied in making the joint to assure that the pipe is "home." The interior of the pipe shall be cleaned of all foreign material as the work progresses. At the end of the workday, the last pipe laid shall be blocked to prevent creep and 01closed with tight fitting cover.

3.04 YARD PIPING AND APPURTENANCES

A. Service line and yard piping shall be tested at not less than 1-1/2 times working pressure for 2 hours. Pressure shall be increased in 50-psi increments and each joint inspected between increments. Test pressure shall be held for one hour; decrease to 0 psi. Test pressure shall be slowly achieved again and held for one more hour. No leakage is allowed. Remake leaking joints with new materials and repeat test until leakage is within above limits. Testing procedures should conform to Township of Hopewell's Sanitary Sewer Design Standards and Construction Details

B. Service line piping shall be cleaned and disinfected as follows:

1. New water piping shall be purged and disinfected in accordance with AWWA C600 and C651.

2. Piping shall be filled with a water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) the system or part thereof and allow to stand for 24 hours.

3. Piping shall be drained and refilled with a water/chlorine solution containing at least 200 parts per million of chlorine and isolate and allowed to stand for 3 hours.

4. Following the allowed standing time, the piping shall be flushed with clean, potable water until chlorine residual is at an acceptable level.

3.05 REMOVAL OF ALL AIR

A. Contractor is responsible for the removal of all air after testing and tie in of all pipelines.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finish for the cast-in-place concrete slabs. Concrete shall conform to Township of Hopewell's Sanitary Sewer Design Standards and Construction Details.

B. See Section 02200 - Earthwork for drainage fill under slabs-on-grade.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For steel reinforcement and formwork.

D. Material: Test reports or certificates.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.
2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.

E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.03 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch (19-mm) nominal maximum coarse-aggregate size.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.04 VAPOR RETARDERS

A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.05 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

2.06 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.07 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3,000 psi (31 MPa) at 28 days unless otherwise noted on drawings.
2. Maximum Water-Cementitious Materials Ratio: 0.50
3. Slump Limit: 4 inches (100 mm) plus or minus 1/2 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch (19-mm) nominal maximum aggregate size.

2.08 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.09 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.

1. Regardless of air temperature mixing and delivery time shall be maximum 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Chamfer exterior corners and edges of permanently exposed concrete.

3.02 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.03 VAPOR RETARDERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturers recommended tape.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.05 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.07 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.09 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

3.11 FIELD QUALITY CONTROL

A. Testing and Inspecting: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION

SECTION 03400
PRE-CAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the requirements for the pre-cast concrete manholes, wet well, and the valve vaults to be provided as part of this project. Pre-cast concrete structures should conform to MUA Rules and Regulations.

1.02 QUALITY CONTROL

A. Manufacturer shall provide certified calculations that the concrete structures and reinforcement is adequately designed for the structure dimensions and depths specified.

B. Pre-cast structures shall conform to ACI and PCI standards. Manufacturer shall be a member of PCI.

C. Pre-cast structures shall conform to all applicable building codes.

1.03 SUBMITTALS

A. Shop drawings of the structures shall be submitted to the Engineer prior to delivery per Section 01300.

B. Shop drawings shall include the following:

1. Detailed drawings
2. Design criteria
3. Design calculations sealed by a Professional Engineer licensed in New Jersey.
4. Lifting and installation procedures

PART 2 - PRODUCTS

2.01 GENERAL

A. Pump station wet well, valve vault, and meter vault shall be pre-cast concrete structures as manufactured by Americast, Rotondo Precast, Contractors Precast Corporation, Hanson Pipe and Products, or approved equal.

B. Pre-cast concrete structures shall meet requirements of ASTM C913 except that the minimum compressive strength of 5000 psi using Type II or III cement.

C. The structures shall have an extended base conforming to ASTM C913 except that the minimum compressive strength of 5000 psi using Type II or III cement.

D. Exterior shall be coated with a bitumastic sealer applied with two coats, with a minimum of 7 mils per dry coat.

E. Structures shall be adequate to withstand hydrostatic and soil bearing pressure loadings as indicated on design drawings.

F. Structures shall be furnished with pre-cast flat slab tops conforming to ASTM C913 with aluminum access doors and appurtenances in accordance with design drawings. The access doors shall be integrally cast into the top at the place of manufacturer. The access doors shall be AASHTO H20 rated as manufactured by Bilco or approved equal. A padlock hasp for owner-supplied padlock shall be provided.

G. Tongue and groove joints of the pre-cast sections shall be sealed with a rubber gasket conforming to ASTM C913 and a minimum of two continuous beads of pre-formed butyl mastic.

H. Pipe connectors shall be Link Seal flexible pipe connectors meeting ASTM C923 and installed by the structure manufacturer.

2.02 VALVE VAULT AND METER VAULT

A. The bottom interior of the valve vault shall be grouted and sloped to drain.

B. Vault drains shall be cast into the side of the vault as shown on the contract drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. Structures shall be set level to prevent settlement.

B. The pump station wet well shall be leak tested for a minimum of 48 hours prior to backfilling. Leak testing shall include filling tank with clean water and measuring water levels. There shall be no leakage from tank. Contractor shall provide the water necessary to complete the leak test.

END OF SECTION

SECTION 03600
NON-SHRINK GROUTS AND MORTARS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Non-shrink grouts and mortars shall include, but not necessarily be limited to, prepackaged, non-shrink, cement-based grouts and mortars requiring only the addition of water. The grouts and mortars shall be specifically formulated for use as a sealant around wall penetrations, for use under machine or column bases, for bolt anchorages, and similar applications where drying shrinkage would be detrimental. Non-shrink grouts and mortars shall be furnished and placed in accordance with the Contract Documents, where indicated on the Plans, or as directed by the Engineer.

1.02 RELATED WORK INCLUDED ELSEWHERE

A. Section 04100 - Mortar

1.03 QUALITY ASSURANCE

A. Inspection

1. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.

B. Containers

1. All non-shrink grouts and mortars shall be furnished and stored in the manufacturer's original containers.

1.04 SUBMITTALS

A. Shop Drawings

1. Shop drawings shall be submitted as specified in the "General Provisions" for all non-shrink grouts and mortars furnished. The shop drawings shall include product description and storage, handling, mixing, and placing instructions or recommendations.

B. Certificates of Compliance

1. Certificates of compliance shall be submitted in accordance with the "General Provisions" for all non-shrink grouts and mortars stating that the material furnished meets the requirements specified in Section 03600.02.

PART 2 - MATERIALS

2.01 MATERIALS FURNISHED BY THE COUNTY

A. The County will not furnish any materials for non-shrink grouts and mortars.

B. The Contractor may obtain potable water from the Township potable water system for mixing with the dry material. The Contractor shall contact the Department of Utilities for requirements.

2.02 CONTRACTOR'S OPTIONS

A. Non-shrink grouts and mortars may be either metallic or non-metallic as specified in Article C.

2.03 DETAILED MATERIAL REQUIREMENTS

A. Water from Other Than Potable Sources

1. Water shall meet the pH requirements of AASHTO T 26, Method B. Water shall not smell or be discolored. Water suspected of questionable quality shall meet limits of the comparison tests with distilled water in accordance with AASHTO T26. The chloride concentration of water used in mixing and curing of non-shrink grouts and mortars will be determined in accordance with ASTM D 512 and shall not have a chloride concentration exceeding 1000 ppm.

B. Non-Shrink Grouts and Mortars

1. Non-shrink grouts and mortars shall conform to the requirements of the Corps of Engineers specification CRD-C 588, Type 3.1, b or d. The grout or mortar shall have a minimum compressive strength of 5000 psi in 7 days when tested in accordance with AASHTO T 106 except that the cube molds shall remain intact with the top firmly attached throughout the curing period. The non-shrink grout or mortar shall have a minimum expansion of 0.0% after 7 days when tested in accordance with AASHTO T 160.

PART 3 - EXECUTION

3.01 EXECUTION

A. Preparation

1. All surfaces to receive non-shrink grout and mortar shall be cleaned of all oil, grease, dirt, and laitance down to sound concrete. Rust shall be removed from the underside of all plates and from all bolts or other embedment items by sanding or power brushing.

2. Where the concrete surface to receive the non-shrink grout or mortar is smooth,

the surface shall be roughened with a small chipping hammer and then saturated with water prior to placing the grout or mortar.

B. Forms

1. When required, forms shall be furnished and placed to confine the non-shrink grout. The forms shall be strong enough to resist buckling and tight enough to prevent leakage.

C. Mixing

1. Mixing water shall be proportioned in accordance with the manufacturer's recommendations for the intended application. Use the stiffest mix possible consistent with placement methods.

2. Mixing shall be accomplished in water-tight containers following the manufacturer's recommendations.

D. Pouring or Pumping Grout

1. Grout shall be poured or pumped into position in such a manner as to avoid air pockets and to fill the entire void. When necessary, use rods or other tools to compact the grout and remove all voids.

E. Placing Mortar

1. Carefully place the mortar in such a manner to avoid air pockets and assure that the material is in complete contact with all surfaces. Unless otherwise specified, the finished surface shall be tooled smooth to match the adjacent area.

F. Curing

1. The non-shrink grout or mortar shall be cured for the time and in the manner recommended by the manufacturer.

3.02 METHOD OF MEASUREMENT

A. Non-shrink grouts and mortars will not be measured.

3.03 BASIS OF PAYMENT

A. Non-shrink grouts and mortars will not be paid for as a separate item but is considered incidental to other items of work. Payment will be included in other related items of work and will constitute full compensation for all labor, equipment, tools, and incidentals necessary to complete the required work.

END OF SECTION

SECTION 04100
MORTAR

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Township standards overrule the following specifications, should any conflicts exist. Mortar shall include, but not necessarily be limited to, furnishing prepackaged or site mixed mortar for masonry, pipe connections, grouting, and other uses as specified in the Contract Documents or as directed by the Engineer.

1.02 QUALITY ASSURANCE

A. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.

1.03 SUBMITTALS

A. Shop drawings shall be submitted as specified in the "General Provisions" for all mortar admixtures. The shop drawings shall include product information, storage, handling, proportioning, and mixing instructions or recommendations.

B. Certificates of compliance shall be submitted in accordance with the "General Provisions" for Portland cement, hydrated lime, and masonry cement stating that the material meets the requirements specified in Section 04100.02.

PART 2 - MATERIALS

2.01 MATERIALS

A. Materials Furnished by the County

1. The County will not furnish any materials for mortar.

2. The Contractor may obtain potable water from the County's potable water system for mixing with the dry material. The Contractor shall contact the Township Department of Utilities for requirements.

B. Detailed Material Requirements

1. Water from Other Than Potable Sources

a. Water shall meet the pH requirements of AASHTO T 26, Method B. Water shall not smell or be discolored. Water suspected of questionable quality shall meet limits of the comparison tests with distilled water in accordance with AASHTO T 26. The chloride concentration of water used in mixing and curing of Portland cement will be determined in accordance

with ASTM D 512 and shall not have a chloride concentration exceeding 1000 ppm.

2. Portland Cement

   a. Portland cement shall meet the requirements of AASHTO M 85 with the fineness determined in accordance with AASHTO T 153 and the time of setting determined in accordance with AASHTO T 131.

3. Masonry Cement

   a. Masonry cement shall meet the requirements of AASHTO M 150 except the water retention and staining tests are waived.

4. Mortar Sand

   a. Mortar sand shall meet the requirements of AASHTO M 45 deleting the requirements for fineness modulus and deleterious substances.

5. Hydrated Lime for Finishing

   a. Hydrated lime for finishing shall meet the chemical requirements of ASTM C 206.

6. Hydrated Lime for Masonry

   a. Hydrated lime for masonry shall meet the chemical requirements of ASTM C 207, Type N.

7. Admixture

   a. Only as approved by the Engineer.

PART 3 - EXECUTION

3.01 EXECUTION

A. Mix Requirements

1. Mortar used for masonry shall be composed in accordance with one of the following:

   a. One part Portland cement, three parts mortar sand by dry loose volume, and hydrated lime not to exceed 20% of the cement by weight.

   b. One part masonry cement and three parts mortar sand by dry loose volume.

c. Prepared bag mixes consisting of masonry cement and mortar sand. The prepared mixes shall produce a minimum compressive strength of 500 psi in 7 days when tested by the applicable procedures of AASHTO M 150.

2. Pointing of masonry after the masonry has been laid shall not be permitted without the approval of the Engineer. The mortar used for pointing of masonry shall be composed of one part Portland cement, one part mortar sand by dry loose volume, and hydrated lime not to exceed 20% of the cement by weight.

B. Mortar for Pipe Connection

1. Mortar used for pipe connections shall be composed in accordance with one of the following:

a. One part Portland cement and two parts mortar sand by dry loose volume.

b. Prepared bag mixes consisting of Portland cement and mortar sand. The prepared mixes shall produce a minimum compressive strength of 1000 psi in 7 days when tested by the applicable procedures of AASHTO T 106.

C. Mortar for Grout

1. Mortar used for grouting anchor bolts, pipe handrail posts, and miscellaneous items shall be composed in accordance with one of the following:

a. One part Portland cement and one part mortar sand by dry loose volume.

b. Prepared bag mixes consisting of Portland cement and mortar sand. The prepared mixes shall produce a minimum compressive strength of 1000 psi in 7 days when tested by the applicable procedures of AASHTO T 106.

2. Water shall be added in sufficient quantity to produce a fluid mixture.

D. Mortar for Precast Concrete Grade Ring

1. Mortar for placing precast concrete grade rings shall be Type M, meeting requirements of ASTM C-270 and the mortar mix water shall consist of 3 parts water to 1 part Acrylic 60 liquid bonding agent as manufactured by Thoro Systems Products or equal.

E. Mixing

1. Mortar may be mixed in an approved mixing machine or manually in a tight box. The dry materials shall be mixed until the mixture assumes a uniform color. Water shall be added as the mixing continues until the proper consistency has been attained for the intended use.

2. Mortar shall be mixed only in quantities that satisfy immediate use. Mortar not used within 45 minutes after the water has been added shall be wasted. Retempering of mortar shall not be permitted.

3.02 METHOD OF MEASUREMENT

A. Mortar will not be measured.

3.03 BASIS OF PAYMENT

A. Mortar will not be paid for as a separate item but is considered incidental to other items of work. Payment will be included in other related items of work and will constitute full compensation for all labor, equipment, tools, and incidentals necessary to complete the required work.

END OF SECTION

SECTION 04150
MASONRY ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Township standards overrule the following specifications, should any conflicts exist. Masonry accessories shall include, but not necessarily be limited to, furnishing continuous wall reinforcement, vertical reinforcement, dovetail anchors, cavity wall ties, wall plugs, nailing strips, control joint filler, and other accessories specified in the Contract Documents or as directed by the Engineer.

1.02 QUALITY ASSURANCE

A. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.

1.03 SUBMITTALS

A. Shop drawings shall be submitted as specified in the "General Provisions" for all wall reinforcement, control joint filler, and veneer anchors. The shop drawings shall include manufacturer's printed installation instructions and general product information.

PART 2 - MATERIALS

2.01 MATERIALS

A. Materials Furnished by the County

1. The County will not furnish any mortar accessories.

B. Detailed Material Requirements

1. Continuous Wall Reinforcement

a. Factory-fabricated continuous reinforcing tie system of No. 9 gauge, or heavier deformed steel side rods and flush welded cross rods conforming to ASTM A 82. Cross rods for cavity wall reinforcement shall have drip configuration.

b. Dimensions:

1) Between points of connection of cross rods with smooth side rods: 6 inches maximum.

2) Between points of connection of cross rods with deformed side rods: 16 inches maximum.

3) Out-to-Out of Side Rods: 2 inches less than the nominal thickness of the wall.

c. System shall include factory-fabricated units for corners and butting and intersecting walls.

d. Reinforcing units shall be hot dip galvanized after fabrication in accordance with ASTM A 153, Class B2.

2. Vertical Reinforcement

a. Deformed carbon steel bars conforming to ASTM A 615, size and grade as indicated.

3. Dovetail Anchors

a. Flexible, adjustable ties factory fabricated from 3/16-inch-thick zinc alloy or mild steel galvanized after fabrication in accordance ASTM A 153, Class B-3.

4. Cavity Wall Ties

a. Fabricate from 3/16-inch diameter corrosion-resistant metal or zinc coated steel, formed into either a 3-inch-wide rectangular shape with ends lapped or a "Z" shape with 2-inch legs, length as required to provide 1 inch of embedment in mortar beyond inner face of wall at each end. Zinc coat steel ties in accordance with ASTM A 153, Class B-3.

5. Wall Plugs (For securing wood nailing strips, and other accessories to masonry)

a. Factory fabricated from corrugated steel sheet and galvanized after fabrication in accordance with ASTM A 153, Class B-3.

6. Nailing Strips

a. Wood, pressure treated in accordance with AWPA C2 with creosote oil solution preservative conforming to AWPA Pl.

7. Control Joint Filler

a. A factory-extruded solid section of rubber conforming to ASTM D 2000, 2AA-805 with a durometer hardness of 80 when tested in accordance with ASTM D 2240. The shear section shall be not less than 5/8 inch thick and the flanges, not less than 5/16 inch thick.

PART 3 - EXECUTION – (NOT USED)

END OF SECTION

SECTION 04200
UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Concrete Masonry Units shall be as specified in the Hopewell Township Sanitary Sewer Design Standards. The Township standards overrule the following specifications, should any conflicts exist. The work to be done under this section includes everything necessary and incidental to executing and completing all masonry work shown on the Drawings or hereafter specified.

1.02 SAMPLE PANEL

A. The Contractor shall erect prior to the beginning of any masonry work, a sample panel of a typical wall 3 feet 4 inches high by 4 feet wide. The sample panel shall be erected on the building site at a location to be selected by the Engineer. The panel shall include the brick, block, reinforcing, mortar and joint treatment to be used on the project. Samples required by this Specifications section shall be cleaned and pointed prior to approval. After approval, the sample wall section shall serve as a standard for all masonry work on the project.

1.03 QUALITY ASSURANCE

A. Fire Rated Masonry: Wherever a fire-resistant classification is shown or scheduled for unit masonry construction, comply with applicable requirements for materials and installation established by the American Insurance Association and other governing authorities.

B. Codes: Comply with applicable requirements of governing authorities and codes for the types of masonry construction shown.

C. Coordination: Review installation procedures and coordinate with other work that must be integrated with masonry.

1.04 SUBMITTALS

A. Submit samples of all material to be used for the Engineer's Approval before any purchasing. All samples shall be clearly marked as to the manufacturer, job, date, contractor and quality.

B. Submit certificates of compliance for masonry materials.

PART 2 - MATERIALS

2.01 MATERIALS

A. Brick, General:

1. Provide modular size brick (7-1/2 inches long x 2-1/4 inches high x 3-3/4 inches wide) ASTM C-216, Grade SW, Type FBS, color as selected by the Owner.

2. Manufacturer: Obtain masonry units from one manufacturer of uniform texture and color for each kind required, for each continuous area and visually related areas.

3. Coring: At Contractor's option, provide solid cored brick for brickwork. Do not use cored brick with net cross-sectional area less than 75 percent of gross area, or with core holes closer than 3/4-inch from any edge.

4. The exterior of the pump station building shall consist of brick. Color and Brick pattern to match existing pump stations in the Township.

B. Building or Common Brick: ASTM C62-84, Grade SW. Concealed units, Grade MW, unless otherwise identified by the Township.

C. Concrete Masonry Units: Nominal face size 8 inches by 16 inches by thickness required for walls and partitions indicated of actual size to achieve 8-inch coursing as approved by the Engineer for appearance and strength, conforming to all State and Local codes, and to following ASTM specifications except as modified herein.

1. Aggregates in units: Lightweight, expanded shale, clay or slate conforming to ASTM C331-80.

2. Hollow Load-Bearing Units: ASTM C90-70, Grade N-1.

3. Units shall be thoroughly air cured a minimum of 28 days under proper care.

4. Maximum moisture content of all units at delivery, and at installation shall not exceed 30 percent of their total absorption capacity. Written certification is required as specified. Units not meeting same at delivery shall be returned to manufacturer or set aside on-site until moisture limit is met, as shown by retesting. Testing shall be at no additional cost to the Owner.

5. Walls and partitions shall meet fire resistance requirements of all applicable codes, ordinances; all such units shall be the rated product of a manufacturer listed in the current Fire Protection Equipment List, published by the U.L. and shall comply with all State and Local Code requirements.

6. Units to remain exposed or to receive paint or coating finish shall be "facing unit" type having a uniform "fine ground" texture finish. Installed units shall equal in

all respects the submitted samples approved by the Engineer.

7. Units shall not contain iron or other substances which might cause surface staining or pop-outs, or will stain paint or corrode metals. Only units true to size, with no spalls, cracks, splits, etc., will be accepted.

8. Provide bull nose units for outside corners constructed in concrete masonry units.

D. Mortar Materials

1. Aggregate for Mortar: Clan, graded sand per ASTM C144-81.

2. Aggregate for Grout: Fine and coarse aggregate conforming to ASTM C404.

3. Portland Cement: Type I, conforming to ASTM C150.

4. Hydrated Lime: Type S, conforming to ASTM C207.

5. Water: Clean and free of deleterious amounts of acids, alkalis or organic material.

E. Reinforcement, Anchors and Ties:

1. Joint Reinforcement: Heavy weight, truss type, prefabricated, mill galvanized in accordance with ASTM A1 16-71, Class 3, welded wire conforming to ASTM A82-72, masonry joint reinforcement; A.A. Wire Products Co. "Adjustable Blok-Trus", Dur-O-Wal "Dur-O-Eye", National Wire Products "Uni-Tie", or equal. Reinforcement shall have 3/16-inch deformed side rods and No. 9 gauge smooth cross rods with drip, and shall be of proper width to extend to within one inch of both faces of wall. Prefabricated corner and tee sections of same type and design as reinforcement shall be provided.

2. Anchors and Ties: Shall be zinc-coated steel or copper-coated steel. Except for steel wire, zinc coating shall conform in accordance with ASTM A1 16-71 Class 2 coating. Copper-coated steel shall conform to ASTM B227-70, Grade 30HS. Extent, location, size and shapes of anchors and ties shall be as indicated and/or as herein specified, and in accordance with best practice of the trade.

   a. Rigid Steel Ties: For anchoring interior CMU walls to exterior walls shall be 3/16-inch thick, 1-1/2 inches wide, and 16 inches long, with one end bent up 2 inches and one end bent down 2 inches.

   b. Wire Mesh Ties: Shall be 16-gauge steel wire, 1/2-inch mesh, of the required width.

   c. Dovetail Anchors: Shall be flat bar type, minimum 16-gauge steel, 1 inch wide, end turned up 1/4-inch or with 1/2-inch hole located within 1/2-inch of end; or wire type, minimum 9-gauge steel, looped and closed.

F. Miscellaneous Materials:

1. Weepholes: Shall be 3/8-inch outer diameter clear, nonstaining plastic tubing.

2. Masonry Sealer: Shall be mineral gum-based material containing approximately 7 percent solids, "Hydrozo Clear Special Light" as manufactured by Hydrozo Coating Co., Lincoln, Nebraska, or equal. It shall pass ASTM C67-73 and C 140-70 submersion tests with a repellency rate of 96 percent and be applied as per manufacturer directions; have a moisture vapor transmission rate of 37.5 percent and, after 2,500 hours weatherometer testing, a repellency rate of 95.3 percent. It shall have the manufacturer's 10-year material warranty against moisture penetration or peeling and flaking.

3. Masonry Cleaner: Shall be Sure-Klean "Vana-Trol", as manufactured by Process Solvent Co., Inc., or an equal.

4. Through-Wall Flashing: Shall be 0.020-inch gauge Nervasteel H-D or equal.

G. Precast Lintels (Texture to Match Exactly Lightweight Masonry Units)

1. Provide reinforced block lintels over openings where other lintels do not occur. Cast lintels at least 28 days before setting in place. Submit shop drawings and obtain approval of precast lintels and reinforcing before casting. Face shall be scored to match standard size of unit to simulate mortar joints at 16 inches on center.

2.02 MORTAR AND GROUT MIXES

A. Mortar: All mortar shall be Type M, conforming to ASTM C270-73, with the materials and mortar proportions limited to the following:

1. Portland Cement Mortar: One part Portland cement, 1/4-part hydrated lime and 2 1/4 to 3 parts of masonry sand measured relative to the total volume of cement and lime used.

2. Masonry Cement Mortar: One part masonry cement, 1 part Portland cement and 2 1/4 to 3 parts of masonry sand measured relative to the total volume of the two cements used, or manufacturer's pre-formulated mortar.

3. Mortar for face brick shall be non-staining, waterproof, colored flamingo masonry cement, utilizing a hydrated hydraulic lime base, color to be selected by the Engineer to blend with color of face masonry selected. Sample shall be mixed with local sand to ensure a color match with that selected and used in sample panel for approval with face masonry.

B. Mixing Mortar: Proportions of materials shall be measured by the bucketful and not the shovelful. Materials shall be mixed in mechanical batch mixers for a period of 5 minutes. The consistency of the mortar may be adjusted for satisfactory workability of the mortar.

If mortar begins to stiffen from evaporation of or from absorption of a part of the mixing water, retemper the mortar immediately by adding water and remix the mortar. All mortar shall be used within two hours of initial mixing and shall not be used or retempered after such period. Any mortar that has started an initial set shall be discarded.

PART 3 - EXECUTION

3.01 GENERAL

A. Precautions

1. Do not lay masonry in freezing weather unless suitable means are provided to heat materials, protect work from cold and frost, and ensure that mortar will harden without freezing. No anti-freeze shall be used without the Engineer's written approval. Freezing weather is interpreted to be any weather when temperature is below 34 degrees F., or 40 degrees F., on a falling thermometer.

2. Cold weather masonry construction and its quality control requirements shall be as follows:

Working Day Temperature	Construction Requirements
Above 40 F	Normal masonry procedures
40 F - 32 F	Heat mixing water to produce mortar temperatures between 40 F and 120 F.
32F–0	Mortar on boards should be maintained above 40F.

3. Protect facing material against staining, and keep top of walls covered with non-staining waterproof coverings when work is not in progress. When work is resumed, top surface of work shall be clean of all loose mortar.

4. Do not wet concrete masonry units.

5. Mortar joints that have been weakened by freezing shall be replaced at no additional cost and if walls are weakened, they shall be rebuilt at no increase to the Contract.

6. It shall be the responsibility of the Contractor to properly brace walls to prevent them from being blown over by storms, wind, etc., prior to the wall being tied into the structure.

B. Scaffolding

1. The Contractor shall provide all required scaffolding to complete the work under this section, including all hanging scaffolding and supports.

C. Masonry Saw

1. Where cutting of masonry units is required, use motor driven masonry saw. Do all cutting to accommodate other trades. Material with shipped or irregularly cut surface will not be accepted.

D. Installation

1. Masonry facing, both interior and exterior, shall be protected against staining. During construction tops of walls shall be covered with non-staining waterproof coverings when work is not in progress. No water shall be allowed to enter walls during their construction. When work is resumed, top surface of masonry walls shall be cleaned of all loose mortar and, in drying weather, thoroughly wetted, except that concrete masonry units shall not be wetted. Do not lay masonry while frost or excess water remains on the surface. Before closing up any pipe, duct or similar inaccessible spaces with masonry, remove all rubbish and sweep out the area to be enclosed, ensure that all piping has been tested.

2. Where fresh masonry join masonry that is partially set or totally set, clean the exposed surface of the set masonry and wet it lightly so as to obtain the best possible bond with the new work. Remove all loose masonry and mortar. If it is necessary to "stop off" a horizontal run or masonry, this shall be done by raking back one brick length in each course. Toothing will not be permitted.

3. Provide safe adequate scaffolding, centering and other equipment necessary for the proper execution of masonry work. Maintain a minimum of 3 inches clearance between all scaffolding and exterior wall faces.

4. All masonry units shall be laid plumb, level and true to line. Lay out all facing coursing before setting to minimize cutting closures or jumping bond. Build in all metal items and anchors as work progresses.

5. All exterior masonry shall be laid-up from exterior side with outside scaffolding, no such work shall be laid from inside.

6. Control Joints and Expansion Joints: Shall be provided where indicated on the Drawings.

7. Bond and coursing shall be as follows, using joint reinforcement for bond as herein specified.

    a. Brick: Shall be laid in running bond, with 1 course in 8 inches to level off with each course of CMU.

    b. CMU's: Shall be laid to achieve the appearance of running bond.

    c. Story Pole: All courses shall be accurately spaced with story pole.

8. Brick Units

   a. All joints between bricks shall be completely filled with mortar: Bed joints shall be formed of a thick layer of smooth or slightly furrowed mortar, applied to the units previously laid, with the brick then shoved in place; or bed joints may be formed as specified for cross joints. Cross joints shall be formed by applying to the brick to be laid, a full coat of mortar on the entire end or the entire side, as the case requires, and then shoving the mortar-covered end and/or side of the brick tightly against the bricks previously laid. The practice of buttering the corners of brick and then throwing mortar scrapings into the empty joints will not be permitted. All brick shall be laid without disturbing the brick previously laid. Dry or butt joints will not be permitted. Grouting shall be done only as necessary.

   b. Wetting: Brick having absorption rate of more than 0.025 ounce per square inch per minute shall be wetted sufficiently so that the rate of absorption when laid does not exceed this amount. All units shall be free from water adhering to their surfaces when they are laid in the wall. Do not wet concrete masonry units.

9. Concrete Masonry Units

   a. Concrete masonry unit walls and partitions shall be laid up with the following strength units, unless otherwise indicated on the drawings.

   b. Hollow Load-Bearing Walls: All other load bearing and non-load bearing walls and partitions.

   c. Units shall be dry when laid (within moisture limits herein specified).

   d. Units shall be laid with full mortar coverage on horizontal and vertical face cells, except that webs also shall be bedded at starting courses in piers, columns and pilasters.

   e. Lay-up units plumb and true to line, in bond specified and bonded or anchored to adjoining construction. Do not expose open ends.

   f. All CMU walls and partitions shall extend to underside of floor or roof construction above, except where otherwise indicated on the drawings.

   g. Where possible, masonry unit walls and partitions shall be built after all overhead ducts, pipes and conduits are in place and tested. Masonry shall be neatly built around the items above. Walls and partitions shall be plumb, true to line and free from defects such as open cells, voids, dry joints and other similar defects. In rooms and spaces scheduled to have CMU finish, all such surfaces, including upper wall surfaces up to termination at structural ceiling in spaces without suspended ceilings, shall be made suitable for paint application. Coordination between the

trades shall be the responsibility of the Contractor. Cutting of openings in walls and partitions in place shall be done only with the approval of the Engineer.

10. Bonding and Anchoring

    a. Units in partitions, walls, etc., shall be laid in running bond with vertical joints broken at center of block below. Wherever possible, walls and partitions shall be masonry bonded as they are built up, and corners and intersections of same shall be bonded together by alternate lapping of blocks. Where masonry bonding into walls and partitions is not possible, same shall be anchored with rigid steel anchors extending 4 inches into exterior walls and 8 inches into intersecting walls or partitions. Anchors into concrete beams, columns, etc., shall be of type to fit slots in concrete.

    b. Metal frames and other built-in work shall be maintained in proper position and hollow metal doorframes spreader backing shall not be removed until walls are fully installed around frames and in proper position and mortar has fully set. Block shall be bedded against all built-in work with full mortar. The cells of a block adjoining built-in work requiring anchors shall have cells filed solid with mortar.

    c. Fill cells of units for three courses below and two on each side of any concentrated loads with 1:2 Portland cement mortar. Where anchor bolts or expansion bolts occur in concrete masonry unit walls and partitions, such units shall have the cells filled with mortar as specified above.

11. Horizontal Joint Reinforcement: Unless otherwise noted on the drawings, all masonry walls and partitions, both interior and exterior, including brick faced cavity walls, shall be reinforced with welded wire joint reinforcement. Reinforcement shall be installed in the first and second bed joints immediately above all lintels and below sills at all openings, at other locations as may be noted on the drawings, at 8 inches vertical intervals in all foundation walls; and at 16 inches vertical intervals in all other wall and partition areas. Reinforcing in the second bed joint above and below wall openings shall extend 24 inches beyond the jambs. All other reinforcement shall be continuous except that it shall not pass through vertical masonry expansion joints. Side rods shall be lapped at least 6 inches at splices, and splices shall be staggered. Reinforcement shall be so placed as to obtain a minimum of 1-inch mortar cover on the exterior face of walls and 1/2-inch mortar cover on interior faces. Reinforced masonry walls shall conform to the applicable building code requirements.

12. Walls of all CMU's shall have concave joints, tooled smooth. Face joints in all other walls and partitions, including face brick and masonry below grade, shall be tooled concave, with the mortar thoroughly compacted and pressed against the edges of the masonry unit. Tooling shall be done when the mortar is thumb-print

hard. Tooled joints shall be finished to uniformly straight and true lines and surfaces, smooth and free of tool marks. Joints in cavity wall wythe receiving rigid board insulation shall be cut flush.

E. Cavity Walls

1. All exterior walls, unless otherwise indicated, shall be cavity walls of thickness indicated, with continuous 2-inch cavity, except for returns at windows, columns, control joints and as detailed, indicated.

2. Two wythes of cavity walls shall be securely tied together by joint reinforcement as herein specified.

3. Cavity between facing and backing wythe shall be kept clean and clear of all mortar droppings, and no mortar ledges shall project into the cavity. Temporary wood strips, cut to width of cavity and fitted with lift-up wires, shall be laid on the joint reinforcement and carefully lifted out before placement of the next layer or reinforcement. Any projecting mortar shall be spread over the back of the outer wythe immediately following the setting of the masonry unit.

4. Weepholes shall be provided in mortar joints of the exterior wythe of all cavity walls in the first course above top of flashing along the bottom of cavity walls, over foundations, bond beams, shelf angles and water stops by placing 3/8-inch nominal diameter plastic weephole tubing 32 inches on center in each row.

F. Coordination With Other Trades

1. Consult other trades in advance and make provisions for installation of their work in order to avoid cutting and patching. Build in work specified under other sections of the Specifications as the work progresses. Provide recesses at walls where required for piping, louvers, ducts, etc., install and set all bolts, plates, anchors, flashing reglets and items to support other work to follow masonry.

2. Set steel lintels which bear on masonry. Lintels shall have beds of mortar and flashed as required by Drawings.

G. Pointing and Cleaning

1. Point all holes in exposed masonry. Cut out defective joints and repoint them with matching mortar. All exposed masonry shall be cleaned thoroughly. Remove foreign material; excess masonry shall be cleaned thoroughly. Remove foreign material, excess mortar and stains. Apply the specified cleaning agent in strict accordance with the manufacturer's printed instructions. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 square feet in a location approved by the Engineer. No further cleaning work shall proceed until the sample area has been approved by the Engineer, after which time the same cleaning materials and method shall be used on the remaining wall area. At the end of each day's work, thoroughly clean faces

of all work below, continue same until cleaning is completed. The use of muriatic acid for cleaning masonry will not be permitted.

H. Wall Flashing

1. Shall be set with full bed of mortar above and below flashing and installed in strict accordance with manufacturer's specifications. Flashing shall extend a minimum of 8 inches beyond all masonry openings of each jamb at head and sill. Flashing shall be laid in all cases, extending down one course minimum from the back-up course and out to within 1/2- inch of face of wall.

I. Access Panels

1. Access panels shall be furnished by the Contractor where required.

J. Clean-Up

1. All wasted mortar, scrapings, broken masonry units, cement bags and all other scrap materials in connection with masonry work, shall be removed from the site as the work progresses. All scaffolding shall be removed upon completion of the work.

END OF SECTION

SECTION 10200
BUILDING ACCESSORIES AND ROOFING SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. The following specification describes the roofing system for the pump station control building. The following specification shall be in accordance with the Hopewell Township standards and shall be governed by the Township where conflicts arise.

1.02 RELATED WORK INCLUDED ELSEWHERE

A. Section 03600 – Non-Shrink Grout and Mortar

B. Section 04100 – Mortar

C. Section 04200 – Masonry Units

1.03 QUALITY ASSURANCE

A. Inspection

1. The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.

1.04 SUBMITTALS

A. Shop Drawings

1. Shop drawings shall be submitted as specified in the "General Provisions" for all non-shrink grouts and mortars furnished. The shop drawings shall include product description and storage, handling, mixing, and placing instructions or recommendations.

B. Certificates of Compliance

1. Certificates of compliance shall be submitted in accordance with the "General Provisions" for all non-shrink grouts and mortars stating that the material furnished meets the requirements specified in Section 03600.

PART 2 - MATERIALS

2.01 ROOFING SYSTEM

A. Roofing system shall be fiberglass Asphalt roofing system which shall be complete with shingles, underlayment, ridge vents, ridge caps and leak barrier at eaves, hips rake edges, around penetrations, ridges, flashing and transitions.

B. Roof Sheathing shall be min. 7/16” thick APA Rated Plywood or OSB Roof Panels.

C. Truss Spacing shall be a maximum of 24”.

2.02 SHINGLES

A. Provide shingles of heavy weight construction, minimum 340 pounds per square nominal. The shingles shall have Class A fire and wind ratings from Underwriters Laboratories.

B. The shingles shall be treated with an algae killing compound to resist staining.

2.03 GUTTERS

A. 4-inch aluminum gutters and downspouts shall be provided.

B. Concrete splash blocks shall be provided at each downspout that discharges to grade.

2.04 INSULATION

A. In addition to CMU Insulation, furnish and install 1.5-inch-thick rigid board Foamular 250 insulation as manufactured by Owens-Corning or equal around the full perimeter of the foundation.

B. Foundation insulation board shall be installed at the inside face of exterior masonry or concrete foundation walls to a depth of two feet below the floor slab, providing an insulation value of R=7.5 minimum.

C. Foamular 250 shall also be placed under the floor slab a dimension extending two feet from the exterior foundation wall all around the perimeter of the foundation.

D. CMU shall be insulated with manufacturer inserted polystyrene insulation blocks in accordance with ASTM C578, Type 1.

E. Ceiling shall be fully insulated between rafters with thermal batt insulation providing a minimum insulation value of R-30. Insulation shall meet ASTM C665, Type II, Class C, be a nominal 9.5 inches thick and shall be Kraft Faced. Insulation shall be manufactured by Owens Corning, PINK Fiberglass Batt Insulation of equal.

2.05 Plumbing Accessories

A. Toilet and lavatory shall be floor mounted, designed and installed to comply with ADA and ANSI 117.1.

B. Exposed brass, faucets, valves, traps, and escutcheons shall be chrome plated.

C. Wall hydrants shall be non-freeze, anti-siphon, and automatic draining.

D. Faucets shall be wall mounted and have independent access to hot and cold.

E. Stainless steel grab bars are required.

F. Provide wall mounted soap and toilet paper dispenser.

G. Provide mirror over sink and paper towel dispenser.

H. Provide a tank-less water heater for the lavatory. A minimum of 40 degrees Fahrenheit temperature rise at 2 gallons per minute is required.

I. Provide floor drain for restroom.

2.06 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

1. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.

2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch.
d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard.
f. Fire-Rated Core: Manufacturer's standard core for fire-rated doors (where indicated in the Door and Frame Schedule).

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.0625 inch.
b. Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

d. Exposed Finish: Prime.

2.07 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

1. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
d. Edge Construction: Model 1, Full Flush.
e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
f. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
g. Core: Manufacturer's standard.
h. Fire-Rated Core: Manufacturer's standard core for fire-rated doors (where indicated in the Door and Frame Schedule).

3. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.078 inch, with minimum A60 coating.
b. Construction: Full profile welded.
c. Exposed Finish: Prime.

PART 3 - EXECUTION

3.01 PREPARATION

A. All surfaces shall be prepared to receive roofing system, and shall be cleaned of all oil, grease, dirt, and laitance down to sound concrete. Rust shall be removed from the underside of all plates and from all bolts or other embedment items by sanding or power brushing.

B. Where the concrete surface to receive the roofing system is smooth, the surface shall be roughened with a small chipping hammer and then saturated with water prior to placing the grout or mortar.

3.02 FORMS

A. When required, forms shall be furnished and placed to ensure proper installation of roofing system. The forms shall be strong enough to resist buckling.

END OF SECTION

SECTION 11200
SUBMERSIBLE SEWER PUMP STATION EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the requirements for all pump stations in the Contract Documents.

1.02 QUALITY CONTROL

A. Pumps and control panel shall be supplied by a sole source for each pump station.

1.03 SUBMITTALS

A. One (1) electronic copy of shop drawings of all structures and equipment shall be submitted to the engineer for approval. Information shall include dimensions, capacity, material, finish, guarantee, etc.

B. Control panel submittals shall include a list of equipment, product literature on the equipment, formal ladder diagrams with proper annotations, and panel elevations showing front mounted (or inner door) equipment layout.

C. Two (2) copies of a complete operations manual for all equipment, including detail drawings, maintenance instructions and other pertinent data shall be compiled and submitted to the engineer for review and approval before acceptance of the facility.

1.04 CONTROL SUMMARY – PUMP STATIONS 1 AND 2

A. Two (2) identical submersible pumps shall be provided. The pump control system shall consist of a controller with level transducer for primary pump control and a backup high level float switch for backup alarm. The pumps shall operate in lead/lag mode. The pumps shall be automatically alternated.

B. Upon the rise of wastewater in the wet well to the “Lead Pumps On” level, the lead pump shall energize. When the level falls to the “Pump Off” level, the pumps shall stop. If the lead pump cannot handle the inflow or fail to operate, the level will rise to the “Lag Pump On” level, at which time the lag pump shall be energized. If lead and lag pumps cannot handle the inflow the level will rise to the “High Level Alarm” level, at which the transducer will send a signal to the light and horn alarm at control panel. The pump controls will alternate between the lead and lag pumps.

C. A backup float switch is provided as a redundant alarm in case of transducer failures. If the level rises to the “backup high-water level” the float switch will send a signal to the Owner’s SCADA system.

D. A phase monitor shall monitor the incoming power line quality and shut down the pumps if inadequate power quality is detected.

E. The following will cause pump shutdown: H-O-A switch in “Off”; motor overload, pump flow failure; motor over temperature; and phase loss/reversal and leakage. Motor over temperature and phase loss/reversal will automatically reset once; the second occurrence shall cause shut down and alarm. Motor overload, flow failure, and leakage will require a manual reset. Motor over temperature will illuminate a panel light which will latch “on” to advise the condition has occurred.

F. In the event of any power failure, re-starting of pumps shall be staggered to reduce system voltage/frequency dip in accordance with requirements for the Emergency Back-Up Generator.

G. Provide backup Wet Well reduced voltage soft starters for each Wet Well Pump. Provide and wire such that upon failure of primary starter for each pump that the backup starter can be manually switched into operation. Controls shall be switched to the backup starter for normal operation.

PART 2 - PRODUCTS

2.01 PUMPS

A. Pump Station 1

1. Contractor shall provide and install two Flygt submersible wastewater pumps as specified below:

a. Pumps shall be Flygt NP 3127 HT 3 submersible pumps.
b. Pumps shall be provided with 8.5 HP, 460 V, 3 Phase, 60 HZ motors.
c. Operating Points:

1) Design Point: 275.55 gpm @ 49.10’ TDH
2) Operating Point: 281.00 gpm @ 49.51’ TDH
3) Shut Off Head: 70 feet (minimum)

2. Each pump shall be capable of passing a minimum 3-inch diameter solid. Motors shall have thermal sensors and leakage sensors.

B. Pump Station 2

1. Contractor shall provide and install two Goulds submersible wastewater pumps as specified below:

a. Pumps shall be Goulds 1310S-2X.26.S66.460 submersible pumps.
b. Pumps shall be provided with 2.4 HP, 460 V, 3 Phase, 60 HZ motors.
c. Operating Points:

1) Design Point: 89.58 gpm @ 36.73' TDH
2) Operating Point: 91.50 gpm @ 37.16' TDH
3) Shut Off Head: 54 feet (minimum)

2. Each pump shall be capable of passing a minimum 3-inch diameter solid. Motors shall have thermal sensors and leakage sensors.

C. Seals

1. Type 21, dual mechanical seal construction mounted in tandem, shall protect the motor. Primary seal shall be silicon / carbide. Secondary seal shall be silicon / carbide. The seal face shall be lapped to a flatness of one light band. A double electrode shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required.

D. Power Chord

1. The motor power chord shall be 10 Ga. SOW/SOWA or SOOW. The cable shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. An epoxy filled tube shall seal the outer cable jacket and individual leads to prevent water from entering the motor housing. Individual conductor strands shall be soldered within the epoxy seal. Cords shall withstand a pull of 300 pounds.

E. Pump Removal System

1. The pump's design shall allow for removal and reinstallation of the pump without the need for personnel to enter the confined space of the wet well and without the removal of bolts, nuts or other fasteners.

2. The entire weight of the pumping units shall be carried by the discharge assembly and the discharge connection elbow with metal-to-metal contact between the pump and discharge flange and the discharge connection elbow.

3. Pumps shall be provided with quick disconnect/auto-coupling assembly, required discharge fittings to mate-up to the discharge elbow, lifting bracket, and all hardware necessary for lifting of the pump using a provided surface mounted davit and winch.

4. Sealing of the discharge interface by means of a diaphragm, O-ring, or other devices shall not be permitted

5. Each pump shall be provided with an oversized stainless-steel lifting bracket mounted by the manufacturer.

F. Pump Construction

1. Major static components (pump casing, intermediate housing and motor housing) shall be of at minimum ASTM A48 Class 30 gray cast iron with smooth surfaces devoid of blow holes and other irregularities.

2. The impeller, which is the rotating exposed piece, shall be of ASTM A532 IIIA Class 30 cast iron. The impeller design shall be a recessed, semi-vortex, multi-vane design.

3. All exposed fasteners shall be ASTM A 276 Type 304 stainless steel. All exposed bolts and nuts shall be 304 stainless steel.

4. The pump's cast iron components shall be coated with at minimum a two-component epoxy finish having at minimum 83% solids by volume. This coating shall be non-toxic and approved for wastewater applications.

5. Mating surfaces between components where watertight integrity is critical shall be machined and fitted with Nitrile Rubber or Viton O-rings. Because these are critical passages and flame paths, no secondary sealing compounds, greases, or other devices shall be used.

2.02 SUBMERSIBLE PUMP CABLES

A. Pump cables shall be STW-A, water resistant 600V, 60°C, cables supplied by the pump system supplier.

B. The power cord assemblies shall be connected to the pump controller motor leads utilizing Isco terminal blocks.

2.03 INSTRUMENTS

A. Level Transducer

1. Level transducer shall be manufactured by Blue Ribbon, model 01002AA, or Engineer approved equal rated for 0-10 PSIG. The level transducer shall provide 4-20 mA analog signals proportional to the wet well level to the PLC. The transducer shall be rated for installation in Class 1, Division 2 areas.

B. Float Switches

1. Floats shall be Commonwealth Scientific Roto Floats, or Engineer approved equal with normally open contacts and minimum 30 feet of cable, each (or prior approved equal). The number of floats provided shall match the number shown in the Contract Drawings. The float switch wiring external of the control panel shall be intrinsically safe.

2.04 BACKFLOW PREVENTION DEVICE

A. All pumping stations owned and operated by the Owner shall have city water provided for washdown and employee safety. City water supply and distribution systems shall be protected by means of an APOLLO or CONBRACO brand 1" Reduced Pressure Zone, backflow preventer, model 4ALF-205-A2F, backflow prevention device or Engineer approved equal.

B. Each backflow prevention device shall be protected from freezing by means of a Raychem Wintergard H612250, 6w/foot, 120-volt, heat tracing with a Ground Fault Equipment Protector (GFEP) or Engineer approved equal in accordance with all current applicable references in the National Electric Code (NEC) at the time of installation. Heat tracing shall be hardwired to an appropriately sized, dedicated GFEP, circuit breaker. There shall be no other branch circuits connected to the dedicated GFEP circuit breaker.

C. The enclosure shall be a Hot Box Model HB2 (or approved equal) and shall be fitted with a hasp allowing the cover to be locked in place to prevent unauthorized access. Slab dimensions and conduits shall match the manufacturer's specifications as shown in the piping arrangement detail. The heat trace shall be equipped with a live circuit, 30mm, LED style lamp, indicator light, mounted externally in a weather proof FS box on a non-movable portion of a Hot Box Model HB2 (or Engineer approved equal). The live circuit, indicator light shall provide positive feedback ensuring that the circuit is intact and the heat trace is functioning properly.

2.05 HOIST

A. A portable hoist shall be provided and shall be series DA as manufactured by Halliday Products Inc. or approved equal. The unit shall be sizes to facilitate equipment placement and removal. The portable hoist shall be all T-304 stainless steel construction with marine grade brake winch and 30 feet (9m) of ¼ inch (7mm) T-304 stainless steel cable with galvanized safety hook. The fixed reach davit arm shall be set at 24" (610mm) and the overall unit height shall be 60" (1.5m). The portable hoist shall have a maximum load of 1,000 lbs. The portable hoist shall be guaranteed against defects in material and or workmanship for a period of 3 years.

2.06 PRESSURE GAUGES

A. Pressure gauges shall be completely isolated from waste stream by diaphragm.

B. Pressure gauges shall be Series 550L oil filled pressure gauges as manufactured by U.S. Gauge, or an approved equal.

C. Pump discharge gauges shall have a pressure range of 0 to 100 psi or 1.5 times working pressure whichever is higher.

D. Gauges shall have stainless steel socket, Bourdon tube, case, and ring.

E. All pressure gauges shall have a valve to allow gauge removal without system shutdown.

F. Gauges shall be located as indicated on the contract drawings with minimum placement on each pump discharge in the valve vault preceding the check valve.

G. Provide one spare gauge of each pressure range.

2.07 FLOW METER

A. The pump station flow meter shall be an Optiflux KC 2000 electromagnetic flow meter manufactured by Khrone, Inc., Peabody, MA or Engineer approved equal.

B. Flow meter converter shall be an IFC 100 unit manufactured by Khrone, Inc., Peabody, MA, or Engineer approved equal and shall be compatible for use with the Khrone Optiflux KC 2000 electromagnetic flow meter.

C. At a minimum, “Flow Rate” and “Total Gallons Metered” shall be programmed for display on the HMI screen.

D. The flow meter shall be flanged for connection to flanged ductile iron pipe connection.

E. The flow tube shall be Enviromag – 2000 with hard rubber lining.

F. The flow meter electrodes shall be flush-mount, replaceable, stainless steel (ANSI 316L) or approved equal.

G. The flow meter converter shall be intelligent microprocessor based. The flow meter converter shall be mounted in the pump station control panel. The flow meter converter shall be power via 120 VAC, 60 Hz and shall have an analog output of 4-20mA DC.

H. The flow meter electronics shall have password protection of site set-up information, built-in diagnostics and battery backup to preserve site set-up information from power loss. Flow meter electronics shall retain, at a minimum, the last totalized flow information prior to power loss until normal AC power is restored. Power requirements shall be 110 VAC, 60 Hz. 24 VDC shall be available as an option and the panel integrator may choose which option to use. System accuracy shall be 0.5% at velocities over 3 feet per second. The flow meter shall require no calibration other than programming. The flow meter shall require no connection to existing wiring other that AC power line, input sensors and output requirements to the PLC. Flow meter shall be IP 68 Submersible rated.

PART 3 - EXECUTION

3.01 WARRANTY

A. The equipment supplier shall warranty the equipment for a period of two (2) years from the date of start-up. All other equipment shall have a minimum two (2) year warranty from project final acceptance.

3.02 TESTING, START-UP, AND OPERATOR TRAINING

A. All equipment shall be installed in accordance with the manufacturer's recommendations and tested under operating conditions to ensure that the equipment is working properly.

B. Representatives of the pumping equipment and control panel manufacturers shall submit written verification that the equipment is installed properly and is working correctly prior to inspections. The Engineer, the Township and the control panel supplier shall be present when equipment is tested. Contractor is responsible for scheduling and notifying all parties for testing.

C. All pipes shall be pressure and leak tested in per Section 02560 PIPING SYSTEMS.

D. The manufacturer shall provide two (2) days of operator training on-site, for up to two (2) operators. All travel expenses and lodging are to be provided by the manufacturer.

END OF SECTION

SECTION 11201
GRINDER PUMP STATION EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

This section specifies the requirements for a grinder pump station. The manufacturer shall furnish a complete, factory-built and tested grinder pump unit(s), consisting of all equipment stated in this Section. Grinder pump unit(s) shall be installed within a fiberglass reinforced plastic basin. Component type grinder pump systems that require field assembly will not be acceptable due to the potential problems that can occur during field assembly.

1.02 QUALITY CONTROL

A. Grinder pump stations, complete with all appurtenances, shall form an integral system, and as such, shall be supplied by one grinder pump station manufacturer. The manufacturer shall demonstrate the ability to fabricate the various pump station components, as shown in the plans and as specified herein, utilizing adequate number of skilled workmen, equipment, tools, facilities, and subcontractors.

1.03 SUBMITTALS

A. PDF copies of shop drawings for all structures and equipment and engineering data to the Engineer for approval. Information shall include dimensions, capacity, and materials of construction for all equipment.

1. Control panel submittal shall include a list of equipment, product literature on the equipment, formal ladder diagrams with proper annotations, and panel elevations showing front mounted (or inner door) equipment layout.

2. PDF copies of complete operations and maintenance (O&M) manuals for all equipment shall be supplied to the Engineer for review. The O&M manual shall include routine maintenance requirements and spare parts lists for each major item of equipment in the pump station.

1.04 OPERATING CONDITIONS

The pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). The pump(s) must also be capable of operating at negative total dynamic head without overloading the motor(s). Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.05 WARRANTY

A. The grinder pump manufacturer shall provide a parts and labor warranty on the complete station and accessories, including, but not limited to, the panel for a period of 60 months after notice of Owner's acceptance. Any manufacturing defects found during the warranty period will be reported to the Manufacturer by the Owner and will be corrected by the Manufacturer at no cost to the Owner.

PART 2 - PRODUCTS

2.01 PUMPS

The pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressive cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. The rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. The stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.02 GRINDER

A. The grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque. These materials have been chosen for their capacity to perform in the intended environment as they are materials with wearand corrosive resistant properties.

B. This assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

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

2. The maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.

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

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

C. The grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, wipes, rubber and the like, to finely divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.03 ELECTRIC MOTOR

A. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4-foot pounds. The motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided using an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.

B. Electrical connections requiring electrical conversion, a buck booster transformer shall be installed for 208 Volt to 240 Volt or 120 Volt to 240 Volt. Buck booster shall buck or boost voltage up to +/- 20%.

2.04 MECHANICAL SEAL

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

2.05 FIBERGLASS BASIN/WETWELL

A. The shell design shall be in accordance with AWWA C950 M-45. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth.

B. Tank design shall be based on industry standard lamination analysis for the glass reinforcement layers and resins systems.

C. Resins used shall be commercial grade unsaturated polyester type, suitable for the intended service as indicated by usage history or resin manufacturer's recommendation.

D. The FRP laminate wall thickness shall vary with the wet well height to provide the aggregate strength necessary to meet the tensile and flexural physical properties requirements. The wet well FRP wall laminate must be designed to withstand wall collapse or buckling based on a hydrostatic loading of 62.4 lbs. per cu. ft.; a saturated soil weight of 120 lbs. per cu. ft.; a soil modulus of 700 lbs per sq. ft.; and pipe stiffness values as specified in ASTM D3753. The Wet well FRP laminate must be constructed to withstand or exceed two times the assumed loading on any depth of the wet well.

E. The station shall have all necessary penetrations molded in and factory sealed. To ensure a leak-free installation no field penetrations will be acceptable.

F. In inner surface shall be free of exposed fiber, crazing and delaminations. No blisters larger than 1/2 inch or wrinkles more that 1/8 inch will be acceptable.

G. The basin dimensions shall be as stated in the Contract Drawings.

2.06 CHECK VALVE

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

2.07 ANTI-SIPHON VALVE

The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper

operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable anti-siphon devices due to their tendency to clog from the solids in the slurry being pumped. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.08 CORE UNIT

The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable because of potential workmanship issues and increased installation time. In some cases, stations taller than 96" may be shipped on their side without the cores assembled in the basin for freight purposes but this is the only exception. The core unit shall seal to the tank deck with a stainless steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

2.10 STAINLESS STEEL CURB STOP/CHECK VALVE ASSEMBLY (Curb Stop Assembly)

A. The curb stop shall be pressure-tight in both directions. The ball valve actuator shall include position stop features at the fully opened and closed positions. The curb stop/check valve assembly shall be designed to withstand a working pressure of 235 psi.

B. The stainless steel check valve shall be integral with the curb stop valve. The check valve will provide a full-ported 1-1/4" passageway and shall introduce minimal friction loss at maximum rated flow. The flapper hinge design shall provide a maximum degree of freedom and ensure seating at low back pressure.

C. All plastic fitting components are to be in compliance with applicable ASTM standards.

D. All pipe connections shall be made using compression fitting connections including a Buna-N O-ring for sealing to the outside diameter of the pipe. A split- collet locking device shall be integrated into all pipe connection fittings to securely restrain the pipe from hydraulic pressure and external loading caused by shifting and settling.

E. Curb boxes shall be constructed of ABS, conforming to ASTM-D 1788. Lid top casting shall be cast iron, conforming to ASTM A-48 Class 25, providing magnetic detectability, and be painted black. All components shall be inherently corrosion- resistant to ensure durability in the ground. Curb boxes shall provide height adjustment downward (shorter) from their nominal height.

F. High Density Polyethylene Pipe – Lateral pipe shall have a working pressure of 160 psi minimum and shall be classified SDR per ASTM D 3035.

G. Factory Test – The stainless steel, combination curb stop/check valve component shall be 100 percent hydrostatically tested to 150 psi in the factory.

2.11 CONTROLS

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

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

C. All fasteners throughout the assembly shall be 300 Series stainless steel. High- level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure switch of the same type. Closure of the high- level sensing device will energize an alarm circuit as well as a redundant pump- on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted due to the periodic need to maintain (rinsing, cleaning) such devices and their tendency to malfunction because of incorrect wiring, tangling, grease buildup, and mechanical cord fatigue. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted due to their susceptibility to condensation, kinking, pinching, and insect infestation. The grinder pump will be furnished with a 6 conductor 14-gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a factory installed NEMA 6P EQD half attached to it

2.12 ALARM PANEL (QUADPLEX)

A. Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front

to allow access only to authorized personnel. The standard enclosure shall not exceed 24" W x 24" H x 10" D.

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

C. The visual alarm lamp shall be inside a red, cylindrical lens at least 1-1/4" in diameter x 1" tall. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

D. The high-level alarm system shall operate as follows:

1. The panel will go into alarm mode if any pump's alarm switch closes. During the initial alarm mode additional pumps will be enabled as needed to assist in pumping down the station. The alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If the station is still in high-level alarm after the delay, the light and buzzer will be activated.

2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.

3. The visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm switch for all pumps.

E. The entire alarm panel, as manufactured and including any of the following options shall be listed by Underwriters Laboratories, Inc.

F. Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation.

G. Alarm Activated Contacts for Remote Indoor Alarm Module – Will work with or without power to the alarm panel.

H. Provides Protection from the following Operating Conditions

1. Low Voltage (Brownout) Protection:

A lockout cycle will prevent the motor from operating and will illuminate the Trouble LED if:

a. the incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running.

b. the lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system).

The system continues to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The Trouble LED remains illuminated during a Brownout condition and a corresponding Brownout message will be displayed on the LCD screen. The LED will turn off when the Brownout condition ends, and the LCD message remains latched until the panel is reset. The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

2. Run Dry Protection:

A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the wastewater level in the tank is below the pump inlet shroud. A corresponding Run Dry message will be displayed on the LCD screen. The condition is rechecked every 20 minutes and the LCD message remains latched. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will go out, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the panel is reset or until there is one cycle of normal operation. If a high-level condition is presented at any time, a pump run cycle will be activated.

3. High System Pressure Protection

A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). A corresponding Overpressure message will be displayed on the LCD screen. The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will turn off, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely and the audible and visual alarm will be activated. The LCD message and alarms will remain latched until the condition is removed, and the panel is reset.

In all of the above cases, if more than one error condition is presented, the LCD message depicting the most recent error condition will be displayed.

I. Panel shall include the following features:

1. High/Low Voltage monitoring with Trouble indication

2. High/Low Wattage (wattage is used instead of current because it is a better

indicator of pump performance) monitoring with Trouble indication

3. Extended Run Time monitoring with Trouble indication

4. Cycle/Event Counter

5. Run Time Counter (Hour Meter)

6. Run Time Limit — time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1-minute intervals

7. Power-up Delay — time adjustable, user-selected options: None (default), to 300 minutes in 1-minute intervals

8. Alarm Delay — time adjustable, user-selected options: zero to 10 minutes in 30-second increments; 3.5 minutes is default

9. System self-test diagnostic

10. User-selectable Alarm latch

11. User-selectable Protect Mode disable

12. User-selectable buzzer timer

J. Generator Receptacle and Auto Transfer – The alarm panel shall include a 60-amp, 250 VAC generator receptacle with a threaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. Two automatic transfer switches shall be provided, which automatically switch from AC power to generator power when power is applied from an external generator. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

K. Quadplex Protect PLUS indicators and programming features shall include:

1. Ready LEDs to indicate AC power to the station is satisfactory

2. Pump Run LEDs to indicate pump is operating (LCDs indicate which pump is running)

3. Trouble LED indicators and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)

4. High Level Alarm LED indicators (LCDs indicate which pump is in alarm)

5. Manual Run switches to manually activate pumps

6. Lead/Lag indication (LCDs indicate which pumps are lead)

7. Menu-driven programmable controllers with navigation overlay-type buttons (Enter, Scroll, Up, Down)

8. Normal Operation LEDs and Mode buttons for Mode status

9. Pump Performance menu LEDs with LCD displays of the following pump performance statistics:

    a. Real-time Voltage
    b. Real-time Amperage
    c. Real-time Wattage
    d. Minimum/Maximum/Average Voltage
    e. Minimum/Maximum/Average Amperage
    f. Minimum/Maximum/Average Wattage
    g. Minimum/Maximum Run-time
    h. Average Run-time
    i. Last Run-time
    j. Cycle/Event Counter
    k. Run Time Counter (Hour Meter)

10. Diagnostics Menu LEDs

11. Initialize System Menu LEDs

12. Run Limit Menu LEDs

13. Alarm Delay Menu LEDs

14. Power Delay Menu LEDs

15. Pump alternating options (no alternation, adjustable time based and test)

16. Pump alternating time options — 24 hours to 72 hours in 12-hour increments

PART 3 – EXECUTION

3.01 FACTORY TEST

Each grinder pump shall be submerged and operated for 1.5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls

which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

3.02 CERTIFIED SERVICE PROGRAM

A. The grinder pump manufacturer shall provide a program implemented by the manufacturer's personnel as described in this specification to certify the service company as an authorized serviced center. As evidence of this, the manufacturer shall provide, when requested, sufficient evidence that they have maintained their own service department for a minimum of 30 years and currently employ a minimum of five employees specifically in the service department.

B. As part of this program, the manufacturer shall evaluate the service technicians as well as the service organization annually. The service company will be authorized by the manufacturer to make independent warranty judgments. The areas covered by the program shall include, as a minimum:

1. Pump Population Information — The service company will maintain a detailed database for the grinder pumps in the territory that tracks serial numbers by address.
2. Inventory Management — The service company must maintain an appropriate level of inventory (pumps, tanks, panels, service parts, etc.) including regular inventory review and proper inventory labeling. Service technicians will also maintain appropriate parts inventory and spare core(s) on service vehicles.

3. Service Personnel Certification — Service technicians will maintain their level-specific certification annually. The certifications are given in field troubleshooting, repair, and training.

4. Service Documentation and Records — Start up sheets, service call records, and customer feedback will be recorded and available by the service company.

5. Shop Organization — The service company will keep its service shop organized and pumps will be tagged with site information at all times. The shop will have all required equipment, a test tank, and cleaning tools necessary to service pumps properly.

3.03 DELIVERY

All grinder pump units shall be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Field installation of the pump in tanks under 96 inches is not allowed. Field installation of the level sensor into the tank is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

3.04 INSTALLATION

A. Earth excavation and backfill are specified under Section 02200 but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

B. The contractor shall be responsible for handling ground water to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

C. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the engineer.

D. Remove packing material. User instructions MUST be given to the owner. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a standard 4" inlet grommet (4.50" OD) for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.

E. Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

F. A 6”-inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

G. The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the contractor. An alarm device is required on every installation, there shall be no exceptions.

H. The contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32 feet, 25 feet of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a factory installed EQD half to connect to the mating EQD half on the core.

3.05 BACKFILL REQUIREMENTS

A. Proper backfill is essential to the long-term reliability of any underground structure. Several methods of backfill are available to produce favorable results with different native soil conditions. The most highly recommended method of backfilling is to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern, Class 1B is a better choice when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone offers an added benefit in that it doesn’t need

to be compacted.

B. Class II, naturally rounded stone, may require more compactive effort, or tamping, to achieve the proper density. If the native soil condition consists of clean compactible soil, with less than 12 percent fines, free of ice, rocks, roots, and organic material, it may be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 85 percent and 90 percent. Heavy, non-compactible clays and silts are *not* suitable backfill for this or any underground structure such as inlet or discharge lines.

C. Another option is the use of a flowable fill (i.e., low slump concrete). This is particularly attractive when installing grinder pump stations in augured holes where tight clearances make it difficult to assure proper backfilling and compaction with dry materials. Flowable fills should not be dropped more than 4 feet from the discharge to the bottom of the hole to avoid separation of the constituent materials.

D. Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 85 percent. Improper backfilling may result in damaged accessways. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.

E. All restoration will be the responsibility of the contractor. The property shall be restored to its original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming, and seeding, and restoration of the traveled ways, as directed by the owner or engineer.

3.06 START UP AND FIELD TESTING

A. The manufacturer shall provide the services of qualified factory trained technician(s) who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the owner's personnel in the operation and maintenance of the equipment before the stations are accepted by the owner.

B. All equipment and materials necessary to perform testing shall be the responsibility of the contractor**.** This includes, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high-level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

C. The services of a trained factory-authorized technician shall be provided at a rate of 40 hours for every 100 grinder pump stations supplied.

D. Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.

2. Turn ON the alarm power circuit and verify the alarm is functioningproperly.

3. Turn ON the pump power circuit. Initiate the pump operation to verify automatic “on/off” controls are operative. The pump should immediately turn ON.

4. Consult the Manufacturer’s Service Manual for detailed start-upprocedures.

E. Upon completion of the start-up and testing, the manufacturer shall submit to the engineer the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

END OF SECTION

SECTION 11640
CHANNEL GRINDERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This section specifies the requirements for open-channel grinders with integrated rotating scrapers.

B. The work of this section includes furnishing all labor, materials, tools, and equipment necessary to furnish and install the sewage grinders for shredding municipal wastewater solids.

1.02 QUALITY ASSURANCE

A. Reference Standards: Comply with applicable provisions and recommendations of the latest version of the following except as otherwise shown or specified:

1. ASTM International (ASTM):
   a. ASTM A36 - Carbon Steel Plate.
   b. ASTM A536 - Ductile Iron Castings.
   c. ASTM A48 - Gray Iron Castings.
   d. ASTM A564 Grade 630 condition H1150 (17-4) stainless steel

2. American Iron and Steel Institute (AISI):
   a. AISI Type 1020 Steel
   b. AISI Type 1045 Steel.
   c. AISI Type 4130 - Heat Treated Alloy Steel.
   d. AISI Type 4140 Heat Treated Alloy Steel.
   e. AISI Type 18-8 Stainless Steel
   f. AISI Type 303 Stainless Steel.
   g. AISI Type 304 and 304L Stainless Steel.
   h. AISI Type 316 and 316L Stainless Steel.

3. Society of Automotive Engineers (SAE):
   a. SAE Type 660 Bearing Bronze

4. National Electrical Manufacturer's Association (NEMA) Standards

5. National Electrical Code (NEC).

6. International Electrotechnical Commission (IEC).

7. The controllers shall comply with U.L. standards.

B. Manufacturer Qualifications

1. Manufacturer shall be ISO 9001 certified and have a minimum of fifteen (15) years of field and production experience and forty (40) years involved in sale of similar products.

2. Manufacturers shall have a dedicated customer support department. The customer support department is required to maintain a telephone help desk and maintain a service center within the U.S. capable of continuing the support.

1.03 SUBMITTALS

A. Submittals shall be made by the Contractor in accordance with Section 01300 - Shop Drawing and Product Data Submittals.

B. Equipment shall be warranted for one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The following manufacturers are approved:

1. JWC Environmental Inc.: Muffin Monster model 30005-008

2.02 OPEN-CHANNEL GRINDER WITH INTEGRATED ROTATING SCRAPERS

A. Design Parameters:

1.	Number of Grinders:	1
2.	Number of Motor Controllers:	1
3.	Power Supply:	230 V/ 3 PH/ 60 Hz
4.	Maximum Flow Capacity per unit:	370 GPM (0.53 MGD)
5.	Cutter Stack and Perforated Drum Height:	8 inches
6.	Drive Type:	Hydraulic
7.	Motor Horsepower:	3 Hp

B. General Summary

1. Grinder shall reduce or shred influent solids for protection of downstream equipment. Grinder shall have two counter-rotating shafts stacked with intermeshed individual cutters and spacers supported on both ends of each shaft with a mechanical seal and bearing cartridges. Grinder shall use low speed and high torque drive and shall be driven by a hydraulic torque motor and hydraulic power unit.

C. Cutter Assembly

1. Cutters shall be Wipes Ready design to achieve two-dimensional cutting to control both the length and the width of output.

2. Cutters

a. Cutters shall be 7-tooth style with 11-mm effective thickness and 4.71-inch (120-mm) diameter. Cutters shall be designed specifically for waste streams containing heavy volumes of solids.

1) Cutter thickness tolerance shall be+.000/ -.001.

2) Cutters shall be keyed to shaft with hexagon opening.

D. Shafts

1. Shafts shall be 2-inch hexagon heat treated AISI 4140 alloy steel.

2. Shafts shall have minimum tensile strength of 170,000 psi.

3. Shafts shall be supported on either end by Mechanical Seal and Bearing Cartridges.

E. Side Rails

1. Side rails shall be constructed of ASTM A536 65-45-12 ductile iron.

2. Side rails shall be Delta P design to guide all items into channel frame.

F. Housing, Covers, and Gaskets

1. Housing and top cover shall be of ASTM A536 65-45-12 ductile iron. Bottom cover shall be of ASTM A36 steel.

2. End housings shall have integral bushing deflectors to directs solids away from seal cartridges.

3. Gaskets shall be cork and neoprene rubber

2.03 FRAME AND SUPPORTS

A. Support frame shall provide structure for mounting and a mechanism for positioning of the grinder in the frame. Guide flanges shall be provided that interface with the integral guide slots of side rails to properly position the grinder in the frame and allow for installation and removal without disassembly or removal of fasteners.

B. Channel Frame

1. Frame shall be fabricated of AISI 304L stainless steel

2. Frame shall mount to channel walls with suitable anchors supplied by Contractor for installation.

2.04 MOTOR CONTROLLER

A. Description

1. Controller shall provide factory-programmed operation of the grinder.

2. Controller shall have switches, indicator lights, and other control devices.

3. Controller shall be designed to suit the power supply and motor characteristics as listed in Section 2.02-A Design Parameters of this Specification.

B. Components

1. Selector Switches

a. Selector switches shall be 22 mm rated equal or better than the enclosure.

b. Selector switches shall be three-position and indicate On-Off/Reset-Remote.

2. Pilot Lights

a. Lights shall be 22 mm, LED (pilot lamp), rated equal or better than the enclosure.

b. Lights shall indicate POWER ON, grinder RUN, grinder JAMMED and MOTOR FAULT, OIL OVERTEMP, and LOW OIL LEVEL.

3. Motor Starters

a. Starters shall be IEC, full voltage, and reversing.

b. The maximum short circuit protective fault current shall be 100 kA.

c. Overload relays shall be adjustable and sized to full load amperes (FLA) of the motor.

4. Control Power Transformer

a. Control Power Transformer shall produce 120-volt AC power from the supply power. Transformer shall be sized and fused in accordance with code to accommodate the control power requirement.

C. Sequence of Operation

1. Grinder control shall be in accordance with the On-Off/Reset-Remote Selector Switch.

a. In the OFF/RESET position, the grinder shall not run, and all fault conditions shall be cleared.

b. In the ON position, the grinder shall run forward.

c. In the REMOTE position, the grinder shall operate as controlled by a remote start/stop dry contact.

2. When an obstruction jams the grinder, the controller shall stop the grinder and reverse the grinder motor rotation nine (9) times to clear the obstruction. The controller will then activate the grinder JAMMED indicator and relay and the grinder shall stop operation.

3. When a motor overload or motor overheating condition occurs, the MOTOR FAULT indicator lamp shall be illuminated, the FAIL contact shall close, and the grinder shall stop operation.

4. When a low oil condition occurs, the LOW OIL indicator lamp shall be illuminated, the FAIL contact shall close, and the grinder shall stop operation.

5. When a power failure occurs while the system is in operation, the system shall not return to normal operation until power is restored and the START pushbutton is pressed.

6. When a power failure occurs while the system is in a fail condition, the system shall return to a fail state when power is restored. The fail state shall not be cleared until reset.

7. Reset of the grinder shall be accomplished from the controller only.

2.05 SPARE PARTS AND SOFTWARE

A. The Contractor shall provide the following spare parts for each unit.

1. Three (3) fuses
2. Three (3) 6-volt, long-life lamps

3. One (1) complete gasket set
4. Three (3) cutters
5. Three (3) spacers

2.06 EMERGENCY STOP

A. An explosion-proof emergency stop button shall be provided in the wet well mounted on the wall as close to the grinder as possible as shown on the electrical drawings.

B. A secondary emergency stop button shall also be located on the nearest electrical utility point.

2.07 FINISHES

A. Paint Coatings for Ferrous Materials: Prepared to SSPC-SP6 (Commercial Blast Cleaning) and coated with minimum 6 to 8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

B. Paint Coatings for Previously Coated Components (Motors, Speed Reducers, etc.): Prepared to SSPC-SP1 (Solvent Cleaning) and SSPC-SP2 (Hand Tool Cleaning) and coated with minimum 6-8 mils TDFT (total dry film thickness) of an aliphatic acrylic polyurethane paint in the color Hunter Green.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The Contractor shall install all equipment specified in accordance with the manufacturer's recommendations, all drawings and related specification sections, and all OSHA, local, state, and federal codes and regulations.

3.02 START-UP

A. The equipment supplier shall provide the services of a factory or manufacturer's representative for a minimum of one (1) day to inspect the equipment for proper installation, apply power for the first time and check for proper motor rotation, oversee the initial introduction of material into the system, and confirm the equipment operates as intended.

3.03 TRAINING

A. Field training for operations, maintenance, and supervisory staff members is to be provided by a manufacturer or manufacturer's representative. Field instruction shall cover key components of the equipment, operating and maintenance requirements, and troubleshooting techniques.

END OF SECTION

SECTION 15425
HEATING, VENTILATION AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the requirements of the heating, air conditioning, and ventilation equipment.

1.02 SUBMITTALS

A. Six (6) copies of a complete operations manual for all equipment, including detail drawings, maintenance instructions and other pertinent data shall be compiled and submitted to the Engineer for review and approval before acceptance of the facility.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. The plans show the general desired arrangement and location of the equipment. Some flexibility in arrangement and locations may be permissible; however, no alternations shall be made except with the specific approval of the Engineer. The contractor shall provide all equipment, wiring, controllers and installation for a completely functioning heating and cooling system for the control building.

B. Exhaust Fans

1. The following exhaust fans shall be submitted for approval with calculations verifying the air change requirements as follows:

   a. Generator Room Exhaust shall be capable of a minimum 8 air changes per hour.
   b. Restroom Exhaust shall be capable of a minimum of 12 air changes per hour.
   c. Wet Well Exhaust Fan shall be capable of a minimum of 12 air changes per hours.

2. Pump station buildings exhaust fans shall be 12” direct drive fans with 17’’ square aluminum housing, and 1/10 HP, 1 phase, 115 Volt, 1,550 rpm motors capable of providing a minimum 1,300 cfm at 0” SP. Exhaust fans shall be manufactured by Soler Palau – USA or approved equal.

3. Ventilation fan for the pump station wet well shall be a direct drive centrifugal roof exhauster with and 1/10 HP, 1 phase, 115 Volt, motors capable of providing a minimum 500 cfm at 0” SP. Exhaust fan shall be manufactured by Soler Palau – USA or approved equal.

C. Electric Unit Heater

1. Electric unit heaters shall be provided for the pump station control and chemical feed building. Heaters shall be a 208 V, three phase, 5 kW heaters as manufactured by Dayton or an approved equal.

2. Heaters shall include the following features: horizontal and downflow in one-unit, built-in thermostat, rugged plate fin element, automatic fan delay control, and high limit thermal cutout that automatically shuts off heater in the event of overheating.

D. Louvers

1. Louvers shall be 4-inch thick with continuous blade appearance and shall be storm proof.

2. Louvers shall be made of extruded aluminum at least 0.081 inches thick and shall have aluminum gravity shutters attached.

3. Louvers shall have aluminum or stainless-steel insect screens.

4. Louvers shall be provided with anchors and fasteners fabricated of compatible material. Dampers shall have PVC seal strips.

5. Louvers shall be self-closing, gravity.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of all equipment shall be accomplished in accordance with contract drawings and the equipment manufacturer's recommendations. Equipment must be properly aligned and anchored to prevent movement or undue stress or associated components or adjacent equipment.

END OF SECTION

SECTION 15444
PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Service sinks
2. Sink faucets
3. Supply fittings
4. Waste fittings
5. Water closets
6. Flushometer valve
7. Toilet seat
8. Emergency shower
9. Water-tempering equipment

1.02 DEFINITIONS

A. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.

C. Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid-solution supply.

D. Tepid: Moderately warm.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. Include diagrams for power, signal, and control wiring.

1.04 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For emergency plumbing fixtures to include in operation and maintenance manuals.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Flushing-Fluid Solution: Separate lot and equal to at least 10 percent the amount of solution installed for each self-contained unit.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

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

B. ISEA Standard: Comply with ISEA Z358.1.

C. NSF Standard: Comply with NSF 61 and NSF 372, for fixture materials that will be in contact with potable water.

D. Regulatory Requirements: Comply with requirements in ICC A117.1, and Public Law 101-336, "Americans with Disabilities Act";] for plumbing fixtures for people with disabilities.

2.02 SERVICE SINKS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Standard America.
2. Crane Plumbing, L.L.C.
3. Gerber Plumbing Fixtures LLC.
4. Kohler Co.
5. Zurn Industries, LLC; Commercial Brass and Fixtures.
6. Or Engineer approved equal.

B. Fixture:

1. Standard: ASME A112.19.2/CSA B45.1.
2. Type: For wall hanging.
3. Nominal Size: Shape and dimensions, As Scheduled.
4. Faucet-Hole Punching: As Scheduled.
5. Faucet-Hole Location: Top.
6. Color: White.
7. Mounting Material: Chair carrier.

C. Faucet: As Scheduled.

D. Support: ASME A112.6.1M, Type II, concealed-arm lavatory carrier. Include rectangular, steel uprights.

2.03 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Sink Faucets: Manual-type, single-control mixing or two-handle mixing, commercial, solid-brass valve.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard America.
b. Chicago Faucets.
c. Elkay Manufacturing Co.
d. Just Manufacturing.
e. Kohler Co.
f. Speakman Company.
g. T & S Brass and Bronze Works, Inc.
h. Zurn Industries, LLC; Commercial Brass and Fixtures.
i. Or Engineer approved equal.

2. Standard: ASME A112.18.1/CSA B125.1.
3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
4. Body Type: Center-set or Single hole.
5. Body Material: Commercial, solid brass.
6. Finish: Polished chrome plate.
7. Maximum Flow Rate: 0.5 gpm.
8. Maximum Flow: 0.25 gal. per metering cycle.
9. Mounting Type: Deck, exposed.

10. Valve Handle(s): Single lever or Wrist blade, 4 inches.
11. Spout: Rigid or Swivel, gooseneck type.
12. Spout Outlet: Aerator or Spray.
13. Operation: Compression, manual.

2.04 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61 for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.

E. Operation: Loose key.

F. Risers:

1. NPS 3/8 or NPS 1/2.

2. Chrome-plated, soft-copper flexible tube or ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

2.05 WASTE FITTINGS

A. Standard: ASME A112.18.2/CSA B125.2.

B. Drain: Grid type with NPS 1-1/4 offset and straight tailpiece.

C. Trap:

1. Size: NPS 1-1/2 by NPS 1-1/4.
2. Material: Chrome-plated, two-piece, cast-brass trap and ground-joint swivel elbow with 0.032-inch- thick brass tube to wall or one-piece, cast-brass trap with swivel 0.029-inch- thick tubular brass wall bend; and chrome-plated, brass or steel wall flange.

2.06 WATER CLOSETS

A. Water Closets: floor mounted, top spud, accessible, as scheduled.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard America.
b. Crane Plumbing, L.L.C.
c. Gerber Plumbing Fixtures LLC.
d. Kohler Co.
e. TOTO USA, INC.
f. Zurn Industries, LLC; Commercial Brass and Fixtures.
g. Or Engineer approved equal.

2. Bowl:

a. Standards: ASME A112.19.2/CSA B45.1 and ASME A112.19.5.
b. Material: Vitreous China.
c. Type: Siphon jet.
d. Style: Flushometer valve.
e. Height: Standard.
f. Rim Contour: Elongated.
g. Water Consumption: 1.28 gal. per flush.
h. Spud Size and Location: NPS 1-1/2; top.
i. Or Engineer approved equal.

3. Flushometer Valve: As Scheduled.

4. Toilet Seat: As Scheduled.

5. Support:

a. Standard: ASME A112.6.1M.

b. Description: Waste-fitting assembly as required to match drainage piping material and arrangement with faceplates, couplings gaskets, and feet; bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.

c. Water-Closet Mounting Height: Standard or Handicapped according to ICC/ANSI A117.1 as noted on drawings.

2.07 FLUSHOMETER VALVES

A. Solenoid-Actuator, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Coyne & Delany Co.
b. Kohler Co.
c. Sloan Valve Company.

d. Zurn Industries, LLC; Commercial Brass and Fixtures.
e. Or Engineer approved equal.

2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
10. Trip Mechanism: Battery-powered electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
11. Consumption: 1.28 gal. per flush.
12. Minimum Inlet: NPS 1.
13. Minimum Outlet: NPS 1-1/4.

2.08 TOILET SEATS

A. Toilet Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard America.
b. Bemis Manufacturing Company.
c. Church Seats.
d. Kohler Co.
e. Olsonite Seat Co.
f. TOTO USA, INC.
g. Zurn Industries, LLC; Commercial Brass and Fixtures.
h. Or Engineer approved equal.

2. Standard: IAPMO/ANSI Z124.5.
3. Material: Plastic.
4. Type: Commercial (Standard).
5. Shape: Elongated rim, open front.
6. Hinge: Self-sustaining, check.
7. Hinge Material: Non-corroding metal.
8. Seat Cover: Not required.
9. Color: White.

2.09 EMERGENCY SHOWER

A. Provide emergency shower with faucet that has the following features:

1. EPA WaterSense certified 1.5 GPM flow rate.
2. Meets ASME A112.18.1/CSA B125.1 and NSF61.
3. Chrome plated vandal-resistant four arm handles with color-coded indexes.
4. Chrome plated shower body assembly.

B. Emergency shower shall be Speakman SC-1220-AF or Engineer approved equal.

2.10 WATER-TEMPERING EQUIPMENT

A. Electric Water-Tempering Equipment:

1. Electrical Tankless Water Heater for wall mounting. Water heater shall provide 85 °F tepid water suitable for use in emergency shower with eye/face wash stations.

a. Electrical Characteristics: Water heater shall be 240V single phase with maximum 12 kW rating.

b. Water heater shall be Stiebel Eltron Tempra 12, Seisco model CA-12-240, Hubbell Model ETX , or Engineer approved equal.

2. Brass tempering valve. Tempering valve shall have a maximum operating pressure of 125 psi and capable of producing an outlet temperature of 85 °F suitable for use in emergency shower with eye/face wash stations

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for water piping systems to verify actual locations of piping connections before plumbed emergency plumbing fixture installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF EMERGENCY PLUMBING FIXTURE INSTALLATION

A. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

B. Install fixtures level and plumb.

C. Fasten fixtures to substrate.

D. Install shutoff valves in water-supply piping to fixtures, to facilitate maintenance of the

equipment. Use ball or gate valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation.

1. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.

3.03 IDENTIFICATION

A. Install equipment nameplates or equipment markers on emergency plumbing fixtures and equipment and equipment signs on water-tempering equipment.

3.04 FIELD QUALITY CONTROL

A. Mechanical-Component Testing: After plumbing connections have been made, test for compliance with requirements. Verify ability to achieve indicated capacities.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Emergency plumbing fixtures and water-tempering equipment will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.05 ADJUSTING

A. Adjust or replace fixture flow regulators for proper flow.

B. Adjust equipment temperature settings.

END OF SECTION

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