

2009

**STANDARD CONSTRUCTION  
AND MATERIAL SPECIFICATIONS**

**FOR**

**WASHINGTON TOWNSHIP MUNICIPAL AUTHORITY**

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Phone Number 717-762-3108  
FRANKLIN COUNTY, PENNSYLVANIA

**WATER SYSTEM**

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## Acknowledgements

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Materials suppliers and manufacturers who made information available for the preparation of these specifications.

Many facts, ideas and opinions have been collectively combined in the creation of these specifications. The objective of the specifications is to assure a uniform quality of materials and construction in the Authority's public water system. These Specifications are a work in progress and must be constantly upgraded for adherence to continuing technological advancements and improved construction techniques. Holders of these specifications are urged to check the Authority's web site for the latest addendums prior to designing or constructing a new project.

The Authority's web site address is [www.wtma.us](http://www.wtma.us)

**STANDARD MATERIAL AND CONSTRUCTION SPECIFICATIONS FOR  
THE WASHINGTON TOWNSHIP MUNICIPAL AUTHORITY’S WATER  
DISTRIBUTION SYSTEM**

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# SECTION 1

## GENERAL INSTRUCTIONS

### 1.01 DEFINITIONS:

Wherever in these Specifications the following words, terms and expressions, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

- A. Authority: The **WASHINGTON TOWNSHIP MUNICIPAL AUTHORITY (WTMA)** including any agent, officer or employee duly authorized to act for the said party in the execution of the work required by the Contract.
- B. Completion Certificate: The certificate of the Engineer or Authority Representative indicating the completion and acceptance of all work specified and performed under the Contract.
- C. Contract: The written agreement executed by and between the Authority and the Developer or Contractor, or the Developer and the Contractor, covering the performance of the work and the furnishing of labor, materials and service in the construction of water extensions or water replacement to WTMA Water Distribution System.
- D. Contractor: A corporation, partnership, or an individual hired by the DEVELOPER to construct a water distribution system or a party hired by the WTMA to construct a water distribution system, acting directly or through authorized lawful agents, legal representatives, or employees appointed to act for said party in the performance of the work under contract.
- E. Developer: For new Subdivisions or Land Developments, the corporation, partnership, or individual intending to develop for residential or other purposes a certain tract of land situated within the water franchise area of the Authority, acting directly or through any authorized lawful agents, legal representatives or employees appointed to act for said party in the execution of the work of the Contract.
- F. Drawings or Plans: Collectively, all of the drawings or plans (or reproductions of them) pertaining to the construction of the project and attached to the Contract or otherwise made a part thereof; and also such supplementary drawings as may be issued from time to time in order to clarify said Contract Drawings, or for showing details which are not shown thereon.
- G. Engineer: The person or organization duly engaged by the Authority as consultant and authorized to review plans, drawings and specifications and to inspect the results of the performance of the work under Contract by the Contractor, acting directly or through properly authorized agents, engineers, assistants, inspectors, or other representatives acting severally within the scope of the particular duties entrusted to them. The word "Engineer" shall include the officers, agents and employees of the Engineer. **In cases where the Authority does not employ a consultant, the word "Authority" is substituted for "Engineer" throughout these Specifications.**

- H. Inspection: The examination of work performed by the Contractor, to ascertain its conformity with these Specifications and the approved Contract documents. Inspection may also be referred to as Construction Observation.
- I. Maintenance Bond: The approved form of security, executed by the Developer and his security guaranteeing the replacement and repair of any unsatisfactory work or materials for 18 months following the issuance of the certificate of final acceptance of the constructed water extension. **The Maintenance Bond security shall be for 18 months and in the amount of 15 percent of the approved contract cost.**
- J. Performance Bond: The approved form of security, executed by the Developer and his surety, which guarantees execution of all construction per the Contract. **The Performance Bond security shall be for one year and in the amount of 110 percent of the approved Contract cost.**
- K. Project: All of the necessary performance, services and materials required for the satisfactory completion of the work under Contract as described in the Specifications and indicated on the Drawings.
- L. Specifications: Collectively, all of the definitions, descriptions, directions, provisions, requirements, terms and stipulations contained in these Standard Specifications; and all written supplements thereto, made or to be made, pertaining to the Contract, and the materials and workmanship to be furnished under the Contract.
- M. Subcontractor: A person, firm or corporation having a direct contact with the Contractor to perform part of the latter's contract; such as one who installs or furnishes and installs equipment forming a permanent part of the Contract work, or who furnishes labor for work required by the Contract in accordance with the Plans and Specifications. This term does not include individual workmen furnishing labor only, nor one who merely furnished material not worked to a special design.
- N. Warranty Period: An 18 month period of time beginning with the Authority's issuance of certificate of final acceptance.
- O. Water Distribution: Any part or parts of the piping, pumping or storage systems used to store and deliver water to the Authority's water franchise area.
- P. WTMA: The **WASHINGTON TOWNSHIP MUNICIPAL AUTHORITY** and its duly authorized agent(s).
- Q. AASHTO: American Association of State Highway and Transportation Officials.
- R. ACI: American Concrete Institute.

S. AISC: American Institute of Steel Construction.

T. ANSI: American National Standards Institute.

U. ASTM: American Society of Testing Materials.

W. Fed. Spec: Federal Specifications, United States Government.

X. “Approved”, etc. The words “approved”, “acceptable”, “satisfactory”, or words of like import, shall mean approved by, or acceptable, or satisfactory, to the Engineer, unless another meaning is plainly intended or otherwise specifically stated.

## 1.02 DRAWINGS AND SPECIFICATIONS

A. The Drawings and Specifications are complimentary, and the requirements of any one shall be considered as the requirements of all.

B. The Specifications in this document are written as if they were included in the Contract Documents executed by and between the Developer and the Contractor and/or Authority and Contractor. Whether they are so used is at the discretion of the Developer; however, the Authority will not accept the water distribution extensions provided by the Developer unless and until they conform to the requirements of these Standard Specifications.

C. All drawings or plans pertaining to the Project (the Contract Drawings) are to be submitted by the Developer to the Authority for review at the time of the Preliminary Planning Phase of the development. After review of these Contract Drawings by the Authority, the Developer shall make any corrections required, and submit corrected copies thereof to the Authority. The Authority’s approval of the Contract Drawings shall not relieve the Developer from responsibility for errors or discrepancies in such drawings. All Contract Drawings shall be prepared and submitted in conformance with the requirements set forth in Section 2.07.

### CONTRACT DRAWINGS – DEVELOPER SUBMISSION

**D. Deviations from the Drawings or Specifications required by the exigencies of construction will be determined by the Authority or its designee only, and authorized in writing.**

E. At all times the Contractor shall keep on the Project, available to the Engineer and the contractor’s representatives, one (1) copy of the Approved Drawings, and Specifications.

## 1.03 PRELIMINARY INSPECTION

Unless the requirement is waived by the Authority prior to the start of actual construction operations, the Contractor, or his authorized representative, shall go over the Project accompanied by the Engineer, or his designated representative, and shall observe for himself/herself, with the approved Drawings before him/her, all pertinent conditions relative to the Contract, including the status of rights-of-way and structures, obstructions, or other objects to be removed, altered and changed.

#### 1.04 WORKING CONDITIONS

- A. No night, weekend, or legal holiday work, requiring the presence of the Engineer or Authority or a representative of either, will be permitted, except in cases of emergency, and then only with the written consent of the Engineer or Authority and to such an extent as he may judge necessary.
- B. Any request for inspectors other than normal working hours must be put in writing 48 hours prior to time needed; the availability of an Inspector is not guaranteed!
  - 1. Normal working hours are considered to be between 7AM and 3:30 PM, Monday through Friday, inclusive.
  - 2. Work beyond the specified normal working hours will be charged to the developer at a rate of 1 ½ times the normal billing rate.
- C. Any construction impacting water service to existing customers shall be treated as an emergency.

#### 1.05 MATERIALS

- A. The Contractor shall furnish the Engineer, promptly after the award or execution of the contract, with a complete statement of the origin, composition, and manufacture of all materials to be used in the construction of the Project. Only materials conforming to the requirements of these Specifications and approved by the Engineer shall be used in the work.
- B. Representative preliminary samples of the materials, of the character and quality prescribed in the Contract shall be submitted when indicated or directed, for advance examination or test. Written approval of the quality of such samples shall be received by the Contractor prior to obtaining materials from the respective sources of supply.
- C. Samples of all materials requiring laboratory tests shall be taken under the direction or supervision of, or in the manner prescribed by the Engineer. Such materials shall not be used until accepted as the result of such tests. Materials will be used only so long as the quality of the material remains equal to that of the accepted sample. The acceptance at any time of any material shall not be a bar to its future rejection, if it is subsequently found to be defective or inferior in quality to the material specified.
- D. Required laboratory tests of materials shall be made by a testing laboratory or agency selected or approved by the Engineer and in accordance with the methods indicated herein. When standard Specifications and serial numbers of technical societies and associations are stipulated, the reference shall be construed to be the latest of such Specifications and serial numbers.
- E. The Contractor shall furnish all labor, materials, and equipment necessary for collecting, packaging and identifying, representative samples of materials, and the shipping of such samples to the testing laboratory. The WTMA shall collect and transfer bacteriological and chlorine test samples to the testing laboratories, which shall be completed at the contractor's expense.
- F. For tests or inspections conducted by, and at the options of, the Engineer, at sites other than the testing laboratory and not under the jurisdiction thereof, the Contractor shall furnish or arrange

with the producer to furnish all material, labor, tools, and equipment, and every facility for the verification of the accuracy of all scales, gauges, measures and testing equipment, necessary for such tests or inspections.

- G. The Contractor shall permit or arrange with the producer to permit the Engineer or any agent of the testing laboratory to inspect or test any and all material being used or to be used, at any time before, during or after its preparation, or while being used during the progress of the work or after its preparation, or after the work has been completed.
- H. Materials shall be stored to insure preservation of their specified quality and fitness for the work. When considered necessary they shall be placed on wooden platforms or other hard and clean surfaces, and not on the ground, and shall be placed under cover when directed. Stored materials shall be located to facilitate prompt inspection. Private property shall not be used for storage purposes without written permission of the owner or lessee of the property. A copy of the written permission shall be provided to the Authority.
- I. When any material intended for use in the construction of the Project has been inspected and rejected after such material has been delivered to the Site, the Contractor shall immediately remove all such rejected material from the property.

#### 1.06 ADVERTISING

No advertising will be permitted on any part of buildings, scaffolding, fences, materials, obstructions, barricades or work.

#### 1.07 PERMITS AND LICENSES

- A. The Contractor or Developer shall, unless otherwise specified, procure all necessary permits and licenses, pay all charges and fees, and shall give all notices necessary and incident to the proper and lawful prosecution of the work. The Developer or Contractor shall pay any fees and charges associated with the Highway Occupancy and the Water Quality Management Permit
- B. The Penn DOT Highway Occupancy and Water Quality Management Permit applications shall be prepared by the Developer (with the assistance of the Authority) in the name of the Authority and submitted to the Authority along with the application fees. After review of the applications by the Authority, the Developer shall make any corrections, if required, and submit corrected copies to the Authority. The Authority will forward the applications and fees to the Pennsylvania Department of Transportation or the Department of Environmental Protection as applicable.
- C. Payment for personnel from State or Local Agencies, as required to be on hand during the construction of work on Highways under their jurisdiction, shall be borne by the Contractor or Developer.
- D. Where work is to be done by the Contractor, in placing any pipe or other construction under railroad tracks, within the right-of-way of any railroad company, the Contractor shall be governed by the requirements of the railroad company involved, and shall consult with the officials thereof relative to the installation. If the railroad company requires any of their

personnel to be on hand during the construction of the work, payment for such personnel shall be borne by the Contractor or Developer. The Developer or Contractor shall pay any fees and charges associated with acquiring an occupancy permit in a railroad company right of way.

#### 1.08 CARE OF PUBLIC AND PRIVATE PROPERTY

- A. The Contractor shall take all necessary precautions to prevent damage to all overhead and underground structures and to protect and preserve property within or adjacent to the Project and shall be responsible for damage thereto. Special care must be used by the Contractor in the prosecution of the work in order to avoid interference or damage to any operating utilities or plants. Where there is any possibility of such interference or damage, the Contractor shall make satisfactory arrangements with responsible officers or owners of the utilities or plants, covering the necessary precautions to be used as safeguards during the performance of the work by the Contractor. Such arrangement shall be made before the work is started and shall be subject to the approval of the Engineer, which approval will not be considered as releasing the Contractor from any responsibility for the acts of himself or his employees or representatives. The Contractor shall protect all land monuments and property markers that will be affected by the construction until they have been correctly referenced. The Contractor shall satisfactorily reset monuments and markers that are disturbed by the Contractor during the construction of the Project or otherwise.
- B. If the proposed water lines cross telephone, telegraph, electric, television cables, gas, oil or sewer lines, no excavation or pipe laying shall be done at those crossings without an approved right of way agreement and the presence of an authorized representative from the office of the authority having jurisdiction. Attention is directed to the provisions of Act No. 287 (1974), and its amendments thereto of the Commonwealth of Pennsylvania, and full compliance therewith is required.

#### 1.09 SAFETY REQUIREMENTS

- A. **The Contractor is responsible for all site safety.**
- B. If, and when the use of explosives is necessary for the prosecution of the work, the Contractor shall store and use in strict conformity to all Federal, State and local laws and regulations. No explosives shall be used without first securing an applicable blasting permit.
- C. Observance of, and compliance with, said regulations shall be solely and without qualification, the responsibility of the Contractor, without any responsibility whatsoever on the part of the Authority or Engineer. The duty of enforcing such laws and regulations lies with the said Department, not with the Authority or Engineer.

#### 1.10 REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Contractor and the Developer are advised that they will be required to design and conduct their work in compliance with the rules, regulations and requirements of the Pennsylvania Department of Environmental Protection.

## 1.11 OBSERVANCE OF LAWS AND REGULATIONS

The Contractor at all times shall observe and comply with all Federal and State laws and regulations, and local bylaws, ordinances and regulations in any manner affecting the conduct of the work or applying to employees on the Project, as well as all safety precautions and orders or decrees which have been promulgated or enacted, or which may be promulgated or enacted, by any legal bodies or tribunals having authority or jurisdiction over the work, materials, equipment, employees or the Contract; such observance and compliance shall be solely and without reliance on superintendence or direction by the Authority or Engineer.

## 1.12 ENGINEER'S DUTIES, EXAMINATION AND INSPECTION

- A. The work shall at all times be subject to the examination and inspection of the Engineer, Authority or its authorized employees, who shall have free access to the work, and be furnished by the Contractor with every reasonable facility for examination of the work, to the extent of uncovering, testing or removing finished portions thereof. The Contractor shall provide all labor and equipment necessary for such examinations. The Engineer may require the Contractor to uncover for examination, or to remove any work done or placed in violation or disregard of instructions issued to the Contractor by the Engineer or his representative.
- B. The Engineer and its assistants are the representatives of the Authority during the construction of the work. When authorized by the Authority, it shall be the duty of the Engineer to see that all materials and work are properly inspected and that all such materials and work conform fully to the requirements of the Specifications. The Engineer shall perform such other duties as may be assigned him from time to time and shall have such additional authority as may be defined elsewhere in these General Instructions. The Engineer shall in no case act as foreman or perform other duties for the Contractor nor interfere with the management of the work by the Contractor.
- C. All inspections and tests shall be performed without unnecessarily delaying the work. All material and workmanship, if not otherwise designated by the Specifications shall be subject to inspection, examination and test by the Engineer or his duly authorized representatives. The Engineer shall have the right to reject defective material or workmanship, or require its correction. Rejected workmanship shall be satisfactorily replaced with proper material and the Contractor shall promptly segregate and remove rejected material from the premises. If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require the work to be specially tested or approved, the Contractor shall give the Engineer a minimum of two business day's notice of its readiness for inspection.
- D. The Engineer shall, within a reasonable time after presentation to it, determine all questions in relation to the construction of the Project, and in all cases decide every question that may arise relative to the performance of the work covered by the Contract.
- E. The Engineer shall have authority to decide all questions that may arise under the Contract relative to the quality and acceptability of materials furnished and the manner, rate of progress, quality and acceptability of work performed, and the interpretation of any or all Plans and Specifications.
- F. Any verbal opinion or suggestion that the Engineer may give the Contractor shall in no way be construed as binding the Authority in any way.

G. In case of any dispute relative to the quality of materials or work, the Engineer shall have authority to reject materials and to advise the Authority to suspend the work. He shall not be authorized to revoke, alter, enlarge, relax or release any requirements of the Specifications, nor to approve or accept any portion of the work, or issue instructions contrary to the Specifications.

### 1.13 DEFECTIVE WORK

- A. When any material not conforming to the requirements of the Specifications and Drawings, has been delivered upon the Site of the Project, or incorporated in the work, or when any work performed is of inferior quality, such material or work shall be considered as defective and shall be immediately removed and renewed or made satisfactory as directed by the Engineer. Failure or neglect on the part of the Engineer to condemn or reject any bad or inferior work or materials, shall not be construed as to imply an acceptance of such work or materials, if such bad or inferior material or work becomes evident at any time prior to the delivery of the Completion Certificate by the Authority to the Developer or termination of the Maintenance Bond, as may apply.
- B. The Contractor shall remove any work or material condemned, and shall rebuild and replace the same.
- C. The Contractor shall promptly move from the premises all materials condemned by the Engineer as failing to conform to the Specifications, whether incorporated in the structure or not, and the Contractor shall promptly replace its own work in accordance with the Contract.

### 1.14 NOTICE

The service of any notice, by the Authority or Engineer to the Developer or Contractor, shall be considered accomplished upon completion or any one of the following procedures.

- A. When delivered, in writing, to the person in charge of the office used by the addressee to conduct business;
- B. When delivered, in writing, to the addressee or any of its authorized agents in person;
- C. When delivered, in writing, to the addressee or any of its agents at the office used by the addressee to conduct the business of the Contractor at or near the Site of the work;
- D. When deposited in the United States Mail, postpaid, and addressed to the party intended for such service at its office used for conducting the business of the Contract at the Site of the work, or its last known place of business.

### 1.15 ENGINEERING STAKES

The Contractor shall furnish, set and maintain suitable stakes, grade boards, temporary structures, templates, and other materials for establishing and maintaining points, marks, and lines. The Contractor shall be held responsible for the preservation of all stakes and marks.

### 1.16 ITEMS REQUIRED PRIOR TO BEGINNING CONSTRUCTION

- A. Water Extension Agreement
- B. County Conservation District approved Erosion and Sediment Control Plan

- C. Blasting permit if needed
- D. Penn DOT or Washington Township Highway Occupancy Permit if needed
- E. Local Street Cut Permits if needed
- F. 10 day notice letter indicating Contractor intends to start work
- G. Pre-Construction meeting
- H. Water Connection Permit(s) issued with building permit, applicable to the project.
- I. Evidence that the final subdivision plan has been filed by the Municipality at the county courthouse, Recorder of Deeds office, if applicable
- J. Performance and Payment Bonds or other financial security to assure completion of the water extension as applicable
- K. Receipt of a letter from the Developer stating the name of the Contractor who will be installing the water distribution extension, when applicable
- L. Receipt of a Public Water Supply Permit issued by DEP when applicable
- M. A list of suppliers for the materials to be used in the water construction
- N. Shop drawings of pipes, valves, air release valves/chambers, manholes, manhole frames and covers, booster stations, storage tanks and other necessary construction materials approved by the Authority
- O. Certification from the pipe manufacturer that the pipe meets or exceeds the requirements of the Authority to proceed with construction
- P. Right's of way for all work outside of the public right of way and the Developer's property.
- Q. Written approval by the Authority to proceed with construction
- R. Notice to Pa. One Call (811) for marking all utilities in the work area.
- S. Application for water service will be made prior to the installation of a new water service. Applications may be picked up at the Authority's office. Following approval of the permit application and payment of fees a permit shall be issued authorizing construction on the Authority's water system.

## **SECTION 2**

### **GENERAL REQUIREMENTS**

#### **2.01 SITE LOCATION**

Project locations are in the service area of the Washington Township Municipal Authority, Franklin County, Pennsylvania. Any project ultimately connecting to the Authority's water system is included in these General Requirements.

#### **2.02 WORK COVERED BY CONTRACT DOCUMENTS**

- A. Without intending to limit or restrict the extent of Work required under these Specifications, the Work generally comprises construction of waterlines to the existing distribution system in accordance with these Specifications and Detail Drawings.
- B. Drawings: The Water Detail Drawings represent the standards of construction of the Authority and are attached and part of these Specifications.

#### **2.03 PRELIMINARY REQUIREMENTS**

- A. Before any work is started, the Developer shall ascertain from the Authority if the Authority intends to employ a consultant as Engineer for the Project. If the Authority indicates that no Engineer will be employed, the word "Authority" is substituted for the word "Engineer" throughout these Specifications, and the Developer and Contractor shall be guided accordingly.
- B. Where waterlines are to be installed within the limits of existing streets, all removal and protection of street paving, backfilling of trenches, temporary and permanent replacement of street paving, restoration of shoulders and the maintenance and protection of traffic will be performed in strict conformance with the requirements of the Washington Township Municipal Authority, the Washington Township Supervisors or the Commonwealth of Pennsylvania Department of Transportation, as applicable. The cost of all inspection by personnel of the Commonwealth of Pennsylvania Department of Transportation or the local municipality shall be paid by the Developer. Work performed within the right-of-way of State Highways shall be in accordance with the requirements of the latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 459, and Occupancy of Highways by Utilities. The Regulations are made a part of these Specifications.
- C. When service connections are required as work of this project, construct them from the curb stop to the building using materials required by these Specifications.
- D. Where feasible, and to the maximum extent possible, locate new water piping in easements outside drainage swales, streets and paved areas.
- E. A waterline trench shall not be used for water drainage purposes.

## 2.04 SUBMISSIONS REQUIRED FOR AUTHORITY CONTRACTS

Contract Drawings for the Authority's Contract work shall be submitted by the Authority or its Engineer.

## 2.05 SUBMISSIONS REQUIRED FOR NEW SUBDIVISIONS

Make all submissions to the office of the Authority unless directed otherwise.

- A. Submit copies of the Developer's plans and a construction progress schedule to the Authority.
- B. Definition: The term shop drawing used throughout this Section includes manufacturer's product data in the forms of descriptive literature, specifications with published detail drawings, Contractor prepared drawings, certified test records or reports and such other certificates required by the Specifications.
- C. The terms Preliminary and Final **Subdivision** Approval are requirements of the Washington Township Supervisors and the Commonwealth of Pennsylvania. The WTMA does not provide Preliminary or Final **Subdivision** Approval. The WTMA provides water capacity and approves extensions to its water system in accordance with these specifications, engineering review comments, and applicable State and Federal Regulations. **It is the Developer's responsibility to communicate, plan and submit water extension requirements to the WTMA in a timely manner for the Developer to comply with the Washington Township's Preliminary and Final Subdivision Approval time requirements. To aid in this process the WTMA will review and submit comments back to the design engineer within 30 days of receipt of drawings and appropriate review fees. Subsequent reviews of the revised plans will also be completed within 30 days of receipt of the revised.**

## 2.06 GENERAL OUTLINE OF STEPS FOR DEVELOPING WATER SYSTEM EXTENSIONS

- A. All land development plans regardless of size shall be required to submit 4 sets of drawings to the Authority for preliminary review and comment.
- B. Planning Phase
  1. Upon notice to the Authority of the intent to propose an extension, Authority staff will provide a preliminary planning conference to provide information about Authority extension approval procedures and to receive general information from the Developer about the proposed extension.
  2. Developer must obtain a copy of the Authority's "2009 Standard Construction and Material Specifications" for the Authority's Water System.
  3. The Developer shall submit a "Proposed Water System Extension Feasibility Study" (hereinafter "Study") prepared by a registered professional engineer. The Study shall

contain any analysis and information needed to support an included certification by the author of the Study that the:

- Proposed extension will adequately serve the water needs of the new development in terms of both domestic water service and fire protection,
  - Existing water facilities or services to which the extension will connect distribution and/or conveyance system to which the extension will connect or influence, are capable, or have capacity, to accommodate the additional demand generated by the development without adverse impacts according to standards applied by the Authority Engineer, and
  - Accompanying new facilities can be successfully designed in conformance with the “Standard Construction and Material Specifications” for the Water System. The Study shall include a general layout of the extension on a plan, if not a finished design, showing the proposed system connection point(s), pipe sizes and locations, proposed valve locations, locations of proposed fire hydrants, locations of any proposed storage facilities, and other features or proposed improvements deemed important to determine the feasibility of the extension.
4. The Authority shall act on the Study based on the written recommendation of the Authority’s Engineer. If approved, such approval shall not be deemed as an approval of any extension of the water system, or as a waiver of any other requirement for the approval of an extension plan, or the acceptance of dedication of any facility to be constructed according to the Study. The meaning of the approval of the Study shall be limited to an affirmation that the requirement for the submission of a Study has been met, and that, as of the time of the submission of the Study, it appears that the completion of the extension is feasible based on the information and certification contained therein. A water capacity reservation agreement is recommended, as water capacity is not reserved until an application to connect is submitted and approved for each lot and the tapping fee is paid or a water capacity reservation agreement is approved.

#### C. Design Phase

1. The Developer should submit 4 sets of drawings as referenced in 2.06A for each submission to the Authority for review and comment. The initial submission shall be done during the preliminary planning stages.
  - When the drawings are delivered to the Authority a check for the plan review fees and initial deposits for engineering and inspection cost shall be submitted to the Authority in accordance with the Authority’s fee schedule. No plans will be reviewed without receipt of this payment.
  - As the design review progresses and if the Authority’s costs exceed the the deposit, the Authority may request additional escrow deposits from the Developer or invoice for any fees in excess of escrowed funds.
  - The plan review fees and initial deposit amounts are set by separate Resolution and are part of these specifications.

2. The Developer shall submit documentation to Authority indicating permission from neighboring property owners when a right-of-way is required from a property not owned by the Developer, or when Developer intends to use an easement not explicitly stated to be used by the Authority or Township. . These may include gas, electric, sewer or phone easements.
3. Developer shall submit all legal descriptions for any easements to be dedicated to the Authority, prior to approval of design drawings. At completion of work, these shall be used in the dedication process.
4. If a Highway Occupancy Permit is needed for installation of the water line, the Developer shall prepare the permit in the name of the Authority. The Developer should then deliver the application to the Authority for signature and subsequent delivery to Penn DOT.
5. The preliminary subdivision plans shall be reviewed by the Engineer and plan changes with responses to all of the Engineer's comments must be addressed to the satisfaction of the Engineer prior to receiving preliminary approval by the Authority.
6. Upon preliminary approval of the drawings, the Developer will be provided a listing of requirements prior to issuance of a Notice to Proceed. See E.1 below.
  - **Note: The approved preliminary plans are also the approved construction drawings for subdivisions and site development plans. The preliminary plan approval letter, when issued, will note the last revision date on the plans. No changes will be permitted after that date, unless the plans are resubmitted to the Authority identifying the requested changes and those changes are approved in writing.**

#### D. Agreement Phase

1. Upon approval of the design drawings, a **Water Extension Agreement (WEA)** shall be entered into between the Developer and the Authority. Water extension agreements apply to both private and public water extensions.
2. If bonding is required, The Developer shall submit to the Authority a construction cost estimate for review and approval by the Authority's Engineer. The approved construction cost estimate will be used for financial security calculations. The construction cost estimate will be multiplied by 1.10 (for a ten percent contingency) and the approved construction cost estimate is the amount of required financial security.

A Construction Cost Estimate for Financial Security is not required for private extensions not in a public right of way unless the extension is intended for use by more than one property. The Developer shall then select the desired form of financial security. The most common forms are Performance Bonds and Letters of Credit. Alternative methods of guarantee may be accepted by the WTMA at its discretion. The Developer is responsible for selecting and submitting the security to the Authority's standards.
3. A Developer may construct with approved preliminary subdivision plans before final subdivision approval is requested. When this occurs financial security is required for all

water line extension work in a public right of way or utility easement or on private property not owned by the Developer. The purpose of this security is to assure that the Authority does not become liable for partial work or damage on properties not owned by the Developer.

4. Upon receipt of the above information, the Authority will develop two (2) original copies of the WEA and attach the Developer's financial security. (When required)
  - a. If additional escrow is required, the WEA will also indicate that additional money shall be deposited with the Authority for costs to be incurred by the Authority.
  - b. The Authority will determine the amount of escrow required.
  - c. The Authority will then forward the WEAs to the Developer for execution.
5. The following items must also be submitted to the Authority prior to issuance of a Notice to Proceed:
  - a. Developer to submit a minimum five (5) copies of Shop Drawings to the Authority for review and comment.
  - b. Developer's Engineer shall submit to the Authority in a digital format a complete set of the approved construction plans.
  - c. Developer to have executed WEA
  - d. Developer to have established the escrow account to the dollar amount specified in the WEA. If additional escrow money is needed during construction, the Authority will duly notify the Developer that an additional escrow deposit is required.

#### E. Construction Phase

1. The Developer is issued a Notice to Proceed after all the above items are addressed.
2. The Developer is responsible for issuing a ten (10) day notice to the Authority indicating the intent to start construction. At this time, a Pre-construction Meeting will be scheduled. Attendees at the Pre-construction meeting include at a minimum the Contractor, Developer, Authority, Construction Inspector, and Authority's Engineer. A representative of the Washington Township Supervisors and of the Erosion and Sediment Control are recommended to be scheduled for this meeting.
  - **The Developer shall submit five (5) sets of the approved drawings to the Authority for construction purposes. These drawings will be stamped "Approved for Construction" by the Engineer. During the Pre-construction Meeting, these drawings will be distributed to Developer, Contractor, Authority, Construction Inspector, and Authority's Engineer. Note: the plan requirements do not address plan requirements of other regulatory agencies.**
3. Developer's Contractor shall install the water extension in accordance with Authority's Standard Construction Specifications.

- The Contractor is responsible for record keeping of lateral locations, final elevations of valve chambers and meter pits and the final location of all piping and valves.
  - The Contractor is responsible for survey and final layout of water extension.
4. The Authority's Construction Inspector shall observe installation of the water extension and the water extension testing.
  5. The Authority's Construction Inspector shall prepare a list of punch list items.
  6. The Developer's Contractor shall complete all punch list items.

F. Post Construction

1. Record Drawings as outlined later in Section 2.07 must be submitted to the Authority at the close of construction. All cost associated with the development of these drawings shall be the responsibility of the Developer.
2. Developer shall submit revised legal descriptions for dedication of the water extension and the water easements, both on and off the Developer's property, as necessary. The requirements of the plats and legal descriptions are as outlined in Section 2.07.
3. Prior to the Authority accepting the dedication of the water extension the Developer shall submit to the Authority a Guarantee Phase Financial Security.
  - a. The security shall be in the amount of 15 % (percent) of the approved construction cost estimate.
  - b. The security shall be in effect for 18-months from the date of executed Deed of Dedication.
    - Ninety (90) days prior to expiration of the Financial Security, the Authority or the Authority's Engineer may perform an inspection of the water extension. Any deficiencies shall be corrected at the Contractor's expense. If Contractor refuses to correct deficiencies, the Financial Security will be used by the Authority to correct them.
  - c. All punch list items have been addressed to the WTMA's satisfaction.
  - d. All unpaid fees are due at this time.
4. Upon approval of the above information and receipt of unpaid fees, the Authority will then permit issuance of individual connection permits in accordance with the WEA. No permits to connect to the water system will be issued until the aforementioned criteria have been met to the Authority's satisfaction.

2.07 CONTRACT DRAWINGS – DEVELOPER SUBMISSION

A. General:

1. Submit four (4) sets of drawings for review. After review of these drawings, make any corrections required and resubmit four (4) corrected sets. If the plans are for final approval five (5) sets of drawings are required as identified later in this section.
  2. If a WQM (Water Quality Management) or Part II permit is required from DEP, submit seven (7) sets.
  3. Sheet Size: 24 x 36 inches
  4. Base all elevations on USGS datum, State Plane Coordinate System and refer to Authority record drawing elevations of the existing water system and indicate the difference between USGS and Authority datum.
  5. Include the following note on each drawing, “All materials used and construction methods employed shall be in accordance with the latest standards of the **“WASHINGTON TOWNSHIP MUNICIPAL AUTHORITY 2009 STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS”**.”
  6. Include the following note on each drawing, “for water system detail drawings, reference the Washington Township Municipal Authority 2009 Standard Construction and Material Specification Drawings”.
  7. Include the following note on each drawing, “Contractor shall test pit all utility crossings prior to installing any water pipe to verify existing horizontal and vertical elevations to assure no conflict with new water line extension.”
  8. Show details of hydrants, bedding, encasement, meter pits, etc., on drawings.
  9. All water piping shall be designed with bends for grade and alignments adjustments. The deflection of pipe is reserved for field adjustments to correct design errors. Deflections are permitted when those deflections are within allowable pipe laying limits.
  9. Bind drawings in sets and number them consecutively.
  10. Include a copy of the attached design checklist indicating that all items meet the Authority’s Standards with the initial submission.
- B. Indicate on the design drawings the following general items:
1. Name of the Design Engineer/Surveyor
  2. Seal of the Design Engineer/Surveyor (on Approved Drawings) **Drawing for booster stations, pressure reducing stations and storage tanks require an engineers seal.**
  3. Signature of the Design Engineer/Surveyor (on Approved Drawings)
  4. Name of the development and the owners
  5. Original Date and all subsequent revision dates.
  6. Indicate by note on the Index Map(s) or Plan and Profile sheet(s) the Water Quality Management Permit Number, or DEP File Code No. if no WQM permit was required, of the existing facility that the proposed water lines are to be connected.
  7. Act 287 list of utilities, PA One Call (811) Serial Number and Logo (and all subsequent amendments thereto)

C. Include the following information on drawings:

1. Location Plan: Showing approximate area of the municipality in which the project is located. No particular scale is required.
2. Plan and Profile Drawings: Plan View drawn to a scale of 1" = 50' and Profile View drawn to a horizontal scale of 1" = 50' and a vertical scale of 1" = 10' and having the following items included thereon:
  - a. Table 1, which is attached, is a checklist of minimum design criteria for water extensions,
  - b. Location of each existing and proposed building,
  - c. Location of existing or proposed valves and vaults,
  - d. Location of existing and proposed fire hydrants,
  - e. Location of proposed meter pits,
  - f. Size of proposed water line (profile view) with desired service connections,
  - g. Location, size and elevation of all existing and proposed underground utilities (Plan View and Profile View)
  - h. Parallel Installations: Minimum ten feet horizontal clearance to sewer mains and five feet to all others. The distance shall be measured inside edge to inside edge. In cases where it is not practical to maintain a 10-foot separation from the sanitary sewer, the Engineer may allow a deviation (see Section 2.07, C.2. j. below) on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water line closer to the sewer, if the water line is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water line is at least 18 inches above the top of the sewer.
  - i. Crossings: Whenever water lines must cross building drains, storm drains, or sanitary sewers, the water line shall be laid at such an elevation that the bottom of the water line is a minimum of 18 inches above the top of the drain or sewer. This vertical separation shall be maintained for the portion of the water line located within 10 feet horizontally of any drain or sewer it crosses. The 10 feet is to be measured on a perpendicular distance from the drain or sewer line to the water line.
  - j. Exception to parallel installations and crossing requirements: When it is impossible to obtain the proper horizontal and vertical separation as stipulated in h. and i. above, both the water main and the sewer line shall be constructed of cast iron, ductile iron, galvanized steel or protected steel pipe having mechanical joints. Other types of pipe joints of equal or greater integrity may be used at the discretion of the engineer. Where water mains must cross under a sewer main, additional protection shall be provided by:
    - (1. A vertical separation of at least 18 inches between the top of the sewer and the bottom of the water line and
    - (2. Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and the breaking of the water line.

The Engineer shall be consulted when any of the above conditions cannot be met. The use of double casing or concrete encasement of sewer and/or water lines are possible alternatives.

**k. Minimum depth of a water main shall be four feet and the maximum depth shall be seven feet from finished grade.**

l. Service connection installation location

- 1) The measurement to locate a service connection is the horizontal distance measured along the centerline of the main from the centerline of the downstream valve.
- 2) The ties and measurements necessary to locate the upper free end of the service connections are:
  - a) The horizontal distance measured to the closest tenth of a foot from the downstream and upstream property markers, house corners, to the end of the service connection.
  - b) The horizontal distance from the centerline of the main waterline to the end of the service connection

m. For water lines installed in fill areas, a note shall be placed on the drawings indicating that the “fill shall be compacted to a minimum of 95% of ASTM D698 Standard Proctor.” The Authority requires testing data to verify that at the invert elevation of the water main that the compaction requirements have been met.

n. A note shall be included indicating that no service lateral shall be placed in driveways, sidewalks, or within 10 feet of a sewer service or from any street or property tree planting.

B. Final Acceptance Submissions:

1. Record Drawings:

- a. Before Water Connection Permits are issued and the work accepted by the Authority, submit a digital copy, reproducible Mylar’s (after final approval) and two (2) copies of all working Drawings, modified as necessary to show the facilities as constructed. Submit a certificate with the record reproducible attesting to the correctness of all information shown on the Drawings
- b. The Authority intends to use prints of the reproducible to provide information to designers and contractors as required by the Commonwealth of Pennsylvania Act 287 and its amendments thereto.
- c. Record drawings shall indicate:
  - 1) Sheet size 24 x 36 inches
  - 2) Lot lines and lot number adjacent to sewer easement or roadway
  - 3) All information as identified in Section 2.07 C on pages 22 and 23 concerning Plan and Profile Drawings.
  - 4) Name of Design Engineer/Surveyor including seal and signature

- 5) Name of Developer including address
  - 6) Name of Owner if different than Developer
  - 7) All valve numbered as provided by the Authority.
2. Straight Line Diagrams: Contractor shall prepare and submit one copy of the lateral locations to the Authority and one copy to the Owner/Developer. Forms are included in these Specifications as Table 2. Water lines including valve and fire hydrant numbers shall be indicated.
  3. Final Acceptance Tests, as specified under the various Sections, completed and successful
  4. Final Acceptance Affidavits: An affidavit and such other satisfactory evidence as is required that all labor, material, rentals, contractors and subcontractors, and indebtedness arising out of performance of the water contract work have been paid; and that all other claims against the Owner/Developer, Contractor, or Subcontractors arising out of performance of the water contract work either have been paid or that the Owner/Developer, Contractor or Subcontractor has and will maintain in force such Public Liability and Property Damage Insurance as will fully protect them and the Authority from any such claims as may be pending or that may thereafter arise, to include any work performed during or at the end of the Contractor's Guarantee period of 18 months. Such guarantee work as may be required because of the Authority's Guarantee Re-inspection which will take place before the end of the 18 month Guarantee time period.
  5. Deed of dedication/Bill of Sale to the Authority of Public Water System which shall include all water mains, booster stations, vaults, valves and fire hydrants. All laterals, booster pumps, private pressure pipe systems and off-street water lines not within a public right-of-way shall remain with the property owner, Developer or by a homeowners association where required by Township regulations.

## 2.07 RIGHT-OF-WAY DRAWINGS

- A. Provide 5 copies of all required descriptions for rights-of-way. Proposed generic form for deed of Easement is available from the Authority. The Authority shall record rights-of-way in the courthouse.
- B. Provide a deed of conveyance/Bill of Sale transferring ownership of the water system extension to the Authority.

## 2.08 CONSTRUCTION PROGRESS SCHEDULE – CONTRACTOR SUBMISSION

- A. Contractor shall submit a letter to the Authority indicating its intent to start construction at least 10 days prior to the desired start date.
- B. At least seven days before work is commenced, submit three copies of a practical and feasible progress schedule showing the order in which the Work is to be carried on, the dates on which salient features will start (including procurement of materials and equipment), and the contemplated dates for completing same.
- C. Prepare the schedule in chart form and of a suitable scale to indicate the percentage of Work completed at any time.

- D. At the end of each month, update the Construction Progress Schedule by entering the actual progress of the Work on the schedule. Deliver three copies of the updated Construction Progress Schedule immediately after its completion.

## 2.09 SHOP DRAWINGS – CONTRACTOR SUBMISSION

- A. Submit a minimum five copies of each shop drawing with such promptness as to avoid delay in the work.
- B. Each submission of shop drawings must be accompanied by a letter of transmittal listing the items in the submission. Each shop drawing must be marked with the name of the Project and the name of the Contractor and be numbered consecutively.
- C. When making a submission for approval, the Contractor shall do so with the understanding that he is considered to have checked the items in the shop drawing before submitting them and that he is satisfied that, in their present state, they not only meet the requirements of the Specifications, but will present no difficulties in erection and completing his Contract, and shall clearly note his approval on all shop drawings prior to their submission to the Engineer. Failure of the Contractor to note his approval will be reason for the Engineer to return such submission to the Contractor unchecked.
  - 1. If it appears that shop drawings submitted by the Contractor to the Engineer have not been properly checked, even though the Contractor's approval has been noted thereon, it will also be considered reason for the Engineer to return such submission to the Contractor unchecked.
  - 2. Markings, written or otherwise, made by the Contractor or by his suppliers or manufacturers must be made on the Submittal in a color other than red. RED is reserved for the exclusive use of the Engineer in marking Submittals.
- D. If shop drawings show variations from the Specifications requirements because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of submission in order that (if accepted) suitable action may be taken for proper adjustment in the Contract; otherwise the Contractor will not be relieved of the responsibility for executing the Work in accordance with the Specifications even though the shop drawings have been approved.
- E. The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for proper fitting and construction of the Work nor from furnishing materials and work required by the Specifications which may not be indicated on the shop drawings when approved.
- F. After review by the Engineer, shop drawings will be returned marked as follows: Approved, Approved as Noted, Revise and Resubmit or Not Approved.
  - 1. **Approved:** When shop drawings are returned "Approved", that means the shop drawings have been found to be in conformance with the Specifications. The Engineer's approval of the shop drawings does not relieve the Contractor from responsibility for errors or discrepancies in such shop drawings.

Continues on page 29.

## 2.10 TECHNICAL REVIEW FOR WATER DISTRIBUTION SYSTEM EXTENSION

Job Number \_\_\_\_\_  
 Developer \_\_\_\_\_  
 Development \_\_\_\_\_  
 Date \_\_\_\_\_  
 Submittal \_\_\_\_\_  
 No. \_\_\_\_\_

<b>Item Number</b>	<b>Item</b>	<b>Acceptable</b>	<b>Unacceptable</b>
1	Note on each Drawing "All materials used and construction methods employed are to be in accordance with the latest standards of the Washington Township Municipal Authority."	_____	_____
2	Note on Drawings "For water system detail drawings reference Standard Construction Specifications, Washington Township Municipal Authority."	_____	_____
3	Note on Drawings "Contractor shall test pit all existing utility crossings prior to installing any waterlines to verify existing horizontal and vertical elevations to assure no conflict."	_____	_____
4	Note on Drawings when water is installed through Authority rights of way including planter 'islands', "No trees, landscape walls, etc. shall be installed within limits easement in accordance with the Authority's standard Deed of Dedication."	_____	_____
5	Name of Engineer/Surveyor	_____	_____
6	Seal of Engineer/Surveyor	_____	_____
7	Signature of Engineer/Surveyor	_____	_____
8	Name of Development and Owner	_____	_____
9	Act 287 Utility List and Serial Number	_____	_____
10	Location of building(s)	_____	_____

□

**Table 1B  
Technical Review for Water Distribution System Extension**

<b>Item Number</b>	<b>Item</b>	<b>Acceptable</b>	<b>Unacceptable</b>
11	Plan view 1"=50' Profile 1"=10'		
12	Min. Cover of 4' from top of pipe		
13	Check for horizontal clearance with sewer (10')		
14	Check for horizontal clearance with storm sewer (5')		
15	Do the plans indicate Utilities to be installed in the water line easement? None allowed		
16	Min pipe size 8", type DIP class 52 CL or SDR 21-C900		
17	Valves (3@Tees, 4@Crosses, 1 every 1000' on every transmission main)		
18	Fire Hydrant Locations 1000' maximum		
19	Right-of-way - 20' (min.) with the Right-of-Way beginning a minimum of 10' from any proposed building		
20	Constructability		
21	Maintenance		
22	Water Consumption/ Demand Data		
23	Hydraulic Model Run		
24	Size of Water Services and Locations Shown		
25	Fire Flow Data and Service Shown, If Applicable		
26	Indicate all utilities on the plans and profiles		
27	Stream crossings meet County standards?		
28	Sheet Size 24 by 36		
29	Revision Date Shown		

Table 2  
Record Drawings  
**Technical Review Checklist**

Job Number \_\_\_\_\_  
 Developer \_\_\_\_\_  
 Development \_\_\_\_\_  
 Date \_\_\_\_\_  
 Submittal No. \_\_\_\_\_

Item Number	Item	Acceptable	Unacceptable
1	Drawings Titled "Record Drawings" ("As-Built" is not acceptable)	_____	_____
2	Name of Engineer/Surveyor	_____	_____
3	Seal of Engineer/Surveyor	_____	_____
4	Signature of Engineer/Surveyor	_____	_____
5	Name of Development and Owner	_____	_____
6	Location of building(s)	_____	_____
7	Plan view 1"=50' Profile 1"=10'	_____	_____
8	Right-of-way - 20'	_____	_____
9	Water Service Connection Stationing	_____	_____
10	Size of Water Service Shown	_____	_____
11	Water Service Length - from Main to R/W Line	_____	_____
12	Water Service Depth at end	_____	_____
13	Size of Fire Service	_____	_____
14	Fire Service Length - from Main to R/W Line	_____	_____
15	Fire Service Depth at end	_____	_____
16	Sheet Size 24-inch by 36-inch	_____	_____
17	Type of water pipe	_____	_____

2. **Approved as Noted:** When shop drawings are returned “Approved as Noted” that means the shop drawings have been found to be in conformance with the Specifications, provided the changes noted by the Engineer are incorporated in the shop drawings. Shop drawings returned “Approved as Noted” will not require resubmission.
3. **Revise and Resubmit:** When shop drawings are returned noted “Revise and Resubmit” that means the Contractor shall make the required corrections and resubmit five copies of corrected shop drawings to the Engineer.
4. **Not Approved:** When shop drawings are returned “Not Approved” that means the Contractor shall make completely new shop drawings and submit five copies to the Engineer for review.

## **SECTION 3**

### **TEMPORARY FACILITIES AND CONTROLS**

#### **3.01 TEMPORARY SERVICES**

- A. General: Provide temporary services at the site of the Work throughout the entire period of construction and until the Work of the Contract is completed and the new facilities are placed in the operation of the Authority’s personnel.
- B. Temporary Water Control:
  1. At all times during the construction of work of this Contract maintain the flow of storm water, naturally occurring water and wastewater in existing facilities and channels affected by the Work.
  2. Particular attention is directed to above requirement in regard to the maintenance of flow in existing water service connections during removal and replacement of the water main.
  3. Contractor assumes risk from floods or other causes, and any damages done to the work in progress or to work completed under Contract. Make repairs and replacements to the satisfaction of the Engineer.
  4. Contractor assumes responsibility for damages to property caused by flooding or back flooding of property due to blocking or restriction of storm water passages, natural waterways and wastewater facilities capacity during normal or excessive periods of water flow.
  5. At any time do not permit wastewater flow from existing sewers to flow into nearby waterways or to flow on surface areas. Furthermore, should an accidental discharge occur, notify Department of Environmental Protection immediately.
  6. The means and methods the Contractor employs to meet above requirements are at his discretion but will be subject to the Engineer’s approval.

## **SECTION 4**

### **REMOVAL OF TEMPORARY FACILITIES AND CONTROLS**

#### 4.01 REMOVAL

Contractor shall dismantle and remove such temporary facilities and controls as required during construction of the project.

## **SECTION 5**

### **TRAFFIC REGULATION**

#### 5.01 DESCRIPTION

Purpose: The purpose of this Section is to provide the Contractor with general guidelines for the control of traffic while the work of the Project within street right-of-way is being performed. The goal is to help ensure safe and efficient traffic movement through work areas and provide safety for the Contractor's work force.

#### 5.02 QUALITY ASSURANCE

Requirements of Regulatory Agencies:

- A. Furnish, erect and maintain at closures, intersections, and throughout the Project, the necessary approved barricades, suitable and sufficient lights, approved reflectors, danger signals, and warning, detour and closure signs. Provide a sufficient number of watchmen and take the necessary and legal precautions for protection of work and safety of the public. Barricades, danger signals, signs and obstructions shall be illuminated from sunset until sunrise. Materials and safety devices (i.e., barricades, flashing warning lights, torches, reflectors and signs) shall conform to the State Department of Transportation Specifications.
- B. Traffic regulation on Authority service area streets shall conform in all respects to the requirements for traffic control on State Highways.
  - Provide a traffic control plan (modeled after a state Highway plan) to the Authority prior to start of work and keep a copy of the plan at the site of the work at all times.
- C. State Highways: The Contractor is advised that he is required to provide traffic control in complete compliance with the rules and regulations of the Pennsylvania Department of Transportation (PDT), including but not necessarily limited to the following:
  - PA Code Title 67, Transportation: Chapter 203 – Work Zone Traffic Control.
  - PA Code Title 67, Transportation: Chapter 441 – Access to and Occupancy of Highways by Driveways and Local Roads.
  - PA Code Title 67, Transportation: Chapter 459 – Occupancy of Highways by Utilities.
  - Section 901 “Maintenance and Protection of Traffic during Construction” of the Commonwealth of Pennsylvania Department of Transportation Specifications

Publication 408, as supplemented, and such other sections therein which complement this Section.

- D. Fines and related costs resulting from the Contractor's failure to provide adequate traffic control shall be borne solely by the Contractor.

## **SECTION 6**

### **TRAFFIC CONTROL MATERIALS**

#### **6.01 MATERIALS**

- A. Materials and safety devices such as barricades, flashing warning lights, reflectors and signs, provided for the purpose of protecting the work and the safety of the public, and for maintaining and protecting traffic, must conform to the requirements specified in Section 901 of the current edition of the Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408 (as supplemented) and to requirements specified in the current edition of PA Code Title 67, Transportation: Chapter 203 – Work Zone Traffic Control which complements Section 901
- B. Provide danger signals and warning signs in the approved color.

## **SECTION 7**

### **SUBSURFACE EXPLORATION**

#### **7.01 DIGGING TEST PITS:**

- A. In locations where new water lines are to be connected to existing mains, the Contractor will not be permitted to proceed with new construction until he has dug test pits and determined the exact location and elevation of any existing facilities. Dig such test pits only at the locations agreed to by the Engineer.
- B. All appropriate approvals (i.e. street cut permits) must be obtained by the contractor from the governing municipality prior to any subsurface exploration.
- C. Pa. One Call (811) shall be completed and cleared

## **SECTION 8**

### **ROCK REMOVAL**

#### **8.01 QUALITY ASSURANCE**

- A. Contractor: Contractor shall have five years documented experience with the use of explosives for disintegration of subsurface rock.
- B. Blaster shall be licensed in accordance with all applicable Federal, State and/or local laws, ordinances and regulations.

## 8.02 REGULATORY REQUIREMENTS

- A. Conform to applicable Federal, State and/or local laws, ordinances and regulations for explosive disintegration of rock.
- B. Obtain and display permits on site from authorities having jurisdiction before explosives are brought to site or drilling is started.

## 8.03 REFERENCES

- A. NFPA-495-Code for the Manufacturer, Transportation, Storage, and Use of Explosive Materials
- B. PA Code- Chapter 211 – Storage, Handling and Use of Explosives

## 8.04 MATERIALS

- A. Rock Definition: Solid mineral material with a volume in excess of 1/3 cu. yd., that cannot be machine excavated as determined by the Engineer.
- B. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.
- C. Delay Devices: Type recommended by explosives firm.
- D. Blasting Mat Materials: Type recommended by explosives firm

## 8.05 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this Section.
- B. Beginning work of this Section means acceptance of existing condition.

## 8.06 ROCK REMOVAL - MECHANICAL METHOD

- A. Excavate for and remove rock by the mechanical method.
- B. Cut away rock at excavation bottom to form level bearing.
- C. Remove shale layers to provide sound and unshattered base for footings, slabs and embankments.
- D. In utility trenches, excavate to 8 inches below invert elevation of pipe and 24 inches wider than pipe diameter.
- E. Remove excess or unsuitable materials from site.
- F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 9 Trenching.

## 8.07 ROCK REMOVAL - EXPLOSIVES METHOD

If rock is uncovered requiring the explosives method for rock disintegration, notify the Engineer and execute as follows:

- A. Advise owners of adjacent building or structures in writing and conduct pre-blast survey of wells, water mains and services, and structures on adjacent properties, as applicable.
- B. Provide seismographic monitoring during progress of blasting operations or limit charges as prescribed in regulations of the Pennsylvania Department of Environmental Protection.
- C. Disintegrate rock and remove from excavation.
  - 1. Conduct blasting operations to avoid injury to persons and property.
  - 2. Use explosive quantity and strength required to break rock approximately to intended lines and grades and yet leave rock in unshattered condition.
  - 3. Cover rock with approved materials.
  - 4. Issue sufficient warning to all persons prior to detonating a charge.
  - 5. Store caps and exploders separately from explosives.
  - 6. Remove all explosives from site at completion of blasting operations.
- D. Provide the Engineer with copies of daily blasting Records as prescribed in Chapter 211 "**Storage, Handling and Use of Explosives**", Section 211.46 of the Pennsylvania Department of Environmental Protection regulations.
- E. Repair any damage to structures, walls, paving, etc. resulting from blasting activities to satisfaction of property owners.
- F. The Owner reserves the right to prohibit blasting and the right to require that rock be removed by drilling and/or drilling and wedging.
- G. Comply with the latest Federal and State requirements for the storage and use of explosives.

#### 8.08 FIELD QUALITY CONTROL

Provide a safe means for visual inspection of bearing surfaces and cavities formed by removed rock.

## **SECTION 9 TRENCHING**

#### 9.01 REFERENCES

Pennsylvania Department of Transportation Publication 408

#### 9.02 PERMITS

- A. Township Highway Occupancy Permit and/or Street-cut Permit
- B. State Highway Occupancy Permit in Authority's name
- C. Blasting Permits

- D. Stream Crossing Permit
- E. Wetland Encroachment Permit
- F. Soil and Erosion Control Permit

### 9.03 PROTECTION

- A. Notify all utilities prior to work so that they may locate all affected facilities.
- B. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.
- C. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.
- D. Notify Engineer of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.
- E. Protect bottom of excavations and soil adjacent to and beneath foundation from frost.
- F. **Use rubber tired or treated equipment on pavement unless otherwise authorized in writing by agency having jurisdiction.**
- G. Grade excavation top perimeter to prevent surface water run-off into excavation
- H. Contractor, at all times, shall keep the gutters open so that storm or other waters shall not have their flow obstructed. If, in any case, the material excavated from the trenches must temporarily extend over the gutters, it shall be duty of the Contractor to plank or bridge over the gutters without extra compensation so that the flow of water is not prevented.
- I. **The Contractor shall be responsible for maintaining a safe job site, including the safety of his employees. This includes safe trench access for the Authority's inspectors.**
- J. Temporary Protective Construction:
  1. Temporary Fence Barricade: Erect and maintain substantial temporary fences that surround the excavation to prevent unauthorized persons entering such areas.
  2. Temporary Fence: Where necessary, to keep one side of streets or roadway free from obstruction or to keep material piled along side of the trench from falling on private property outside the right-of-way, erect and maintain a safe and substantial fence.
  3. Barricades: Furnish and erect substantial barricades at crossings of trenches, or along trenches, to protect the traveling public.
  4. Excavation Covers: Cover open excavation when work therein is suspended or left unattended, such as at the end of a workday. For such covers, use materials of sufficient strength and weight to prevent their removal by unauthorized persons.
  5. Remove temporary protective construction at the completion of work on the Project.

### 9.04 WORK IN PRIVATE RIGHT OF WAY

- A. When a Right of way is required to be secured by owner, the Contractor shall protect from injury all property including land, ornamental shrubs and trees, fences, and other improvements there to what may exist and replace in kind all those damaged.

- B. The Developer or Contractor shall to pay all property damage claims for trespass occupation outside the right-of-way.
- C. It shall be the Contractor's responsibility to obtain all other rights-of-way for access to the Construction site. Written authorization from all effected property Owners shall be provided to Engineer before beginning work in the affected area.

#### 9.05 SELECT MATERIALS IN ACCORDANCE PENNDOT'S PUBLICATION 408

- A. Coarse Aggregate AASHTO No. 8 (Penn Dot 1B Stone)
- B. Coarse Aggregate AASHTO No. 57 (Penn Dot 2B Stone)
- C. Coarse Aggregate PA No. 2A
- D. Coarse Aggregate PA No. R-3
- E. Bituminous Concrete Base Course
- F. SRL – E Wearing Course.
- G. HMA Superpave
- H. Class E – 1 Emulsified Asphalt Tack Coat.
- I. AC – 20 Asphalt Cement

#### 9.06 INSPECTION

- A. Verify stockpiled fill to be reused is approved.
- B. Verify areas to be backfilled are free of debris, snow, ice, or water, and surfaces are not frozen.
- C. Verify materials delivered to site are as specified.

#### 9.07 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. When necessary, compact sub grade surfaces to density requirements for backfill material.

#### 9.08 EXCAVATION

- A. All excavation shall be unclassified; remove as required for piping installation shown on the drawings. Excavate subsoil required for piping as shown on the Drawings.
- B. Removal of Pavement & Storage of Materials
  1. Grub and clean surface of all materials of whatever nature over the line of trench
  2. Classify material removed and preserve such material as may be required for use in backfilling.
  3. Store removed material and preserve such material as may be required for use in backfilling.
  4. Cut paving to neat lines equidistant from the centerline of the trench. Width of paving removed initially shall be no greater than the trench width.

5. In business streets, important thoroughfares, narrow streets, or other limited areas; proceed as follows:
  - a. Material subsequently excavated shall be used to backfill the trench where required by the Detail Drawings.
  - b. Material not required for backfilling or which cannot be stored on streets or right-of-ways shall be removed. Contractor shall bring back as much of the required material removed as maybe required to properly backfill the trench or if so required furnish other material as may be necessary.
- C. Hand trim excavation and leave free of loose matter. Hand trim for bell and spigot pipe joints.
- D. Remove lumped subsoil, boulders, and rock up to 1/3 cu yard, measured by volume. Remove larger material under the requirements of Sections 8 and 9 of these specifications.
- E. Excavation shall not interfere with normal 45 degree bearing splay of foundations.
- F. Correct unauthorized excavation at no cost to Owner.
- G. Fill over-excavated areas under pipe bearing surfaces in accordance with direction by Engineer.
- H. Stockpile excavated material in area designated on site and remove excess subsoil from site.
- I. Excavate trenches at least 30 feet in advance of pipe laying.
- J. Excavated material shall be placed to minimize the inconvenience to occupants traveling in streets and driveways of adjoining properties.
- K. Excavated material shall not be deposited on private property without written consent of the property Owner. A copy of that consent shall be filed with the WTMA.
- L. In case more material is excavated from an excavation or trench than can be backfilled over the completed work, or than can be stored within the limits of the right-of-way, or in the event working space is limited or space cannot be provided for traffic and drainage, the excess material shall be removed to a place provided by the Contractor. The Contractor shall bring back as much material so removed as may be required to backfill the work; if of the proper kind; or, if so required furnish other material as may be necessary.

## 9.09 BACKFILLING

- A. Support pipe during placement and compaction of bedding fill. The bedding shall be graded by hand to provide a uniform and continuous bearing support for its entire length - bell holes shall be provided at ends of pipe lengths, but size of holes shall be kept to a minimum. The bell holes shall be backfilled with bedding material which shall be compacted and brought up to the height of the adjacent material. After pipe is placed bedding material shall be hand placed and carefully compacted to the dimension shown on the Drawings.
- B. Backfill trenches to contours and elevations. Backfill systematically (as early as possible) to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy sub-grade surfaces.
- C. Compact all backfill material as shown on Detailed Drawings or as directed by Engineer, or Governmental Agency.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.

- E. Remove surplus backfill material from site.
- F. Backfill in accordance with the details shown on the Drawings, or as required by the local governmental agency.
- G. Materials shall be placed to 95% (percent) of the maximum dry density as determined by ASTM D698 or as directed by the Engineer.
- H. At the end of each workday the excavated area shall be completely backfilled and/or steel plates be placed over the excavation to accommodate traffic.
- I. Backfill shall be free of topsoil, vegetation, lumber, metal, refuse; and free of rock or similar hard objects larger than six inches in any direction.

**9.10 UNSUITABLE MATERIAL**

Remove and dispose of unsuitable material encountered during trench excavation work and replace with R-3 Coarse Aggregate material as specified herein.

**9.11 TOLERANCES**

Top Surfaces of Backfilling: Plus or minus one-eighth (1/8) inch

**9.12 SEEDING**

- A. General Requirements: The Seeding work shall consist of surface restoration work in lawn areas and also in right-of-ways. Minimum materials requirements are as follows:
  - 1. Topsoil: Use productive topsoil as available on site as excavated. Add topsoil as required using topsoil from Contractor’s source. Provide topsoil that is free of subsoil, clay, stones and materials toxic or otherwise harmful to lawn and grass growth.
  - 2. Lime and Fertilizers: Provide lime and Fertilizer which conforms to the applicable State regulations and which is specifically formulated for lawn and grass growth.
  - 3. Lawn Mulch and Mulch Binder: Provide mulch material free of noxious weeds, seed bearing stalks, and roots harmful to lawn growth. Provide non-asphalt emulsion binders of water-soluble sticking aids, gums and polymers.
- B. Grass Seed: New crop seed, furnished in sealed packages with proof of correct mixture evidenced, age of seed indicated and compliance with applicable state regulations evidenced if required.

**1. Mixture Type A (Lawns):**

Species in Mix	Mix Percent	Min Percent		Max Percent
	By Weight	Purity	Germination	Weed Seed
Kentucky 31, Tall Fescue	20	90	90	0.50
Kentucky Bluegrass	60	85	80	0.40
Perennial	20	90	90	0.50

## 2. Mixture Type B (Right-of-Way):

Mix Percent	Min Percent	Max Percent		
<u>Species in Mix</u>	<u>By Weight</u>	<u>Purity</u>	<u>Germination</u>	<u>Weed Seed</u>
Kentucky Bluegrass	30	85	80	0.40
Perennial Rye Grass	70	90	90	0.15

C. Performance: Place topsoil over the restored areas to an approximate depth of four inches, grade the surface to meet adjoining grades and the surface is to be free of objectionable material larger than one inch.

1. Incorporate lime and fertilizer into the topsoil layer in a tillage operation. Apply lime and fertilizer at the rates recommended on the packages of the individual products.
2. Sow the seed mixtures at the minimum rate of FIVE (5) pounds per 1,000 sq. ft. area and not more than five days after soil supplements have been applied.
  - a. Cover seeds by imbedding them into the topsoil ¼-inch using equipment designed for the specific purpose.
  - b. Compact the seeded areas using a lawn roller weighing 60 to 90 pounds per linear foot of roller.
  - c. Immediately following seeding, apply mulch to a total coverage depth of not less than 1½ inch. Apply mulch binder in the number of passes as needed to secure the mulch but not to exceed three passes with the maximum applied binder not exceeding 10.0 gallons per 1,000 sq. ft.

## SECTION 10

### EROSION AND SEDIMENT POLLUTION CONTROL

#### 10.01 DEVELOPER WATER SYSTEM EXTENSIONS

The Developer and the Developer's Engineer and the Contractor assume all responsibility for the design and implementation of the Erosion and Sedimentation Control Plan.

#### 10.02 REQUIREMENTS OF REGULATORY AGENCIES

##### A. Erosion and Sediment and Pollution Control Plan:

1. Conduct soil erosion and sediment pollution control work in accordance with rules, regulations and requirements adopted by the Pennsylvania Department of Environmental Protection (DEP).
2. Detail requirements for the control plan are described in an Erosion and Sediment Pollution Control Program Manual that may be obtained from the Bureau of Soil and

Water Conservation, Division of Soil Resources and Erosion Control, Harrisburg, Pennsylvania.

3. Shall be included as part of the preconstruction requirements.
- B. Fines and related costs resulting from failure to provide adequate protection against soil erosion and sediment pollution control are the obligation of the Contractor.
- C. Erosion and sediment pollution control measures employed will be subject to approval and inspection by the Pennsylvania Department of Environmental Protection and/or the Franklin County Conservation District.

## **SECTION 11**

### **TUNNELING, BORING AND JACKING**

#### **11.01 RELATED WORK**

- A. Rock Removal: Section 8
- B. Trenching: Section 9
- C. Piped Utilities-Water lines: Section 12
- D. Water Service Installation: Section 13, Water Construction and Material Specifications for Service Laterals and Building Water Piping

#### **11.02 QUALITY ASSURANCE**

##### **A. Workmen Qualifications:**

1. Employ in the work only personnel thoroughly trained and experienced in the skills required.
2. Have welds made only by welders, tackers and welding operators who have been previously qualified by tests as prescribed in the Structural Welding Code AWS D1.1 of the American Welding Society to perform the type of work required.

##### **B. Design Criteria:**

Provide encasing conduit under highways of sufficient strength to support all superimposed loads, including an American Association of State Highway and Transportation Officials H-20 Loading with 50 percent added for impact.

##### **C. Requirements of Regulatory Agencies:**

1. Work of this Section within State Highway right-of-way will be subject to inspection by representatives of the Commonwealth of Pennsylvania Department of Transportation and the work must be performed in accordance with the requirements of the latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, the Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities.
2. Inspection, insurance or other charges demanded by the Commonwealth of Pennsylvania Department of Transportation, or other authority having jurisdiction shall be paid for by the Developer.

D. Source Quality Control:

1. Shop Tests: In accordance with Section 2.10, concerning shop drawings, each pipe manufacturer must have facilities to perform listed test. The Engineer reserves the right to require the manufacturer to perform such additional number of tests as the Engineer may deem necessary to establish the quality of the material offered for use.

<u>MATERIAL</u>	<u>TEST METHOD</u>	<u>NUMBER OF TESTS</u>
Steel Pipe	ASTM A 139 or ASTM A 53	As specified in ASTM A 139 or ASTM A 53 As applicable

2. Laboratory Tests: The Engineer reserves the right to require that Laboratory tests also are conducted on materials that are shop tested. The Contractor shall furnish labor, materials, and equipment necessary for collecting, packaging, and identifying representative samples of materials to be tested and the shipping of such samples to the Testing Laboratory.

11.03 REFERENCES

- A. American Association of State Highway and Transportation Officials (H-20): (AASHTO) Loading for Conduits Installed Under Streets, Road, or Highways
- B. American Society for Testing and Materials:
  1. ASTM A 53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  2. ASTM A 123, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  3. ASTM A 139, Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 in. and Over)
  4. ASTM A 307, Specification for Carbon Steel Externally Threaded Standard Fasteners
  5. ASTM A 569, Specification for Steel, Carbon (0.15 Maximum Percent, Hot-Rolled Sheet and Strip, Commercial Quality
  6. ASTM A 615, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  7. ASTM C 32, Specification for Sewer and Manhole Brick (Made from Clay or Shale)
  8. ASTM C 33, Specification for Concrete Aggregates
  9. ASTM C 150, Specification for Portland Cement
  10. ASTM C 270, Specification for Mortar for Unit Masonry
- C. American Welding Society: AWS D1.1 Structural Welding Code

- D. Commonwealth of Pennsylvania Department of Transportation (PDT), Specifications Publication 408/87, as supplemented. PDT Section 703.2 Coarse Aggregate

#### 11.04 SUBMITTALS

- A. Shop Drawings and Products Data: Furnish completely dimensioned shop drawings, cuts or other data as required providing a complete description of Products to be installed.
- B. Certificates: Certified records or reports of results of shop tests shall contain a sworn statement that shop tests have been made as specified.
- C. Furnish Penn DOT for approval, detail drawings, accompanied by design calculations, for the tunneling shield, tunneling pits, including sheeting and bracing therefore, tunnel liner plate and tunneling procedure and grouting method. All such drawings and computations shall bear the seal of a Registered Professional Engineer.
- D. Furnish Penn DOT for approval, detail drawings, accompanied by design calculations, for boring or jacking pits including (sheeting and bracing), steel pipe, boring or jacking procedure and grouting method. All such drawings and computations shall bear the seal of a Registered Professional Engineer.

#### 11.05 PRODUCT DELIVERY, STORAGE AND HANDLING

Transport, handle and store materials and Products specified herein in a manner recommended by the respective manufacturers of such to prevent damage and defects.

#### 11.06 SITE CONDITIONS

- A. Scheduling: Perform tunneling, boring or jacking operations continuously on a 24-hour basis if required by Penn DOT or Railroad Company.
- B. Protection: As specified in Section 9 and such added requirements included herein:
1. Adequately support and protect utilities and facilities that are encountered in, or may be affected by, the work.
  2. Accommodation of Traffic: As specified in Section 5.
  3. Explosives and Blasting: Not permitted in performance of work of this Section.
  4. Excavation Conditions: As specified in Section 9.
  5. Excess Materials: As specified in Section 9.
  6. Borrow Material: As specified in Section 9.

#### 11.07 MATERIALS (tunneling, boring & jacking)

##### A. Encasing Conduit

1. Steel Tunnel Liner Plate: Cold formed, steel, four flanged liner plates.
  - a. Minimum Inside Neutral Axis Diameter: As shown on the Drawings or as indicated by the Engineer.
  - b. Minimum Thickness: U.S. Standard Gauge 8, marked on each liner plate

by manufacturer.

- c. Steel: Structural quality hot rolled carbon steel; ASTM A 569.
- d. Provide tapped grout holes and plugs (minimum 1 ½ inch diameter) in every third plate.
- e. Hot Dipped Galvanized: ASTM A 123
- f. Nuts and Bolts: Minimum ½-inch diameter, coarse thread, conforming to ASTM A 307, Grade A
- g. Coating: Factory coat inside and outside with asphaltic material to a minimum thickness of 0.05 inch.
- h. Acceptable Manufacturers:
  - Armco Drainage and Metal Products, Inc
  - Republic Steel Corp.
  - Commercial Shearing and Stamping Company
  - Or Equal.

2. Steel Pipe: ASTM A 139, Grade B or ASTM A 53, Grade B

- a. Minimum Diameter: As shown on the Drawings.
- b. Minimum Wall Thickness: As required by design criteria.

3. Water Pipe and Fittings: As specified in Section 12.

#### B. Casing Spacers

- 1. Spacers shall be made of Stainless Steel and UHMW polymer plastic runners.
- 2. Shall be supplied by Advance Products & Systems, Inc., PO Box 53096, Lafayette, LA 70505-3096. 1-318-233-6116.

#### C. End Seals

- 1. 1/8 inch thick synthetic rubber with S.S. Bands
- 2. Model AC Pull on End Seal by Advance Products & Systems, Inc.

D. Aggregate Backfill: AASHTO No. 8 (Penn Dot 1B stone) coarse aggregate conforming to PDT Section 703.2

E. Sand: ASTM C 33, fine aggregate

F. Hold down Rod: Reinforcement bar, ASTM A 615, Grade 60, deformed.  
Field coat with Bitumastic No. 300-M as manufactured by Koppers Company, Inc., or equal

#### G. Contractor Options in Products

The Contractor may install a larger diameter encasing conduit than is shown on the Drawings, provided that the Contractor has secured the prior written approval of the applicable agencies having jurisdiction. If the Contractor elects to install a larger diameter-encasing conduit than is shown on the Drawing, all necessary clearances under the roadways, pipelines or other structures shall be maintained.

## 11.08 EXECUTION

### A. Inspection

1. Inspect Materials and Products before installing in conformance with the inspection requirements of the appropriate referenced standard.
2. Remove rejected Materials and Products from the Project.

### B. Preparation: As specified in Sections 8 and 9.

### C. Performance

#### 1. Excavation:

As specified in Sections 8 and 9 and with such added requirements included herein. Should the Contractor in constructing any tunneling, boring or jacking pit excavate below the sub grade for the water pipe, he will be required to backfill the area excavated below the sub grade with Aggregate Backfill or with concrete as required by the Engineer.

#### 2. Tunneling shall conform to the applicable requirements of Section 9 and all applicable requirements of Penn DOT.

- a. Install the tunnel liner plate to the limits indicated on the Drawings or required by the Engineer or Penn DOT.
- b. Tunneling pits shall be as shown on the Water Detail Drawing entitled "Tunnel Work Pit and Tunnel Liner Plate".
- c. Exercise care in trimming the surface of the excavated section in order that the steel liner plates fit snugly against undisturbed material.
- d. Do not advance excavation ahead of the previous installed liner plates any more than is necessary for the installation of the succeeding liner plate.
- e. Support vertical face of the excavation as necessary to prevent sloughing. Completely bulkhead the heading at any interruption of the tunneling operation.
- f. Paint field bolt heads and nuts.

#### 3. Grouting:

- a. Place a uniform mixture of grout under pressure behind the liner plate and the undisturbed material.
- b. Provide grout holes tapped for no smaller than 1½-inch pipe, spaced at approximately 3 feet around the circumference of the tunnel liner plates in every third ring.
- c. Start grouting at the lowest hole in each grout panel and proceed upwards simultaneously on both sides of the tunnel.
- d. Install a threaded plug in each grout hole as the grouting is completed at that hole.
- e. Proceed with grouting as required by the Engineer, but in no event shall more than six linear feet of tunnel be progressed beyond the grouting.

#### 4. Boring shall conform to the applicable requirements of the regulatory agency and additional requirements specified herein.

- a. Install the encasing conduit by the boring method to the limits indicated on the Drawings or such additional limits required by the Engineer or regulatory agency.
  - b. Excavate and sheet boring pit.
  - c. Provide devices at the front of the pipe to prevent auger and cutting heads from leading the encasing conduit. Unsupported excavation ahead of pipe is prohibited.
  - d. Over-cut by cutting head not to exceed the outside diameter of the encasing conduit by more than one-half inch
  - e. The use of water or other liquids to facilitate casing placement and spoil removal is prohibited.
  - f. If voids develop or if bored hole diameter is more than 1 inch greater than the outside diameter of the encasing conduit, place Grout to fill voids.
  - g. Check conduit alignment in a manner and at times required by Engineer. Check alignment and grade at least once per shift as the work progresses.
  - h. Completely bulkhead heading at interruptions in boring operation.
  - i. Completely weld joints around the circumference between sections of steel pipe encasing.
5. Jacking: Jacking shall conform to all applicable requirements of the regulatory agencies and additional requirements specified herein: This operation shall be conducted without hand mining ahead of the pipe and without the use of any type of boring, auguring, or drilling equipment.
- a. Install the encasing conduit by the jacking method to the limits indicated on the Drawings or such additional limits required by the Engineer or the regulatory agencies.
  - b. Preliminary work shall consist of excavating and sheeting an acceptable shaft on the downstream side of the crossing and the installation of a backstop and guide timbers.
  - c. Design: Bracing and backstops shall be so designed and jacks of sufficient rating used so that the jacking can be progressed without stoppage except for adding lengths of pipe.
  - d. Accurately place guide timbers on line and grade.
  - e. Support: The vertical face of the excavation shall be supported as necessary to prevent sloughing.
  - f. Use poling boards and bulkheads as required if sub grade conditions in the heading are unstable.
  - g. Jacking and excavation within the pipe shall proceed simultaneously with the ground being cut no more than 2 inches outside the pipe at the top and sides and not less than 2 inches above sub grade at the bottom.
  - h. The use of water or other liquids to facilitate casing placement and spoil removal is prohibited.
  - i. If voids develop or if the jacked hole diameter is more than 1 inch greater than the outside diameter of the encasing conduit place grout to fill voids in manner approved by the regulatory agencies.

- j. Check conduit alignment in a manner and at times required by Engineer. Check alignment and grade at least once per shift as the work progresses.
  - k. Completely bulkhead heading at interruptions in jacking operation
  - l. Completely weld joints around the circumference between sections of steel pipe encasing.
6. Laying and Testing Pipe: Lay and test pipe in encasing conduit as specified in Section 13 and such added requirements included herein.
- a. Support and maintain the alignment and grade of water piping until the concrete cradle is installed and concrete has cured.
  - b. Provide concrete cradle as indicated on Detail Drawings.
  - c. Paint exposed portion of hold down rod if used.
7. Encasing Conduit: Filling and Closing: After the water pipe has been installed in the encasing conduit and has been tested, fill the encasing conduit with sand or AASHTO No. 8 (1 B) stone. Concrete is not considered acceptable fill material.
- Close one end of encasing conduit with rubber boot before filling encasing conduit. Close other end of encasing conduit with rubber boot after filling encasing conduit or as operation dictates.
8. Cleanup: As specified in Section 9
9. Field Quality Control Testing: After laying pipe in encasing conduit and before filling conduit, conduct line acceptance testing as specified in Section 13.

## **SECTION 12**

### **PIPED UTILITIES- WATERLINE**

#### 12.01 RELATED DOCUMENTS

Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section.

Section 12 includes:

- Piping and Fittings
- Valves, Tapping sleeves and Valves
- Fire Hydrants
- Fire Flow Meters and Vaults
- Air Release Vacuum Valves
- Pressure Reducing Valves and Vaults
- Meter Pits, Meters and Ancillary Materials
- Service Connections

## 12.02 QUALITY ASSURANCE

A. Piping, valves, and specials specified herein shall be essentially the standard products of manufacturers who have been regularly engaged in the successful production of high quality materials of this type for at least ten years.

### B. Safety

The Contractor shall not apply a pressure which exceeds the rated pressure of a pipe, valve or appurtenances.

### C. Test requirements

1. All pressure pipe and fittings shall be tested by the contractor in a manner satisfactory to and witnessed by the Engineer. The Contractor shall furnish all equipment, appurtenances, pumps, taps, polyurethane plugs, and calibrated gauges to conduct the following tests at no cost to the Authority.

2. Use only potable water for the hydrostatic pressure tests.

### D. Preparation for testing

#### 1. Engineering submittals

a. Submit a testing schedule including test sections with elevations and a list of equipment to be used. The water system design shall include the physical piping and connections required for testing purposes.

b. Submit certification attesting that the pressure gauges to be used have been calibrated and are accurate within 3 percent.

c. Submit certification attesting that the chlorine form composition is as specified.

d. Verify locations for water and chlorine additions and for expelling air.

e. Water for filling the piping and the water transporting vehicles must be preapproved by the WTMA prior to filling the waterline. The use of a public water source and a tanker used solely for transporting drinking water is required when the WTMA is unable to supply water for testing purposes. The Engineer may require testing of the water source or its transportation at the owners cost when a concern exists regarding water quality to be used in the testing. Note that cost of water used for testing purposes shall be billed the Contractor.

#### 2. Site requirements

a. The Engineer shall be notified a minimum of two business days in advance to schedule testing and determine pressure requirements. All of the requirements identified in D. **“Preparation for testing”** above must be completed prior to scheduling testing.

b. All service corporations shall be in place. (Note the service Corps must be rated to pass the 200-psi pressure test requirements).

c. Thrust blocks must have a minimum 7 days of curing unless the contractor at his option and the Engineer’s knowledge uses a high early strength concrete in which case the testing may occur after 3 days have elapsed.

- d. All taps necessary for testing and to expel air from the pipeline shall be made at the contractor's expense. Following successful testing of the pipeline the contractor shall plug all taps (not required for proposed services) and have them inspected by the WTMA.

#### E. Pressure Tests

1. The waterline to be tested shall be slowly filled with water while expelling all air from the waterline at the high point. The waterline is to be maintained full of water for a period of not less than 24 hours before the test.
2. The pressure test shall first consist of raising the water pressure based on the calculated water pressure at the lowest point on the section of the water line being tested. The lowest point shall be at 200 pounds per square inch (psi); however, pressures shall be determined by the WTMA for each test based upon the test site conditions. The leakage test shall be at 200 psi for thirty (30) minutes to be followed by the pressure test at 160 psi for ninety (90) minutes.
3. An alternative testing procedure is to conduct one pressure test at 200 psi for 2 hours, with a maximum allowable pressure drop of 2 psi.
4. Each pressure test shall be limited to a maximum of 1,600 feet of pipe. When a valve is located within the pipeline being tested, that valve shall be closed following the leak test and the pressure removed from the side of the valve not having the pressure gauge, to test the valve. The maximum allowable pressure drop is 2 psi within 15 minutes. All valves shall be pressure tested to assure a proper seal. The Engineer may approve longer pipe testing distances when the longer distances do not impact quality assurance.

#### F. Leakage test

1. The leakage test shall be in accordance with AWWA C-600, Section 4.1, except that the Contractor shall provide an approved means for measuring leakage.
2. The Leakage Test shall consist of adjusting the test pressure based on the elevation of the lowest point of the section being tested and the difference in elevation (pressure) at the gauge elevation, to a pressure in pounds per square inch numerically equal to 50 pounds greater than the normal working pressure of the pipeline. This test shall be maintained for ½ hour.
  - Example: The working pressure of a waterline is 80 psi. The working pressure of 80 psi plus 50 psi requires a leakage test at 130 psi. The lowest point in the waterline is at an elevation of 720 feet. The gauge is placed at an elevation of 750 feet. Since the gauge is 30 feet higher than the lowest point in the waterline, that elevation must be factored into the gauge reading. The adjustment is made by multiplying 30 feet by 0.433 (pound per foot per square inch) which equals 12.99. The pressure at the gauge reading for the leakage tests would be 130 psi less 12.99 psi or 117 psi. The Engineer will provide the test pressure based on site conditions.
3. Maximum allowable leakage is one (1) gallon per hour per inch pipe diameter per mile of pipe, which shall be calculated before testing, is started.
4. The method of repair or replacement of defective work, piping or specials shall be approved in advance by the Engineer.
5. **No waterline will be accepted by the Engineer until after the pressure and leakage tests are passed.**

6. All testing must be witnessed by Owner's representative. Documentation of all testing must be submitted to Owner. See Detailed Drawings, Pipe details, P-3

G. Disinfection of the water pipeline

1. Disinfection of the water pipeline shall be performed in accordance with the Engineer's directions and shall conform to AWWA's "Procedure for Disinfecting Water Mains" Designation C-651-05. Before disinfection, the lines shall be flushed with water.
2. Valves located within the chlorinated section shall be closed after chlorination for at least 2 hours and then reopened prior to bacteriological testing.
3. Chlorine Form and Application
  - a. The chlorine form to be applied to the system shall be either chlorine gas solution or calcium or sodium hypochlorite granular form. The hypochlorite must be mixed with water before using it as a form of disinfectant in the waterline. The Engineer's written approval of the chlorine form to be used is required.
  - b. Continuous Feed Method:

Feed water and chlorine into the waterline at a constant rate such that the water will not have less than 25 mg/l free chlorine. Chlorine application shall not cease until the entire line is filled with heavily chlorinated water. Each fire hydrant and blow-off shall be opened and filled with chlorinated water at this time.
4. The Contractor shall flush the chlorine from the water main under direction from the WTMA and schedule with the WTMA for a bacteriological sample(s) to be collected and tested at a state certified laboratory. Failure of the test sample(s) to pass the bacteriological test shall require the contractor to disinfect the pipeline for additional testing. The number of bacteriological tests required shall be determined by the WTMA and based upon length of pipeline, pipeline configuration and site conditions. (These details should be addressed during the design and construction phases) The samples shall be collected by a certified water operator employed by the Authority and taken to a certified laboratory, at the Contractor's cost.

All water used for disinfection shall be disposed of properly. In no case shall this water be disposed of in adjacent streams. The Contractor shall submit to the WTMA the proposed means for ultimately disposing of the chlorinated water. When disposal requires dechlorination, specifics shall be included with the disposal means
5. At no time shall customer side service lines be connected to the curb stop before the main has been thoroughly sterilized and has passed water quality testing.
6. The WTMA shall not accept the deed of dedication of the waterlines until after the waterlines have passed the bacteriological testing requirements.

H. Service connections to the waterline are prohibited until after final acceptance of the waterline by the WTMA occurs.

I. Cost

All costs associated with testing of the water system shall be at the Contractor's expense.

### 12.03 SUBMITTALS

- A. Submit shop drawings or catalog cuts, as appropriate, for materials listed under Article 12.01 of this Section. Submit only those materials that are actually to be used in the work. These will usually be as follows:
  - 1. Pipe and fittings, Ductile Iron or PVC as applies
  - 2. Gate valves and valve boxes
  - 3. Pressure regulating valves
  - 4. Tapping sleeves and valves
  - 5. Curb stops and boxes
  - 6. Detection tape
  - 7. Water meters, meter pits, and accessories
  - 8. Fire hydrants
  - 9. Fire flow meters
  - 10. Vaults for valves and fire flow meters
- B. Submit manufacturer's Certification of Compliance in accordance with Section 1.05
- C. Make submittals prior to start of construction. Make submittals to Engineer.
- D. For each development and / or water line extension, the developer will provide the Authority with:
  - 1. One hydrant wrench
  - 2. One valve wrench a minimum of 7' in length. When the valve depths vary throughout the project the Authority may require 2 different length valve wrenches.
  - 3. One Curb stop key
  - 4. One Curb box top key
  - 5. One meter pit key (if meter pits are located within the project)

### 12.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle the piping, valves and specials in accordance with requirements specified in Section 1 Materials 1.05, the manufacturer's recommendations, and as supplemented herein.
- B. Pipe and related materials shall be loaded and unloaded by lifting with hoists or skidding to avoid shock or damage. Under no circumstances shall such material be dropped or skidded against piping already on the ground.
- C. Pipe and related materials shall at all times be handled with care to avoid damage. The interior shall be kept free from dirt and foreign matter. All pipe, valves and appurtenances shall be carefully lowered or raised into place, with suitable equipment in a manner that will prevent damage to the material. Under no circumstances shall pipe or accessories be dropped or dumped.
- D. Pipe, pipe linings, fittings, valves, fire hydrants and all related materials shall be thoroughly inspected for defects prior to their being installed. **Any defective, damaged, or unsound material, as determined by the Engineer, shall be repaired or replaced as directed at no additional cost to the Owner.**

- E. All lumps, blisters and excess coating shall be removed from the ends of each pipe. The joints shall be wire brushed and wiped clean, and dry and free from oil and grease before the pipe is installed.

## 12.05 PIPES, VALVES, HYDRANTS AND FITTINGS

**All piping, valves and fittings used for construction or repairs to the public water system shall be manufactured in the United States of America and be in compliance with applicable AWWA Standards and NFS Standards.** Waterline piping shall be either Ductile Iron (DI) or PVC as directed by the Engineer. DI Piping is required: within Pen Dot roadways, across mountainous terrain, at stream crossings, with all pipes greater than 8 inches in diameter and in other instances where the Engineer determines that DI Pipe is the better pipe for a specific use. PVC Pipe is to be used where DI Pipe is not required.

### A. PVC Pipe

1. All PVC pipes 3” and larger shall be polyvinyl Chloride (PVC), Bell jointed. The PVC pipe shall be class 200 (DR 14) AWWA Standard C-900 pressure rated pipe. The pipe shall be made from Class 12454-A or class 12454-B Virgin components as defined in ASTM D 1784 4,000 PSI Design Stress. All pipe and fittings shall conform to the latest revisions of the following specifications D 2241 and AWWA C900-DR-14 Class 200.
2. Two inch pipe shall be SDR-21, Class 200 Polyethylene pipe. (Note conversion from AWWA C900, SDR 14 pipe requires a schedule 80 (PVC) male iron pipe adaptor.
3. Fittings shall be Class 350 ductile iron, short casting mechanical joint, and meet ANSI A21.10, ANSI A21.11, and be of the size specified. The inside of all fittings shall be given a double thickness cement lining and bituminous seal coat in accordance with ANSI A21.4.

### B. Ductile iron pipe (DI pipe)

All DI Pipe and fittings shall be manufactured in the United States of America.

1. Ductile iron pipe shall be Class 52 (minimum) and must be manufactured in accordance with ANSI/AWWA C-150 and C-151 standards for DI Pipe, centrifugally cast. Furnish fittings in accordance with ANSI 21.10 250 psi rating
2. Pipe joints shall be of a restrained joint type, such as Field-Lok 350 gaskets as manufactured by US Pipe or equal. Restrained Joint Gaskets or equal are required at each joint and shall comply with ANSI A21.11 and AWWA C111 standards.
3. All DI Pipe shall be cement lined and coated inside and out with a bituminous seal coat in accordance with ANSI A21.4 and AWWA C104 Standards.
4. Mega lugs shall also be provided at each fitting and/or bend.
5. If restrained pipe is furnished, furnish fittings of the same type and manufacturer as the furnished pipe.

### D. Copper Tubing

Copper Piping is not permitted on the Authority’s water system. The following copper specifications are included in the event that design circumstances require the use of copper piping. An example is the use of copper piping for the bypass line in a meter vault.

1. Tubing: ASTM B88 and B-251 for lines 2” in diameter or less, for under ground service, Type K Annealed

2. Joints: Compression
3. Fittings: Cast copper alloy compression tube fittings
4. Manufacturer (no substitutes allowed)
  - a. Ford
  - b. Mueller

## 12.06 VALVES AND SPECIALS

All valves to have mega-lug glands or equal manufactured to ASTM A536, 60-42-10 ductile iron standards. All nuts/bolts shall be installed with proper torque according to the manufacturer's instructions.

### A. Gate Valves 2-12 inches in diameter

Gate valves shall be iron body valves, compression resilient seated meeting or exceeding AWWA C509-80. All valves shall have a working pressure of 250 psig. Valves shall have mechanical joint ends and be equipped with a 2-inch operating nut and shall open when turned to the left (counter clockwise). Valves shall have fusion-bond epoxy coating on the inside and outside of the valve. The valve shall be American Flow Control series 2500 Resilient Wedge Gate Valve or approved equal.

### B. Tapping sleeves and valves

#### 1. Tapping sleeves

- a. The tapping sleeve shall be a Smith-Blair, Inc. style 622 all stainless steel or approved equal.
- b. The tapping sleeve shall have a body and neck made of 304 stainless steel.
- c. The flange shall be 304 stainless steel and recessed to accept a tapping valve per MSS-SP60. The flange drilling shall be per AWWA C207 class D (ANSI 150# hole pattern).
- d. The sleeve gasket shall be of a concave wedge design and NSF-61 listed. The gasket shall be NSF approved.
- e. The nuts and bolts shall be  $\frac{3}{4}$  inch ( $\frac{5}{8}$ " in 4" and 6" nominal) 304 stainless steel. The bolts shall be replaceable. The nuts shall be hex head type 304 stainless steel and fluoropolymer coated.
- f. The sleeve shall contain a  $\frac{3}{4}$ " test outlet and bronze plug for hydrostatic testing of the seal prior to tapping.
- g. The tapping sleeve shall meet applicable AWWA C223 standards.

2. The Contractor shall verify the type of existing pipe and the outside diameter of pipe on which the tapping sleeve is to be installed. The tapping sleeve shall have bell or caulked type ends. The sleeves shall be made in two halves, which can be assembled and bolted around the main. Gaskets shall extend the entire length of the sleeve to form a watertight joint when the side bolts are properly tightened.

#### 3. Tapping Valve

- a. The tapping valves shall have flanged inlets with mechanical joint outlets. All valves shall be vertical iron body, bronze mounted, inside screw valves with 2-inch operating nuts, and

resilient seated. The valve shall open to the left, and shall be fitted with O-ring seals. The tapping valves shall conform to the applicable sections of AWWA Standard C500.

- b. The Contractor shall furnish manufacturer's certified shop drawings. In addition, the manufacturer shall furnish an affidavit that the tapping valves furnished comply with all applicable provisions of AWWA Standard C500.
- c. The interior surface of each valve shall receive two coats of Asphaltic Varnish in accordance with Federal Specification TT-V-51C.
- d. The exterior surface of each valve shall receive two coats of bituminous coating in accordance with AWWA Specifications.
- e. Manufacturer (No Substitutes Allowed)
  - (1. American Flow Control (series 2500 valve)
  - (2. Mueller
  - (3. U.S. Pipe

#### C. Mechanical Couplings

1. General: Steel mechanical couplings of a gasket, sleeve type shall be furnished and installed as required. The coupling shall be of the proper diameter to make a tight joint. The coupling shall not have stops. All couplings shall be for greater than 200-psi working pressure.
2. Material: Each coupling shall consist of one middle ring of a thickness and length suitable for the proposed application and test pressures; two followers; two rubber compounded wedge section gaskets and sufficient trackhead bolts to properly compress the gaskets.
3. Manufacturer
  - a. American Flow Control
  - b. Mueller
  - c. Smith Blair

#### D. Valve Box

1. All valves buried in the ground where applicable shall be provided with cast iron extension type valve boxes of the roadway type.
2. The valve boxes shall be of three-piece construction, and shall be of the screw type.
3. The valve boxes shall have a 5¼-inch shaft, and shall be furnished with covers. Valve box alignment saddle
4. The valve boxes shall be hot coated inside and out with a tar or asphalt compound.
5. Lid/cover shall be marked with the word "water"
6. Acceptable Manufacturers
  - a. Bingham and Taylor, Culpepper, VA
  - b. Approved equal

#### E. Curb Box

1. For  $\frac{3}{4}$  inch and 1-inch diameter service connections shall be:
  - a. Sames Model No D-1P4, plug type, cast iron arch pattern base, slide type, with stationary 24 inch extension rod, 3 feet to 4 feet vary, Erie Pattern or approved equal.
  - b. 2  $\frac{1}{2}$ -inch shaft with a cover marked water
2. For service connections 1  $\frac{1}{2}$  inches or larger, a valve box will be required.

#### F. Meter Pit and Accessories

1. Meter pit for new services shall be a Plastic Pit Setter for moderate to cold weather as manufactured by the Ford Meter Box Co, Inc. No substitutes accepted. (PDBHC-244-18-36Q)
  - a. The setting shall be standard for Double Lid Cover, with pipe brace.
  - b. Inlet valve shall be a Ford BA13-232W Angle Ball Valve
  - c. Outlet valve shall be Ford HHCA31-232 Angle cartridge Dual Check Valve
  - d. Meter shall be a  $\frac{5}{8}$  inch X  $\frac{3}{4}$  inch supplied by the WTMA and purchased by the owner
  - e. The inlet and outlet couplings shall be CTS Quick Joint JT
  - f. The pit diameter shall be 18" and the depth 36-inch
  - g. Meter Pit shall have a Ford Wabash Double lid cover Model No. WA3L-C-T
  - h. The Authority will supply  $\frac{5}{8}$  X  $\frac{3}{4}$  inch water meters to residential customers (at the customer's cost) unless a larger meter is requested by a customer and approved in advanced by the Authority.
2. Replacement of existing meter pits when necessary shall use the meter pit and accessories noted above under normal circumstances. When conditions warrant and the Authority requires or approves the following pit and accessories shall be used:
  - a. Ford meter setter VBHC72-24-44-33Q, compression type, 24 inch, padlock wings, dual check valves, seal wire hole on inlet inverted key valve, short stainless steel inserts for PE Pipe or tubing  $\frac{3}{4}$  inch CTS Grip JT and  $\frac{3}{4}$  inch brace pipe eye.
  - b. Meter Box shall be as supplied by Mid-States Plastic Inc or approved equal. Note additional specifications in the detailed drawing W-8 of the General Drawings.

#### G. Service Meters

1. All Residential water service meters shall be  $\frac{5}{8}$  X  $\frac{3}{4}$  inches unless approved differently by the engineer.
2. All commercial water service meters shall be appropriately sized based upon water consumption requirements supplied by the owner.
3. All water meters shall be provided by the Authority after receipt of meter cost from the owner.
4. All meters are purchased from Sensus
  - a. Residential meters shall be  $\frac{5}{8}$  inch X  $\frac{3}{4}$  inch SR11 Meter TR/PL 1,000 gal 4 whpl as bonnet secscrew CI bottom L/Conn, the meter and radio read transceiver are as supplied by Sensus, no substitutions.

- b. Non-residential customer meters shall be supplied by Sensus and contain the appropriate radio read transceiver. Sizing and model no. shall be determined by the Engineer using information provided by the owner.

H. Service saddles shall:

1. meet applicable AWWA C800 standards and be NSF 61 Listed
2. be designed with PVC and other soft or brittle pipe in mind.
3. have a single stainless steel band
4. be rated at 200 psi or greater
5. be Ford No's FS10 AND FS202 or approved equal

I. Copper Service Connector and Stops

1. Corporation stop: Design to conform to AWWA C800. All bronze construction, key operated, with gasket and eighth bend coupling. All corporations shall be compression fitted type.
2. Curb stop and box: Design to AWWA C800.
  - a. All bronze construction, inverted key stop.
  - b. Stop: Ballcorp Model No B44333.

J. Fire Hydrants.

1. Fire hydrants shall be compression type with 5¼-inch main valve, and a 6-inch mechanical joint inlet.
2. The hydrant shall have NS Threads, two 2½-inch hose nozzles, and one 4½-inch pumper nozzle, complete with nozzle cap chains.
3. The hydrant shall be traffic type with breakable safety flange and stem coupling and shall open counter clockwise.
4. The hydrant shall have a pentagonal operating nut and shall be provided with National Standard Threads on the hose and pumper nozzles.
5. Hydrants shall conform to AWWA C502 and shall be leak proof at the design pressure.
6. Hydrant shall be Model B-62-B, chrome yellow in color, traffic type, as manufactured by American-Darling Valve and Manufacturing (no substitute allowed).

K. Detection Tape

1. Detection tape shall be metal detectable reinforced underground utility marking tape with a 50 gauge (0.0005 inch) solid aluminum foil core with permanent printing under a Mylar layer.
2. The detection tape shall consist of a aluminum 9.0 mil (0.0009 inch) overall thickness, coated and colored cross-woven polyethylene, with no less than 2,500 lbs. of tensile break strength per 12 inch width and color coded suitable for direct burial.
3. Detection tape shall be 6-inch width minimum.

L. Air Release/ Vacuum Valve

1. The air release valve shall close drop tight, incorporating an adjustable Buna-N orifice button. All internal metal parts shall be of stainless steel. The float shall be of stainless steel and be capable of withstanding a test pressure of 1,000 PSIG. The linkage/lever mechanism shall be able to be removed from the valve without disassembly of the mechanism, and shall be designed to prevent jamming.
2. The body and cover shall be cast iron conforming to ASTM A126, Class B, and shall be designed to withstand a test pressure of 450 PSIG. (Operating pressure 250 psi).
3. The air release valve shall be as manufactured by GA, APCO or Valve Matic.

M. Double Check Valves and Reduced Pressure Zone Backflow Preventors

1. Acceptable manufacturers are Wilkins and Watts.
2. Type of valve shall be approved by the Engineer.

N. Pressure reducing valves

Shall be Manufactured by Ross Valves or approved in advance by the WTMA.

O. Miscellaneous Valves and Specials

1. Lever operated ball valves shall be bronze suitable for 225 pounds services. Valves shall be one-piece body design, blowout proof stem, reinforced teflon seats and seals, threaded ends and lever operated. Valve shall be manufactured by Stockham, NIBCO or Crane.
2. Pressure Gauges shall be 4½-inch dial size, with range suitable for line pressure. Valves shall be furnished with shut-off valve and diaphragm seals to protect gauges from surges and solids. Gauges shall be liquid filled as manufactured by the Mueller Brass Company, Lukenhiemer, Stockham, Crane or equal.
3. Meter pit valves shall be Ford Ball Meter Valves with locking caps up to 2” in size. If greater than 2” in size, the valves shall be a gate valve with a hand wheel operator.

P. Water Meters

1. Displacement Type: AWWA C700 furnished by Authority
2. Turbine Type: AWWA C701; Sensus Series “W”
3. Compound Type: AWWA C702; Sensus, Single Register, High Performance (SRH)
4. Fire Service Type: AWWA C703
5. Non-residential customer meters shall be supplied by Sensus and contain the appropriate radio read transceiver. Sizing and model no. shall be determined by information provided by the owner.

Q. Vault Design

1. All vaults shall be designed by a licensed Professional Engineer registered in the State of Pennsylvania, and engaged by the manufacturer.
2. All dead loads, live loads, flotation, erection, temperature and anchorage stresses shall be considered.
3. The calculations shall be prepared in a neat and legible manner, sealed by the licensed Professional Engineer performing the calculations.

4. For design, groundwater shall be assumed at the top of the vault and the design shall provide for a fifteen (15) percent factor of safety against flotation. The vaults shown in the detailed drawings assume a water table two feet below the floor. Actual ground water levels may require a change in the vault design.
5. The concrete shall have a minimum 28-day compressive strength of 5,000 psi. The Engineer may allow a 28-day compressive strength of 4,000 psi for smaller vaults located in non-traffic areas.
6. Pre-cast concrete vaults shall conform to the requirements of these specifications, the Detailed Drawings and ASTM C478.
7. All tongue-and-groove joints in the pre-cast wall, including the joint at the top of the base, shall be made up using gaskets, and shall conform to ASTM C443. Joints may also be made up using Butyl joint sealant rope material in lieu of the gasket. The pre-cast sections shall be provided with a special groove to receive and hold the gasket in position during joint assembly. After joint assembly, the gap between sections shall be packed on the inside and outside with WTMA approved Hydraulic Cement, and shall be troweled smooth so that no projections remain on the inside. There shall be no concrete or concrete bearing between the various sections. The gasket shall not support the weight of the section.
8. Slab tops shall be set in a full bed of mortar. The slab top shall be crowned a minimum of  $\frac{1}{4}$  inch per foot for drainage.
9. All openings found in the concrete shall be reinforced with additional diagonal bars tied to each layer of wall or slab reinforcement. Any required inserts and wall openings shall be coordinated with mechanical requirements prior to casting the units.
10. All exterior surfaces of pre-cast concrete vaults, except for the top of the cover slab, shall be waterproofed using two coats of Koppers Bitumastic black solution or approved equal. When the cover slab is below ground, the cover slab shall also be waterproofed.
11. A foundation mat of AASHTO No. 57 stone to support the base shall be provided. Mat shall be six (6) inches minimum depth and shall bear on sound undisturbed earth; excavate and remove sub grade material as necessary to reach sound sub grade. Stone sub grade mat shall be a minimum of two feet greater than the footprint of the vault base, and shall be compacted to a uniform, level surface.
12. Pre-cast base shall be accurately located and uniformly supported on the foundation mat in a level position.
13. Install wall sections in properly oriented position; follow manufacturer's instructions for joining each section using the gaskets.
14. All joints shall be packed with WTMA approved Hydraulic Cement.
15. Units shall be installed plumb and level.
16. All materials and protection against flotation shall be provided during the installation process.
17. The requirement for requiring a removable top slab for each vault shall be determined by the contents of that vault and accessibility requirements for future maintenance.

## 12.07 STEEP SLOPES

Water mains on 20% or greater shall be anchored securely with concrete anchors or equal. It will be the responsibility of the design engineer to prepare a detailed anchor design. The anchors shall be spaced in accordance with PA DEP requirements and approved by the Engineer. See Detailed Drawing P-6

## 12.08 LAYING PIPE

### A. General.

1. All pipe shall be laid in accordance with ASTM D2321-74 using 6 inches of 1B stone bedding (see Detail Trench Drawing TR W-1 & W-2) and laid to the required lines and grade, **without offset or unevenness.**
2. Pipe laying shall proceed upgrade with pipe laid carefully, hubs upgrade, spigot ends fully centered into adjacent hubs.
3. Extreme care shall be exercised to prevent damage when the pipe is handled. Joints shall be carefully cleaned before pipes are lowered into the trenches and shall be kept clean during laying operations by means of plugs or other approved devices. When pipes are dirty from sitting, or from transport, they must be washed and swabbed out before being installed.
4. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Each pipe shall be firmly held in position so that the invert forms a continuous grade with the invert of the pipe previously placed.
5. Under no conditions shall pipe be laid in water, on sub grade containing frost, and/or when trench conditions are unsuitable for such work. In all cases, water shall be kept out of the trench until concrete cradles, supports, encasement, or saddles, and materials in the joints have hardened, as applicable.
6. Any pipe that has its grade or joint disturbed after laying shall be taken up and re-laid. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe without expense to the Owner.
7. Walking or working on top of the completed pipeline, except as may be necessary in backfilling or tamping, shall not be permitted until the trench has been backfilled to a height of at least 2 feet over the top of the pipeline.
8. **When pipe laying is not in progress, the open ends of the pipe shall be closed by watertight plug, especially at the end of a workday. Watertight plugs shall be on the job and checked by the inspector.**
9. Every precaution must be taken to insure that foreign materials are kept from entering the pipe, both while it is setting above ground and especially while it is being installed. At no time should any debris, tools, rags, or any other material, be placed inside the pipe or fittings. Failure to maintain these requirements shall result in line flushing and televising prior to chlorination.
10. Pipe shall be laid with bell ends facing the direction of laying, unless otherwise shown on the drawings. Before placing a pipe in the trench the pipe shall be inspected for any dirt or foreign debris. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to the correct line and grade. The pipe may never be forced home by putting a piece of equipment on the bell end of the pipe.

11. Ductile Iron Pipe shall be installed in accordance with AWWA A600.

12. All concrete encased DI Pipe, fittings, valves, and appurtenances shall be wrapped in 8 mil thick polyethylene prior to encasement in accordance with AWWA C105. The weep holes on fire hydrants shall be kept free to drain.

B. Push-on Type Joints

1. The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. These parts shall be kept clean throughout assembly at the joint.
2. The circular rubber gasket shall be flexed inward and inserted in the gasket recess of the bell socket. Care shall be taken to insure that the gasket is properly seated.
3. A minimum amount of lubricant shall be evenly applied to the spigot end with a brush. Gasket lubricant shall be AWWA approved.
4. The spigot end shall be properly centered and force applied, using a ratchet jack-type tool or a roller chain-type ratchet jack, until the white/blue stripe at the spigot end is just visible at the face of the bell. Any required deflection shall be made only after the joint assembly has been made.
5. Proper positioning of the gasket shall be checked with a “feeler” gauge after each joint is made.
6. The edges of “field cut” pipe shall be touched up with a file or grinder to remove rough edges and facilitate assembly.

C. Mechanical Joints

1. Thoroughly clean the bell and the spigot end of the pipe of all foreign matter and wash them with soapy water.
2. Slip the gland and gasket over the plain end and seat the spigot end in the bell (the small end of the gasket and the lip on the gland shall face the bell).
3. Push gasket into position with fingers, making sure it is evenly seated.
4. Move gland into position for bolting, insert bolts and make all nuts finger-tight, keeping the spigot centrally located within the bell.
5. Bolts shall be tightened in accordance with the Manufacturer’s written instructions.
6. If effective sealing is not obtained at the maximum torque indicated by manufacturer’s instructions, the joint must be disassembled and reassembled after thorough cleaning. Under no circumstances are bolts to be over stressed.
7. After joint is completed, tighten retainer gland in place in accordance with the manufacturer’s instructions.

D. Mechanically Coupled Joints

Mechanical couplings shall be installed in strict accordance with the manufacturer’s instructions, and in a manner to insure permanently tight joints under all reasonable conditions of expansion, contraction, shifting, and settlement. The required torque ranges for the joint harness shall be as specified by the pipe manufacturer.

E. Copper Pipe

Copper piping is not allowed in the Authority's water system.. When an exception to the copper piping ban is allowed, such as the bypass lines for valves and detector meters, it shall be installed in accordance with the manufacturer's written instructions and details on the approved drawings.

F. Water Service Laterals

Water Service Lateral specifications are provided in Section 13.

## 12.09 SETTING VALVES AND VALVE BOXES

- A. All valves shall be provided with a valve box or precast concrete valve manhole as detailed on the Detailed Drawings.
- B. Unless otherwise directed by the Engineer, all valves shall be set with their stems truly vertical.
- C. The tops of the valve box shall be set neatly to the grade of the surface of the existing ground, unless directed otherwise by the Engineer.
- D. The valve box shall not transfer shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve.

## 12.10 CONNECTIONS TO EXISTING WATER MAIN

A. Connections shall be made to existing water mains only when authorized by the Authority and these connections shall be made in strict accordance with the requirements set forth by the WTMA and as specified hereinafter. Newly constructed water mains must pass all pressure and bacteriological tests before a physical connection to the public water system is authorized.

B. General.

- 1. The Contractor shall take special precautions to maintain the functional operation of the existing water mains, except for when preplanned and scheduled shutdowns are approved, the time and date of which shall be established in advance with the Authority's Water Company Superintendent.
  - a. All preparatory work shall be totally finished one day before a scheduled shutdown occurs. The water valve will not be closed until all equipment and personnel are at the work site. If the shutdown is delayed for any reason the Authority may cancel the shutdown and reschedule it on a later date. All work requiring a shutdown, once started, must be worked on continuously until all service is restored.
  - b. Methods used to complete the work must minimize the duration of the shutdown. Should the WTMA determine that a shutdown would be detrimental to service for existing customers, owner may require an alternate piping or tie-in arrangement to preclude the need for a shutdown.
- 2. **The Contractor shall at no time operate water valves in the existing water system. Only a qualified Authority representative shall operate valves on the public water system.**
- 3. When an existing water main is damaged, service shall be restored promptly and the Contractor will be billed for all expenses, including customer notification and lost water.

C. Schedule of Work

1. In locations where new mains are to be connected to existing mains, the Contractor will not be permitted to proceed with the construction of the connection until he has dug test pits, and determined the exact location, elevation, and type of the existing pipe and its outside diameter. The Contractor is reminded that older pipe may vary in roundness and outside diameter, and consider this factor in ordering materials for the connection. The cost of excavating, maintaining, and backfilling test pits shall be considered incidental to the work, and no separate payment will be made. Pits shall be protected and backfilled by the Contractor.
2. When the conditions and geometry of the connection warrant, as determined by data obtained from the excavation of the test pits, the Contractor shall order the necessary materials for the connection and inform the Engineer of required changes to the proposed connection.
3. All construction work that requires shutting water service off to existing customers shall be required to provide a construction plan and time schedule as part of the approval process. Water main shutdowns affecting customers shall be time limited based on number and type of customers losing water services. The contractor shall be responsible for all cost of the shut down including customer notification of the shutdown.
  - a. The Contractor shall notify the Authority a minimum of 7 days before the time he proposes for installing the connection, the day and time of the proposed shutdown and the length of time customers will be without water. The Authority shall establish the permitted date and time for the shutdown based on the Authority's knowledge of system conditions and impacted customers. The Contractor is hereby warned that the Authority reserves the right to require that any particular connection be made at night or on a weekend and/or require temporary water service lines to insure customer service.
  - b. Before beginning the installation of a connection, the Contractor shall prepare as much work in advance as possible and have all necessary tools, equipment, materials, and labor at the work site before the Authority will shut the water supply off to its customers.
  - c. Once the existing main is cut, and customers lose water service, work shall be continuous until service is restored.

## 12.11 CONCRETE FOUNDATIONS

- A. Where required by the ENGINEER, pipe shall be placed on a formed concrete cradle, or unformed concrete shall be placed around pipe for bedding and encasement.
- B. Concrete cradles shall consist of structures requiring forms and be composed of concrete, built-in trenches to support pipes, and to the dimensions shown on Detail Drawing. (TR-W6 Concrete Cradle)
- C. Concrete bedding and encasement shall be composed of concrete placed in trenches, without forms as pipe bedding, or encased around pipe, to the dimensions and in the locations indicated on the approved drawings.

## 12.12 REACTION BACKINGS

- A. Concrete reaction backings shall be provided for all tees, bends/elbows (both horizontal and vertical), fire hydrants and mainline ending of the waterline piping. Concrete shall be Class A in accordance with Penn DOT Form 408. Note Detailed Drawings under Reaction Backing
- B. Retainer glands or other types of restrained joints, and tie rods and clamps shall be used to the maximum extent possible, in lieu of concrete thrust blocks when installing connections, unless

shown otherwise on the approved drawings. If it is necessary to use concrete thrust blocks, the high early strength cement-concrete shall be used.

#### 12.13 WATERLINE SERVICE INSTALLED

- A. Service lines curb stops, meter pits with frost-free cover meter setters and pressure reducing valves are to be installed as indicated on the Detailed Drawings of these specifications. Residential water meters are provided by the Authority, at the owners cost, upon approval of a connection application and payment of all fees and costs.
- B. All work on water service lines require the owner or contractor use a plumber listed on the Authority's Registered Plumber's List. Non-residential water service requirements shall be identified on the approved Site Development Plan. Site requirements identifying water use and fire flow requirements shall determine site waterline sizes, fire protection and metering requirements. The Detailed Drawings of these specifications should be the basis for all design requirements.
- C. **Water service for all authority customers require an approved application to connect and payment of all outstanding fees before connection to the public water system is permitted. The use of water from the Authority's public water system without authorization is theft of service and a second-degree misdemeanor in the State of Pennsylvania.**
- D. The Authority's cross connection program requires the use of double check valves per the detailed drawings to protect the public water system. This includes all customers having on-site water systems (wells), industrial facilities, schools, commercial applications and fire and lawn sprinklers having cross connection capabilities.

#### 12.14 FIRE HYDRANT INSTALLATION

- A. All Site Development Plans shall meet applicable fire protection codes. Requirements concerning code and hydrant specifications, testing and location are made by the Washington Township Supervisors, who owns and maintains all hydrants in the public right of way. Requirements concerning installation, pressure and bacteriological testing are made by the Authority who owns and operates the public water system.
- B. Fire Hydrants shall be provided and installed as set forth in these specifications where a proposed system is to be served from an existing Authority water main or in any case where the Authority is to accept a new system for ownership and operation.
- C. Fire hydrant locations
  - 1. Shall be no more than 1200 feet apart on water main supply line
  - 2. Shall be no more than 1000 feet apart in residential areas.
  - 3. Hose lays from hydrant to house to be limited to 600 feet. Hose lay distance is defined as being measured along the route a piece of fire apparatus must travel in laying fire hose from a hydrant to the fire.
  - 4. Houses on panhandled lots shall comply with the hose lay distant requirement of 600 feet.
  - 5. Multi-family housing, shopping centers, malls, motels, light industry, schools, industry and large /tall building shall be determined based upon a maximum requirement of having all

portions of a building within 300 feet hose lay distant from a hydrant and the particulars of the Site development plan.

6. At the end of all dead end lines such as those installed in cul-de-sacs.
7. Typically at all intersections.
8. Between the water main and the edge of the right of way. See the Detail Drawings F-1 under Fire Protection.
9. Hydrants placed in new work shall be placed between four (4) and six (6) feet from the cart way paving.

D. All fire lines off the public right of way shall be metered.

E. Fire hydrants shall precede main line valves

F. Installation Requirements

1. The installation of new fire hydrant piping should be one straight run of pipe with no additional joints other than the mechanical joint at the hydrant.
2. All joints should be restrained with retaining rings for mechanical joints, field-lok gaskets for push-on joints and Mega-lugs or approved equals.
3. All hydrants shall be installed with six (6) inch Pressure Class 350 cement lined DI pipe, and a six (6) inch mechanical joint resilient seat valve. The six (6) inch shutoff valve shall be installed no farther then two (2) feet from the water main and no closer than two (2) feet to the hydrant.
4. The hydrant shall be installed plumb. Offsets are not permitted on new waterline installations.
  - a. When offsets are approved, the contractor shall provide a one piece offset as manufactured by Gradelok or equal. **Assured Flow Sales, Inc.** Phone number 800-388-0678
  - b. Gradelok is manufactured of 350 Ductile Iron, cement-lined inside and tar-coated outside for corrosion protection, and conforms to AWWA C153/ANSI A21.53/AWWA C104/ANSI A21.4
5. All buried elements of fire hydrant assemblies encased with concrete shall be wrapped with 8-mil thick polyethylene in accordance with AWWA C105. Care shall be taken to insure the weep hole is not obstructed.
6. The fire hydrant base shall be blocked against un-disturbed earth with concrete, the volume of which will be specified on the plan according to the pressure (Note detailed Drawings in Reaction Backing). All hydrant leads are to be installed at four (4) feet of cover so that a four (4) foot six (6) inch hydrant will be used behind the curb. The Safety flange shall be buried up to the bury line that is marked on the hydrant
7. The trench must be dug six (6) inches deeper than the bottom of the pipe, filled with suitable bedding material and tamped to bring the trench back to the required depth. The bottom of the trench should be hand leveled to insure a good bed for the pipe. A hydrant should be set on a flat piece of concrete block to keep it from settling. When the hydrant is blocked with concrete care must be taken to insure the drain holes are not clogged with concrete. The area around the hydrant base must then be back-filled with clean 3/4 inch stone at least to one (1) foot above the drain holes and a minimum of 1/3 cubic yards, and

covered with a 8-mil plastic cover to prevent dirt from encasing the drain holes and to insure proper drainage. The hydrant trench must then be back-filled in six (6) inch lifts and mechanically tamped until it is brought up to the finished grade. Note Detailed Drawings under Fire Protection.

8. Hydrants must be covered with a black plastic or burlap bag until it has been placed in service to warn that the hydrant is not usable.
9. Sufficient time shall be allowed for the concrete blocking to set up before the hydrant is placed into service.
10. The hydrant, valve, and tee shall be set on a poured concrete pad, bricks or concrete blocks to support them.

#### G. Flow Test Requirement

The contractor shall flow test each hydrant for volume and pressure following completion of the waterline pressure, leak and bacteriological testing. The flow test shall be scheduled with the Authority Water Superintendent and a certified operator from the superintendent's staff and a Township Representative shall be present during the testing. Test information shall be certified and signed by the tester and a copy provided each to the WTMA and the Washington Township Supervisors. The hydrant crown and caps will be color coded by the Washington Township Supervisors based on the test data provided on each hydrant.

#### H. Fire Hydrant Specification See Section 12.06 J for fire hydrant specification.

## SECTION 13

# SERVICE LATERAL AND BUILDING WATER SERVICE INSTALLATION

### 13.01 GENERAL

#### A. Permit Application

1. A copy of the Permit Application may be obtained at the Authority's office located at 11102 Buchanan Trail East or at the Authority's web site at [www.wtma.us](http://www.wtma.us) under forms and specifications. A copy of the Registered Plumbers list should be obtained with the application.
2. The application requests information required for future billing, the name of the Registered Plumber scheduled to make the installation, and a drawing of the building site identifying the location of the building to be served and the location of the proposed water service and the sewer lateral (actual or proposed). The drawing may be hand drawn and does not need to be to scale. Its main function is to identify service locations and prevent conflicts.
3. The application will be reviewed and accepted as presented or returned with comments.
4. Final Approval will occur after the application is accepted and all applicable fees are received by the Authority.

#### B. Fees

1. Connection Fees include: Capital and Distribution Fees, Special Purpose fees (when applicable), purchase cost of the water meter and inspection fees.
2. All fees, other than meter costs, are determined by Authority Resolutions; the meter cost is the latest cost per meter purchased by the Authority.
3. Most lots have water available to an existing meter pit at a property line. Some older lots were subdivided before current regulations and do not have water service to the property line. In these instances the property owner is responsible for the costs of installation of the water service lateral from the main to the property.
4. Work Includes the permitting, installation and inspection of water service laterals and of the building water service. Service Laterals are normally  $\frac{3}{4}$  inch diameter and water meters  $\frac{5}{8}$  X  $\frac{3}{4}$  inch. Preapproval is required for larger service lines and meters.

### 13.02 MATERIALS

**All materials to be used for a building's water service shall be a commercial grade and specifically made for use in public water supply systems and shall comply with applicable AWWA Standards. Products from most retail outlets fail to meet the required drinking water standards and will not pass the inspection. Materials used shall meet the listed specifications or approved equal. Preapproval for unlisted materials should occur prior to purchase installation to avoid delays and possible material replacement.**

- A. Meter, 5/8 X 3/4 inches SRII Meter TR/PL 1000 gal 4whpl as bonnet sec screw CI bottom L/Conn, the meter and radio read transceiver are as supplied by Sensus, no substitutions.
- B. Meter Transceiver Unit-Pit Version Touchcoupler single port ,Model MXW520K-TL-1
- C. Meter pit for new services shall be a Plastic Pit Setter for moderate to cold weather as manufactured by the Ford Meter Box Co, Inc., PDBHC-244-18-36Q. No substitutes accepted.
- D. Meter setter shall be Ford, compression type, 24-inch padlock wings, double check on outlet, seal wire hole on inlet angle ball valve with 3/4 inch brace pipe eye, VBHC72-24-44-33Q.
- E. Inlet valve shall be a Ford BA13-232W Angle Ball Valve
- F. Outlet valve shall be Ford HHCA31-232 Angle cartridge Dual Check Valve
- G. Meter shall be a 5/8 X 3/4 inches supplied by the WTMA and purchased by the owner
- H. The inlet and outlet couplings shall be CTS Quick Joint JT
- I. The pit diameter shall be 18 inches and the depth 40 inches
- J. Meter Box Cover, Ford Walbash Double Lid Cover W3BPD Deep dish inner lid WA3L-C-T centered touchread lid
- K. Tapping saddle, Smith-Blair Models 315 and 317, dual strap, 300 psi. A typical residential service shall be a 3/4 inch tap.
- L. Corporation Valve, Ford Model No FB1000, shall be threaded into the tapping saddle.
- M. Curb Stop, Ballcorp Model No. B44333 shall be installed no more than 2' before the meter pit.
- N. Curb Box, Sames Model No. D-1P4, plug type, cast iron arch pattern base, slide type, with stationary 24 inch extension rod, 3' to 4' vary, Erie Pattern.
- O. Polyethylene Tubing, 3/4 inch PE3408, 200 PSI, SDR 9, ASTM 2737 Pipe with short inserts
- P. "Y" Branch shall be bronze alloy "Y" Branch manufactured by Ford Meter Box Company
- Q. Pressure Reducing Valve as manufactured by Watts, 3/4 - 2 inch, USB or equal, inlet pressure 5 to 250 psi, outlet pressure 40 to 150 psi.
- R. 6 inch Metallic locating Tape

### 13.03 CONSTRUCTION

- A. Depth
  - 1. Service line shall be a minimum of 4 feet depth, maximum of 7 feet depth. No exceptions allowed.
  - 2. Curb Stop shall be 2 feet from meter pit and adjusted to final grade
  - 3. Meter Box shall be adjusted to final grade and located at the edge of utility easement; however, at no time shall it be closer than 5 feet from electric and/or gas utilities or the driveway.
  - 4. Meter spuds shall be 18 inches from finished grade. Any measurement not within 16 inches to 20 inches shall be reset to the required depth.
  - 5. Metallic locating tape shall be laid on the stone bedding.
- B. Pressure reducing valve and shutoff valve

1. The meter setter and curb stop provide a shutoff valve and a back flow valve on the water service connection.
2. The owner shall also provide a shutoff valve, a check valve and a pressure reducing valve on the owner's side of the water meter.
3. Pressure reducing valve reduces waterline pressure and protects the building's plumbing devices, which includes the hot water heater's pressure relief valve.
4. Backflow prevention (check valve) is recommended on all water services and required under the following conditions:
  - a. Residential customers are required to have backflow prevention devices in conjunction with irrigation systems, fire sprinkler systems, when another water source such as a well or cistern is available on the premises, or when there are other systems on the customer's premises that could present a cross connection. A double check valve assembly (DCVA) is the appropriate device for isolation of most systems noted above.
  - b. Commercial and industrial customers are required to have backflow prevention devices at the water meter and may need additional devices dependent upon the water-using equipment found on the premises. Services having a greater risk may be required by the Engineer to have a reduced pressure double check valve assembly and/or an air gap (RPDCVA).
  - c. All DCVAs and RPDCVAs must be tested annually by a certified technician and a copy of the test results submitted to the Authority.

C. Frost Protection requirements:

1. Service line shall be 4 feet deep.
2. Meter box cover with plastic inset lid shall be adjusted to grade
3. Outside valves, when valves are installed outside a building or in a crawl space they shall be installed inside a standard meter pit. (Pressure reducing, shutoff and check valves).
4. Exposed waterlines in crawl spaces shall be installed within a standard meter pit, wrapped with heat tape, and insulated.

D. Bedding

1. All waterlines shall be bedded on 6 inches of stone, have 6 inches of stone bedding on each side and 1 foot of bedding covering the pipe.
2. All bedding shall be 1B or No. 8 stone.
3. Six inch metallic locating tape shall be placed on top of the stone bedding.

E. Tapping Waterlines

1. All water taps shall be wet-taps.
2. 3/4 and 1-inch taps shall be made by the Authority at the Owners expense. Contact the Authority for the current price.

3. All other taps shall be scheduled no less than two business days in advance and will be permitted only in the presence of an Authority representative.
4. All tapping equipment shall be inspected by an Authority representative prior to tapping a public water line **and properly disinfected at the tap site.**

#### 13.04 INSPECTION AND TESTING

- A. The water service from the main to the curb stop shall be tested for pressure and leakage using the operating ater mains pressure.
- B. The water service from the meter to the building shut off valve shall be at the water main working pressure.
- C. Approval of a water service lateral occurs upon the passing of the inspection, pressure tests, back filling of the trench, final road restoration (when applicable) and the adjustment of the valve boxes and the meter pit to grade. The water meter shall be a maximum of 18” from grade.
- D. All DCVA and RPDCVA shall be tested annually by a certified technician and a copy of the test report shall be submitted to Authority.

#### 13.05 OWNERSHIP AND MAINTENANCE RESPONSIBILITY

- A. Water service lines to the curb stop are the responsibility of the property owner(s). WTMA must have access to maintain the meter.
- B. All water services and water meters within the public right of way become part of the Authority’s public water system upon the passing of the inspection and testing. All future maintenance on water lines and meters from the main to the curb stop shall be the Authority’s responsibility.
- C. The property owner is responsible for all maintenance from the property owner’s side of the curb stop. This includes the connection to the setter and all backflow prevention devices.

## SECTION 14 RIGHT-OF-WAY GATE

#### 14.01 RELATED DOCUMENTS

Drawings and general provisions for Contract, including General and Supplementary Conditions and other Specification Sections, apply to this Section. Note Detail Drawing W-6.

#### 14.02 RIGHT-OF-WAY GATE

- A. General Requirements: Install a gate system of the type specified herein on off street rights-of-ways to prevent unauthorized entry. The exact location for the gate system shall be selected by the Authority.
- B. Gate System Design: Provide a chain link fence gate with hinge and locking posts, as specified in Section 15 of these specifications: “Above Ground Water Booster Pumping Stations”.

## SECTION 15

# DESIGN CRITERIA FOR WATER BOOSTER PUMPING STATION

### 15.01 GENERAL

- A. The purpose of this document is to establish minimum technical and design standards for developers and engineers for the design and acceptance of water booster pumping stations within the service area of the Washington Township Municipal Authority (WTMA). The standards are intended to ensure uniformity and quality of construction for water booster pumping stations throughout Washington Township. Any deviation from the standards contained herein shall be subject to the approval of the WTMA. **Plans and specifications shall be prepared and certified by a professional engineer registered in the Commonwealth of Pennsylvania.**
- B. Certain equipment manufacturers have been noted herein for the purposes of establishing standards for the level of quality of materials and workmanship, reliability, ease of maintenance, and minimization of spare parts inventory. All equipment and materials provided shall be new, latest technology and unused.

### 15.02 DESIGN DATA

- A. All work shall be in accordance with the requirements of the Pennsylvania Department of Environmental Protection (PA-DEP) and the PA-DEP Public Water Supply Manual. All work shall also be in conformance with NFPA-70 (National Electrical Code) and NFPA 58 (Standard for Storage and Handling of Liquefied Petroleum Gases) latest editions. Utility work for Power and Telephone services shall meet all requirements of the Utility Company providing service.
- B. Pumps shall be capable of handling the maximum peak hourly flow with one unit out of service.

### 15.03 SUBMITTALS

- A. At the time of application the following shall be submitted to the WTMA for approval:
  - 1. Completed application form
  - 2. All calculations and assumptions for the system head curve, total dynamic head, flow qualification, pump duty cycle at average and peak daily flow, and any other design calculations.
  - 3. Site plan showing subject pumping station relative to area under development and the existing water system
  - 4. Building blueprints for the pumping station.
  - 5. All pump curves.
  - 6. Recommended spare parts list from the equipment manufacturer
- B. Five copies of the equipment submittal drawings shall be submitted to the WTMA for approval prior to fabrication of the equipment.

- C. Prior to acceptance of the pumping station, the following shall be submitted to the WTMA for approval:
1. Five copies of the manufacturer's O/M manuals for all mechanical and electrical equipment.
  2. One copy of manufacturer's certified test data including reprime performance tests.
  3. As-built drawings for the entire site, including electrical, building and utility information.
  4. Compliance with all PADEP requirements.

#### 15.04 SITE REQUIREMENTS

- A. The pumping station site shall have a minimum size of forty (40) feet by forty (40) feet.
- B. Access to the station shall be via a dedicated asphalt or concrete paved road with a minimum width of sixteen (16) feet. In unusual cases, curbs and gutters may be required by the Engineer. In no case shall the profile grade exceed 12 percent. The entire pump station area will be paved with a minimum of 4 inches of BCBC. The site will be graded to create a minimum slope of 1 inch per 1/2 foot away from the building.
- C. The pumping station shall be designed to remain fully operational and accessible during a one hundred (100) year flood event. Applicable regulations of State and Federal Agencies regarding flood plain obstructions shall be followed.
- D. The pumping station site shall be dedicated to the Authority and all connecting utilities and water mains shall be located within dedicated easements.

#### 15.05 FENCING

- A. Height – Fencing shall be of the chain link type, seven (7) feet high, with bottom reinforcing wire. Except where specifically indicated otherwise, fencing shall include extension arms supporting three (3) strands of barbed wire. Height of fence is measured from ground line to top strand of barbed wire. The entire fencing shall be the standard product of a manufacturer specializing in the manufacture of chain link fencing.
- B. Placement – The fence will be placed two (2) feet from the rear and side property lines. In the front the fence will be placed on the right-of-way line.
- C. Fabric – The chain link fence fabric shall be nine (9) gauge galvanized wire having a uniform square mesh measuring approximately two inches between its parallel sides.
- The fabric shall be fastened to the line posts by means of No. 6 gauge zinc-coated wire slips spaced approximately 12 inches apart. It shall be attached to the top rail by means of a double wrap at intervals of approximately 2 feet. Fabric shall be attached to the terminal posts by means of a tension strip held by specially designed clips which are bolted to the post.
- D. Line-Posts – Line post shall be galvanized steel 2-1/2 inch O.D. posts, weighing 3.65 pounds per lineal foot, of sufficient length to allow for installation to a depth of 3 feet or greater below ground level. The post shall be spaced in the line of fence no farther apart than 10 feet.
- E. Terminal Posts – End, corner, and gateposts for a single gate 4 foot opening and up to a 16 foot opening for double gates shall be 4 inches O.D. galvanized steel posts, weight 5.79 pounds per lineal foot. Each post shall be of sufficient length to allow for a depth approximately 3 feet below ground level.

1. Both line and terminal posts shall be set in cylindrical concrete foundations. A hole shall be excavated for the full depth of the post, not less than 10 inches in diameter for all line posts and 12 inches in diameter for terminal posts.
  2. The fence shall have a continuous top rail for its full length of standard galvanized pipe, 1 5/8 inches O.D.; weight 2.27 pounds per lineal foot, the top rail shall pass through openings provided for that purpose in the post tops and each length shall be coupled with insert sleeve coupling.
  3. A one-piece, press steel arm, zinc-coated after fabrication, shall be clamped to the top of each line post so as to include upward to an angle of 45 degrees. Arms shall be formed with tongue for permanently attaching barbed wire topping.
  4. At all changes in relative grade greater than 15% (percent), pull post and diagonal braces shall be provided.
- F. Barbed Wire – The top foot of the fence shall consist of 3 strands of barbed wire attached to 45-degree arms. Barbed wire shall be zinc-coated, 4 point thickset with barbs spaced 4 inches apart.
- G. Tension Wire – A No. 7 gauge coil spring wire, zinc-coated, shall be stretched along the bottom of the fence and securely fastened to the line posts. The chain link fabric shall be attached to the wires by means of 12 gauge zinc-coated pig rings spaced at intervals of approximately 2 feet.
- H. Truss Braces – A truss brace of standard galvanized pipe 1 5/8 inches O.D., weight 2.27 pounds per lineal foot, with a 5/16 inch diameter truss rod and turnbuckle attachment shall be installed between each end or gate post and the adjacent line post.
- I. Gates – Gate frames shall be made of 4 inch O.D. galvanized steel posts, weight 5.79 pounds per lineal foot, joined at the corners by arc welding, to form a rigid panel. Frame shall be filled with chain link fabric of the same gauge as used on the fence. The fabric shall be fastened in the frame on all four sides by means of adjustable hood bolts and tension rods. Three strands of barbed wire shall be fastened to the extended end bars of gate frames.
- All gates shall be as shown on the Drawings, equipped with all necessary accessories of an approved type, including latches, and stops for both open and closed positions. A latch for locking shall be provided. Locks for each gate shall be provided by the owner. Contact the Authority for keying information. The main gate will have a minimum width of sixteen (16) feet.
- J. Galvanizing – All miscellaneous parts excluding the fence above and below the ground shall be zinc-coated throughout by the hot-dip spelter process.
- K. Sign – A sign shall be placed on the gate identifying the pump station and phone numbers to call in the event of an emergency.
- L. Shop Drawings – The Contractor shall prepare and submit Shop Drawings for WTMA's approval. The WTMA must approve the shop drawings before fence installation may begin.
- M. Installation – Provide and install a chain link fence including the necessary gates, terminal post, and fittings, as indicated on the standard drawings in these specifications.

## 15.06 PUMPING STATION BUILDING

- A. The building shall be constructed so that the face of the building is parallel to the road or street.
- B. The building shall be of masonry construction. The developer shall encase the building in brick or use textured block as approved by the Authority. All walls must be insulated with zon-ite block insulation. Color charts shall be submitted to the Authority for approval of the color for the brick or block.
- C. All work shall be protected during the cold weather. Concrete block shall be Grade N with a Type I moisture content. Mortar and grout shall comply with ASTM C150 Type I.
- D. The building shall have a minimum 8 foot clear ceiling height, 10 feet overall width and 20 feet overall length. The size shall be increased if necessary to provide adequate clearance for equipment operation and maintenance. The building shall have one insulated steel double entry with a removable center post. The door shall have a minimum opening of six (6) feet, with key lock and stainless steel hardware. The building shall have no windows.
- E. The roof of the building shall be constructed with wood trusses with a minimum pitch of 3.5 to 12. The maximum span of the trusses will be two (2) feet from center to center. The roof shall be covered with shingles having a life expectancy of 30 years. The roof shall extend one (1) foot beyond the walls, on all sides. Color shall be approved by the Authority.
- F. The floor shall be a reinforced concrete slab with a minimum thickness of eight (8) inches. Two (2) floor drains shall be installed with drain line discharging to ground. A trap and flap valve shall be installed on the drain line.
- G. Internal walls shall be covered with one (1) coat of prime and two (2) coats of epoxy paint. The ceiling shall be covered with 5/8-inch water-resistant drywall. The ceiling shall be painted with one coat of primer and two coats of epoxy paint. The ceiling and walls shall be painted white. Twelve (12) inches of batt insulation providing a minimum R-19 rating shall be placed on the drywall in the ceiling.
- H. Locksets shall be keyed to the Authority's existing master-key system. Deliver four (4) master keys to the Authority only.
- I. A minimum of 4 feet of unobstructed floor space shall be provided in all directions around the pumping equipment and electrical panels. In larger pumping stations, the Authority may require larger maintenance buffer zones.
- J. One frost-free hydrant shall be installed outside the building and a ½ inch sample tap within the building.
- K. Sufficient wall or ceiling mounted electric heat shall be provided to prevent freezing inside the building at -10 degrees F ambient temperature. A remote thermostat shall be required.
- L. One (1) dusk to dawn light shall be mounted to the front of the building so that it illuminates both the gate and the door.
- M. A minimum of one (1) 110-volt receptacle shall be provided with ground fault protection and weatherproof covers outside of the building near the front door.
- N. A minimum of one (1) 110-volt receptacle shall be provided with ground fault protection and weatherproof cover on each of the interior walls. A maximum of two (2) 110-volt receptacles can be connected to one (1) twenty (20) amp breaker. The 220-volt receptacle will have its

own twenty (20)-amp breaker. All wiring and parts shall carry the UL listing and be NEMA rated.

- O. Interior lighting shall be 2 lamps, 60-watt rapid start fluorescent fixtures. The bulbs will have waterproof protective coverings over them. Interior lighting shall maintain a minimum of 40 to 50 foot-candles at floor level.
- P. In general, the building type and architecture should match and compliment adjacent buildings and properties. It shall also meet all applicable building codes.
- Q. One (1) five (5) pound fire extinguisher shall be mounted to the wall just inside the door.
- R. An adequately sized air conditioner shall be provided within the building.
- S. The water main with valves and meter shall be located within the station.

### 15.07 BOOSTER PUMPS AND ASSOCIATED CONTROLS

- A. The pumps shall be located above grade inside the pump station building. The booster pumps and controls shall be provided as one unit by the booster pump manufacturer. The manufacturer shall be manufactured by ITT Corporation, Goulds Pumps or approved equal.
- B. All valves, suction and discharge headers and controls shall be furnished by the pump manufacturer. Booster pumps shall be equipped with the following:
  - 1. Base: flat steel constructed base with supporting rib,
  - 2. Pump: the pump shall be 316L stainless steel construction, end suction or vertical multistage,
  - 3. Main fuse disconnect NEMA 4, IP 55 enclosure Approvals: UL, cUL, CE with lock out for each pump,
  - 4. Aquavar controller: Goulds pumps variable speed CPC Controller for each pump, Wall mounted,
  - 5. Suction and discharge manifolds: ANSI removable flanges, stainless steel,
  - 6. Pressure gauges: liquid filled 2.5 inch diameter, bourdon type, WIKA or equal,
  - 7. Suction and discharge isolation valves: wafer type, low loss, or equal and
  - 8. Check valves: non-slam, silent type, vertically mounted, Watts or equal.

**Note:** The above specifications are subject to change without notice by the manufacturer. When changes occur they must be approved as an “or equal” prior to acceptance by the Engineer.

#### 9. Air Release Valve

The station shall be equipped with one automatic air release valve. The location will be determined as part of the design review. Valves which require connection to the suction line shall not be acceptable.

#### C. Protection

- 1. Over/ Under voltage, motor overload, short circuit, ground fault, motor overheat (with thermistor), programmable no/low flow shut-down, low suction pressure, pump run-out.

2. Lightning arrester
3. Alarm package with the ability to transmit alarm conditions to the WTMA staff.

D. Controls:

1. Analog input control (4 – 20mA) two-point control based on pressure, flow or differential pressure
  2. The pump control panel shall be manufactured by a UL panel builder and the assembly shall bear a serialized UL label for “Enclosed Industrial Control Panels”. All wiring, workmanship, and schematic wiring diagrams shall comply with the National Electrical Code (NEC).
  3. Obtain pumping equipment, motors, motor starters, pump controls and appurtenances from the pump manufacturer whose responsibility it is to insure that the pumping equipment is properly coordinated and operating in accordance with these specifications.
  4. The pump control panel shall be constructed and tested at the pump manufacturer’s facility.
  5. Control voltage shall be 110 volt. Control wiring to classified areas shall be intrinsically safe (low voltage) or explosion proof, meeting the requirements of the National Electrical Code.
  6. All equipment shall be wired with automatic restart capability after a fault or restoration of power.
  7. Elapsed time meters shall be provided for each pump on the motor control panel.
  8. Electrical components shall be as manufactured by Allen-Bradley, General Electric, Furnas or equal. Circuit breakers for motor controllers shall have through the door operating mechanisms to prevent the door from opening when the breakers are in the “on” position. Motor starters, relays and selector switches shall be NEMA rated. Motor control circuits shall have a “Hand-Off-Auto” selector switch with an “On” pilot light.
  9. The standby engine shall have DC electronic pressure switch liquid level controls to drive one pump during failure of utility power and during scheduled exercise periods. A 115-volt battery charger to maintain the charge on the 12-volt DC battery supplied with the engine shall be provided.
  10. A power conduit and wiring to all equipment as called for in these specifications shall be provided. All wiring shall be in conduit except final flex type connections to equipment subject to vibration.
- E. Pressure Transducer: 300 PSI, 17-4 PH stainless steel, ¼” NPT connection, shielded two wire cable, operating temperature –13° F to 185° F, supply voltage 7- 35 Vdc, 4 – 20mA output. Accuracy is .5% of full scale; proof pressure is 4 x full scale.
- F. Alternate Input: Up to two transducers shall be required with each controller. These may be pressure, flow, differential pressure, temperature or other 4 – 20mA signals.
- G. Terminals: Dry relay contacts for pump run, pump error, low pressure switch, remote ON/OFF control, analog output 0 – 10 Vdc (system pressure) and full opened slave pump starter.
- H. Multi-Pumps: AquaForce interface card
- I. Hours of operation meter for each pump, visible without opening panels.
- J. For any design flow, a minimum of two variable speed pumps shall be provided; each capable of pumping in excess of the peak hourly flow.

- K. No specific tools shall be required to replace any of the pump components.
- L. Pumps, motors and controls shall be tested as a unit at the pump manufacturer's facility prior to shipment. The Authority shall be provided with a copy of the certified test data.
- M. Fabricated Steel Base – Common fabricated steel base shall be provided for pump and motor assemblies. Bases shall be comprised of a base plate, perimeter flange, and reinforcements. A layer of neoprene rubber shall be installed between the steel base and the concrete on which the base is mounted.
- N. Supports and Thrust Blocks – All pipes connected to the pump station shall be supported according to good commercial practice to prevent piping loads from being transmitted to the pumps. Pump station discharge force main piping shall be anchored with thrust blocks where and as shown on the approved contract drawings.
- O. The manufacturer shall have an authorized repair facilities located within 100 miles of the Washington Township Municipal Authorities service area.

#### 15.08 EMERGENCY STANDBY POWER

- A. 20 HP Pumps or Less:
  1. The pump will be equipped with a Wisconsin auto start backup system or approved equal. The Wisconsin engines will use LP gas. The exhaust from the Wisconsin motors will be vented to the outside via flexible stainless steel piping.
  2. One (1) LP gas tank shall be placed to the side of the building. The LP gas tank and fuel supply piping shall be sized to adequately furnish the engine with LP gas when the temperature reaches 10 degrees F and the tank is 60% full. LP gas pipe size and tank shall be per engine supplier's recommendations.
    - a. The tank shall contain sufficient propane for the emergency generator to run 5 days without refilling the tank.
    - b. The tank shall be protected from vehicle damage by bollards.
  3. Provide critical grade muffler for engine exhaust.
  4. The manufacturer shall have an authorized repair facilities located within 100 miles of the Washington Township Municipal Authorities service area.
  5. The proposed shop drawings shall comply with the Engineer's recommendations for quality assurance.
  6. Startup shall include 4 hours of training to the Authority's designated employees.

B. For greater than 20 HP Pumps

1. Subject to compliance with the approved shop drawings, provide products by Caterpillar or approved equal by Kohler, Detroit Diesel or Onan Corp.
2. The prime mover shall be liquid cooled and diesel fueled engine of four-cycle design at an operating speed of 1800 RPM with a 0.8 power factor.
3. The engine is to be cooled with a unit-mounted radiator, fan, water pump, and closed engine coolant recovery system providing visual diagnostic to determine if the system is operating with a normal engine coolant level.
4. The intake air filter must be mounted on the unit. Full pressure lubrication shall be supplied by a positive displacement lube oil pump. The engine shall have a replaceable single spin on full flow oil filter. Engine oil drain must be provided to outside the mounting base for cleaner and more convenient engine servicing. A fan guard shall be provided.
5. The engine shall have a battery charging DC Alternator with voltage regulator.
6. The engine fuel system shall be designed to operate on No. 2 diesel fuel. A secondary fuel filter, water separator, manual fuel priming pump, fuel shut off solenoid and all fuel lines shall be installed at the point of manufacture.
7. Sensing elements must be located on the engine for low-pressure shutdown, high engine temperature shutdown, low coolant level shutdown, over speed shutdown, and over crank shutdown.
8. The engine shall have an engine mounted, thermostatically controlled water jacket heater or crankcase heater to aid in quick starting. Wattage shall be as recommended by the engine manufacturer.
9. The following items shall be factory installed:
  - a. Heavy Duty battery of adequate voltage and amperage to operate and start the engine
  - b. Flexible stainless steel connector between engine exhaust manifold and the engine exhaust system.
  - c. Stainless steel exhaust silencer, muffler and support structure. Measured sound level at a distance of 10 feet from the exhaust discharge is 72 dBA or less.
  - d. The fuel supply tank shall be above ground, be of dual walled construction and be sized with sufficient capacity to operate the engine under full load for 5 days without refueling.
  - e. Nameplates for each major system component, resistance to seismic forces for each item equal to a minimum force value equal to the weight of item,
  - f. Skid of adequate strength and rigidity with lifting attachments.
10. Alternator as approved by the Engineer.
11. Shall be designed to meet environmental conditions at point of installation
12. The controls, outdoor set enclosure remote enunciator installation, and pre-acceptance testing shall be as approved by the Engineer.
13. The complete standby electric generating system including components shall be warranted by the Manufacturer against defective materials and factory workmanship for a period of 2 years

or 500 hours of operation, whichever comes first. Such defective parts shall be repaired or replaced at the Manufacturers option, free of charge for parts, labor and transportation.

14. Startup shall include 8 hours of training

15. The manufacturer shall have an authorized repair facilities located within 100 miles of the Washington Township Municipal Authorities service area.

#### 15.09 SPARE PARTS

Spare parts for the pump and generator shall be provided as per the manufacturer's recommendations.

#### 15.10 MOTORS

A. The pump motors shall be open drip proof, induction type, with premium efficiency characteristics and normal starting torque and low starting current characteristics, suitable for 3 phase, 60 hertz, voltage to match facility voltage, AC electrical current. Provide inverter duty motors for projects requiring the use of inverter motor drives. The motors shall not be overloaded at the design condition or at any head in the operating range as specified.

B. Each motor shall be in current NEMA design cast iron frame with copper windings, 1.15 service factor and Class F insulation.

C. Finish:

Exterior surfaces of pumps, piping, and steel framework shall be chemically or mechanically cleaned prior to painting. Exposed surfaces are to be coated with a gray, non-lift water reducible primer possessing low VOC, high solids characteristics. The bright white semi-gloss acrylic enamel shall incorporate rust inhibitive additives. The finish coat shall be 1.0 to 1.5 MIL dry film thickness (minimum), resistant to oil mist exposure and solvent contact. Salt spray exposure test shall be rated 100 hours (minimum). The factory finish shall allow for over-coating and touch up after installation.

D. The manufacturer shall have an authorized repair facilities located within 100 miles of the Washington Township Municipal Authorities service area.

#### 15.11 ELECTRICAL

A. Electric Service

1. Electric Service shall be 240 volt, three phase if available. If 120/240 volt three phase is not available, transformers shall be utilized to transform 480Y/277 3 phase or 208Y/120 volts 3 phase to 120/240 volt 3 phase. The Variable Frequency Drives shall have input and output line reactors.

2. Design shall include all arrangements with the utility company to provide power to facility. Design shall be in accordance with all utility company requirements.

3. The main electrical panel shall be service entrance rated with a main circuit breaker and circuit breakers to feed building loads and installed within the building.

4. A surge protection device shall be provided on the main service panel board.

5. Lightning arresters shall be provided

B. Automatic Alarm System

1. Alarm conditions are as follows:

- Power failure (internal to dialer)
- Power failure – Emergency Generator Activated
- Pump No. 1 failure
- Pump No. 2 failure
- Low pressure alarm
- High flow alarm
- Spare

2. Transmit messages with user-recorded voice. Tapes are not permitted. Provide acknowledgment capabilities by both touch-tone and call back.

3. Voice messages shall be kept intact during power failure or when all power is removed for up to one (1) year.

4. The unit shall be capable of dialing any phone number on command and function as a speakerphone.

5. Power requirements shall be 115 VAC with twenty (20) hour battery backup and battery charger.

6. Include integral surge protection.

7. The alarm system shall include system set-up and training of the Authority's operators.

15.12 PROTECTION OF EQUIPMENT

The pumping station should be placed into service soon after delivery of the equipment. If operation is delayed, the equipment including controls shall be stored indoors free from excessive dust and in a low humidity and heated environment.

15.13 START-UP

A. An authorized service technician from the original equipment manufacturer shall be provided for installation start-up. Start-up shall also include operator training on the pumping station, generator operation and maintenance.

B. The WTMA shall be notified seven (7) days prior to start-up and an Authority representative shall be present during the period of start-up.

C. A copy of the technician's start-up report showing all field data control, set points and equipment condition shall be furnished to the WTMA.

D. Sufficient water for start-up and equipment check shall be the responsibility of the developer.

15.14 CLEAN-UP

In State Highways, Municipal and private roads and improved private property, the Developer shall ensure that the Contractor cleans up as the work progresses and shall maintain his construction areas in a clean condition up until acceptance by the Owner or the Township, without regard to who caused the need for clean up. In unimproved areas, the Contractor shall

clean-up before acceptance of the work by the Owner or the Washington Township Municipal Authority.

#### 15.15 ACCEPTANCE OF BOOSTER PUMPING STATION

Completion of the following items is required before final acceptance:

1. All Equipment shall be operating as designed
2. Training shall be completed on the pumping equipment, generator and alarm system
3. As-built drawing shall be provided
4. Spare parts delivered
5. Punch-list completed
6. Piping and equipment chlorinated, dechlorinated and have passed bacteriological testing
7. Payment of all outstanding fees
8. Maintenance Bond
9. Deed of Dedication
10. Compliance with PADEP's requirements.

**TABLE 1  
AIR TEST TABLE**

**SPECIFICATION TIME REQUIRED  
FOR SIZE AND LENGTH OF PIPE INDICATED**

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec x Length, ft.)	Specification Time for Length (l) Shown (min:sec)									
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.		
4	1:53	597	0.19 x Length	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 x Length	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:50
8	3:47	298	0.76 x Length	3:47	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187 x Length	4:43	4:43	4:43	4:43	4:47	5:56	6:55	7:54	8:54	8:54
12	5:40	199	1.709 x Length	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50	12:50
15	7:05	159	1.671 x Length	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	20:02	20:02
18	8:30	133	3.846 x Length	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51	28:51
21	9:55	114	5.235 x Length	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	39:16	39:16
24	11:20	99	6.837 x Length	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17	51:17
27	12:45	88	8.653 x Length	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54	46:54	46:54

UTILITIES  
: 1

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