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NORTHAMPTON, BUCKS COUNTY, MUNICIPAL AUTHORITY

STANDARD CONSTRUCTION SPECIFICATIONS

FOR THE

PUBLIC WATER SYSTEM



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SECTION I

GENERAL INSTRUCTIONS

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STANDARD CONSTRUCTION SPECIFICATIONS

SECTION I

GENERAL INSTRUCTIONS

1. Introduction

- 1.1 It is the intent of these Instructions, Specifications, STANDARD DETAIL DRAWINGS, and Construction Standards, as presented herein (hereinafter referred to as “Specifications”), to comprise the minimum requirements of the Northampton, Bucks County, Municipal Authority for the construction, extensions, enhancement, and repair of the PUBLIC WATER SYSTEM by a CONTRACTOR in Northampton Township, Bucks County, Pennsylvania, subject to such additional terms as are hereafter set forth in AGREEMENT executed with AUTHORITY.
- 1.2 All WORK shall be done in accordance with requirements of AUTHORITY, its Rates, Rules, and Regulations (hereinafter referred to as “RULES”) as are then currently in effect and these Specifications and CONTRACT DOCUMENTS. WORK shall be executed in the best and most workmanlike manner by qualified, conscientious, and experienced workmen, to be determined by standards as AUTHORITY may reasonably promulgate.

2. Definitions

The following definitions shall be applicable in these Specifications and in CONTRACT DOCUMENTS:

- 2.1 “AGREEMENTS” shall mean all Contracts entered into by CONTRACTOR with AUTHORITY for the purpose of constructing the PUBLIC WATER SYSTEM, and Contracts related or incidental thereto.
- 2.2 “APPROVED” shall mean as approved by ENGINEER and/or AUTHORITY.
- 2.3 “AS BUILT” drawing is the plan prepared after the completed installation which reflects the updated, in-place information such as revised stationing, actual depth and length of facilities, reference dimensions lateral stationing and which documents any additions, deletions, and/or revisions to the original design. AS BUILT drawings are sometimes referred to as RECORD DRAWINGS.

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- 2.4 “AUTHORITY” shall mean the Northampton, Bucks County, Municipal Authority. The term may also include any agent, employee, or representative of the Northampton, Bucks County, Municipal Authority. “OWNER” shall be synonymous with AUTHORITY. “NBCMA” may be used for brevity.
- 2.5 “CHANGE ORDER” shall mean a written document signed by AUTHORITY and ENGINEER authorizing an addition, deletion, or revision in WORK or an adjustment in the Contract Price or the Contract Time issued on or after execution of AGREEMENT.
- 2.6 “CONTRACT DOCUMENTS” consist of the Advertisement, Instructions to Bidders, Form of Proposal, General and Special Conditions, these Specifications, Form of Agreement, Form of Bond, List of Contract Drawings, STANDARD DETAIL DRAWINGS, and other plans.
- 2.7 “CONTRACTOR” shall mean the CONTRACTOR and any individual, group, partnership, corporation, or any other lawfully created and existing entity (including his or their heirs, legal representatives, successors or assigns) and is the party of the second part of the CONTRACT contained herein. The term may also include any agent or representative of CONTRACTOR, including any SUBCONTRACTOR where applicable.
- 2.8 “ENGINEER” shall mean the person, firm or corporation who represents AUTHORITY on the AGREEMENT or CONTRACT with AUTHORITY and may be used time to time during construction for observation of WORK on the PUBLIC WATER SYSTEM.
- 2.9 “EQUAL” shall mean equal as determined and approved in writing by ENGINEER after consultation with AUTHORITY.
- 2.10 “NOTICE” shall have been deemed to have been duly served if written and delivered in person to the individual, or to a member of the firm, or to an officer of the Corporation for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives notice.
- 2.11 “PUBLIC WATER SYSTEM” shall mean all lines, pipes, laterals, vaults, hydrants, valves, tanks, pumps and such other additions and improvements intended to serve the potable water requirements of the project being constructed and developed by CONTRACTOR.

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- 2.12 “RECORD DRAWINGS” shall mean the CONTRACT DRAWINGS that have been amended and modified to reflect actual WORK performed on the PUBLIC WATER SYSTEM. They are usually called AS BUILT DRAWINGS. (See Sec. 2.3 above).
- 2.13 “STANDARD DETAIL DRAWINGS” shall mean all plans, sketches, drawings, designs, and other similar documents related to WORK to be performed on PUBLIC WATER SYSTEM.
- 2.14 “SUBCONTRACTOR” shall mean an individual, group, partnership, or corporation having a direct contract with CONTRACTOR to furnish a special service, labor, or material towards the completion of WORK.
- 2.15 “SUBSTANTIAL COMPLETION” used herein shall be held to mean construction that is sufficiently completed in accordance with CONTRACT DOCUMENTS or AGREEMENT and certified by ENGINEER and/or AUTHORITY as modified by CHANGE ORDERS agreed to by the parties, so that a project can be used, occupied or operated for its intended use. In no event shall a project be certified as substantially completed until at least 90% of WORK is completed.
- 2.16 “TOWNSHIP” shall mean Northampton Township, Bucks County, Pennsylvania.
- 2.17 “WORK” shall mean labor, services, materials, and equipment as required for the successful completion of the construction of the PUBLIC WATER SYSTEM.

3. Responsibility of CONTRACTOR

- 3.1 CONTRACTOR shall furnish all materials, implements, machinery, equipment, tools, supplies, transportation, labor, and supervision required to construct the PUBLIC WATER SYSTEM as required by these Specifications. It shall be the responsibility of CONTRACTOR to proceed with WORK in the manner and within such limitations as may be prescribed by AUTHORITY and in accordance with the AGREEMENTS.

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- 3.2 CONTRACTOR shall make himself familiar with all Federal, State, and Local LAWS and all Ordinances, Codes, and Regulations of TOWNSHIP which shall apply during the performance of WORK (hereinafter referred to as “LAWS”). CONTRACTOR shall conform to all LAWS, the requirements of these Specifications, all CONTRACT DOCUMENTS and RULES without any deviations, exceptions, or changes unless CONTRACTOR has received prior written approval from AUTHORITY or ENGINEER. The most stringent requirements among the LAWS, RULES, CONTRACT DOCUMENTS and Specifications shall apply.
- 3.3 Before commencing WORK, CONTRACTOR shall procure all necessary permits, approvals, and licenses. CONTRACTOR shall pay all charges, costs and fees due, and shall give any NOTICES necessary and incidental to the proper and lawful prosecution of WORK.
- 3.4 Any agent, or SUBCONTRACTOR installing any portion of PUBLIC WATER SYSTEM for CONTRACTOR shall be given a copy of these Specifications and SUBCONTRACTOR shall construct PUBLIC WATER SYSTEM in accordance with these Specifications. Any WORK performed that is not in conformance with these Specifications shall be removed and replaced with WORK that does conform with these Specifications. CONTRACTOR shall be responsible for the satisfactory completion of PUBLIC WATER SYSTEM and for WORK done by any of its agents or SUBCONTRACTORS.
- 3.5 Should CONTRACTOR perform WORK at the Project on weekends, holidays, evenings, or on any other occasion which shall cause AUTHORITY or ENGINEER to incur additional expenses and costs not reasonably anticipated by AUTHORITY, including payment of overtime wages or other compensation to their respective employees, or actual engineering, legal, and other direct expenses incurred by AUTHORITY, then in such event, AUTHORITY may deduct such additional expenses and costs from any payment due or which shall thereafter become due CONTRACTOR, in addition to any other lawful remedy which AUTHORITY may pursue to recover such additional expenses and costs.

4. CONTRACTOR’S AGREEMENT

- 4.1 CONTRACTOR, its surety, and AUTHORITY shall execute AGREEMENTS in form prepared by the Solicitor of AUTHORITY prior to commencement of WORK. It is acknowledged by CONTRACTOR that the terms of these Specifications and CONTRACT DOCUMENTS may not include all terms of AGREEMENTS or may be contrary or inconsistent with the terms and provisions of the AGREEMENTS. Accordingly, in the event that the terms in these

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Specifications or CONTRACT DOCUMENTS are either contrary to, inconsistent with, or fail to contain provisions of AGREEMENTS, then in any such instance as stated herein, the terms of AGREEMENTS shall control and shall be binding upon CONTRACTOR, its agents, successors, assigns, and sureties, unless such provisions shall contain less stringent requirements of CONTRACTOR.

5. Insurance by CONTRACTOR

5.1 Contractor shall not commence WORK under AGREEMENTS until CONTRACTOR has obtained all insurance required under this Section 5 and the AGREEMENTS and such insurance has been approved by AUTHORITY, nor shall CONTRACTOR allow any SUBCONTRACTOR to commence WORK until all similar insurance required of such SUBCONTRACTOR has been so obtained and approved.

5.2 CONTRACTOR shall either require each SUBCONTRACTOR to procure and maintain during the life of their contracts insurance of the type and in the same amounts as specified or insure the activities of SUBCONTRACTOR in its own policy. Policies must show AUTHORITY and ENGINEER as additional insureds.

A thirty (30) day Notice of Cancellation shall be provided to AUTHORITY and be so indicated on the Certificates for all policies.

Two (2) original copies of all Certificates shall be provided.

Insurance Companies shall have an A. M. Best rating of "A" or better.

Umbrella policies shall set forth the primary coverage to which the excess coverage shall apply.

Only Certificates of Insurance from companies licensed to do business in the Commonwealth of Pennsylvania shall be approved.

5.3 CONTRACTOR shall maintain, in amounts required by LAW, Workers' Compensation Insurance for all employees participating directly or indirectly in the performance of WORK. CONTRACTOR shall require any SUBCONTRACTORS to provide Workers' Compensation Insurance for all employees participating, directly or indirectly, in the performance of WORK. CONTRACTOR shall, at all times, indemnify and save harmless AUTHORITY, of and from all claims for Workers' Compensation made by any employee of CONTRACTOR and SUBCONTRACTORS.

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- 5.4 CONTRACTOR shall maintain Insurance to protect CONTRACTOR, AUTHORITY, TOWNSHIP, and ENGINEER from claims for damages for personal injury, including accidental death, as well as from claims for property damages, which may arise from actions by SUBCONTRACTORS, their workers, servants, employees, or agents.

CONTRACTOR and SUBCONTRACTORS shall provide the following type policies and minimum coverage per Schedule "A" below, which may be modified, altered, or increased by AGREEMENTS between AUTHORITY and CONTRACTOR.

SCHEDULE "A"

- (a) Commercial General Liability
General Aggregate - \$2,000,000.00
Products/Completed Operations Aggregate - \$2,000,000.00
Personal/Advertising Injury - \$1,000,000.00
Each Occurrence - \$1,000,000.00
Fire Damage - \$50,000.00
Medical Payments - \$5,000.00
Including perils of Explosion, Collapse and Underground
- (b) Automobile Liability - \$1,000,000.00 Combined Single Limit Including Non Owned and Hired Automobiles
- (c) Owners and CONTRACTORS Protective Coverage - \$1,000,000.00
Naming (1) AUTHORITY, its Officers, Board Members, Agents and Employees and (2) ENGINEER as insureds
- (d) Excess/Umbrella Liability –
Each Occurrence - \$4,000,000.00
Aggregate - \$4,000,000.00

AUTHORITY and ENGINEER shall be included as additional insureds.

AUTHORITY shall have their Broker of Record review all policies for conformance and adequacy.

CONTRACTOR shall not commence WORK until AUTHORITY has been provided with Certificates of Insurance showing policies of insurance are issued and are in full force and effect.

6. Conduct of WORK and Safety

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- 6.1 CONTRACTOR shall use all reasonable means to maintain the normal flow of traffic on TOWNSHIP and PennDOT roadways during all phases of WORK. Should it become necessary to close any roadway, CONTRACTOR shall obtain permission to do so from the applicable governing agency. CONTRACTOR shall notify TOWNSHIP or PennDOT, as the case may be, in writing, three (3) working days prior to any roadway closing, partial closing, or modification of normal vehicular traffic flow. CONTRACTOR shall erect suitable and lawfully required warning lights and signs at all appropriate locations.

CONTRACTOR shall erect suitable and lawfully required directional signs to advise motorists of the route of detours or modification of normal vehicular traffic flow. TOWNSHIP and PENNDOT regulations shall be adhered to at all times without fail. Any fines or excess costs resulting from CONTRACTOR'S actions shall be the responsibility of CONTRACTOR. Failure to pay shall result in deductions from CONTRACTOR'S account.

- 6.2 CONTRACTOR shall confine his operations strictly within the limits of construction where shown on the Plans or inside the rights-of-way lines where appropriate or as directed by AUTHORITY. If there is any uncertainty as to limits, CONTRACTOR shall request further direction from AUTHORITY. Upon completion of WORK, CONTRACTOR shall clean-up and restore all areas of his operations to a condition at least EQUAL to or better than original conditions. Unless specified elsewhere herein, all restoration shall be included in CONTRACTOR'S unit and/or lump sum prices bid. Damage to property outside of specific construction limits shall be the responsibility of CONTRACTOR and restoration of same shall be EQUAL to or better than the original condition and shall be made at CONTRACTOR'S expense.
- 6.3 CONTRACTOR shall be responsible for the safety, efficiency, and adequacy of all machinery, equipment, and methods used by CONTRACTOR and SUBCONTRACTORS, and for any damage which may result from their improper construction, maintenance, or operations.
- 6.4 Extreme caution shall be exercised at all times for the protection of persons and property. The safety provisions of all applicable LAWS and building and construction LAWS, shall be strictly observed.
- 6.5 CONTRACTOR shall take all precautions and furnish and maintain all guards, barricades, handrails, lights, and other appurtenances required for the prevention of accidents to all persons or property at or near WORK site.

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6.6 CONTRACTOR shall promptly repair all areas in TOWNSHIP or adjacent areas affected by construction and return such areas to a state EQUAL to or better than that which existed prior to the construction.

7. Equipment and Materials

7.1 All materials and equipment specified herein shall be considered the minimum standards acceptable to AUTHORITY. AUTHORITY and/or ENGINEER may, in particular situations, require CONTRACTOR to meet more stringent specifications or additional requirements as are deemed to be in AUTHORITY'S best interests.

7.2 Materials provided by CONTRACTOR shall be new and of first quality. All materials approved by AUTHORITY and/or ENGINEER and furnished by CONTRACTOR shall bear the manufacturer's stamped or sealed designation indicating conformance with the latest AWWA, ASTM, ANSI, NEMA or other referenced specifications.

7.3 Unless otherwise specifically provided for in CONTRACT DOCUMENTS, all workmanship, equipment, materials and articles incorporated in WORK shall be new and the best grade of the respective kinds for their purpose. Where equipment, materials, articles or workmanship are referred to in CONTRACT as EQUAL to any particular standard, ENGINEER shall decide the question of equality.

7.4 Whenever any item of machinery, equipment, or material is designated by reference to a particular brand, manufacturer, or trade name in these Specifications, it is understood that an APPROVED EQUAL product may be substituted unless such item shall be designated "no substitution" by AUTHORITY or ENGINEER.

7.5 CONTRACTOR shall furnish to ENGINEER for approval the manufacturer's detailed specifications for all machinery to be installed in WORK. These specifications shall include full information as to type, performance characteristics, and all other pertinent information as required. CONTRACTOR shall likewise submit for approval as required full information concerning all other materials or articles which he proposes to incorporate in WORK.

7.6 Any or all equipment, materials or articles installed or used without such prior approval shall be at the risk of rejection.

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- 7.7 Catalogue cut sheets or certifications shall be required in six (6) copies of all machinery, equipment, and materials. Approval of ENGINEER on all submittals shall be received, in written form, prior to use or installation..
- 7.8 Materials specified by reference to the number or symbol of a specific standard, such as an A.S.T.M. specification, a federal specification or other similar standard, shall comply with requirements in the latest revision thereof and any amendment or supplement thereto in effect on the date of the Invitation for Bids hereof, except as limited to type, class or grade, or modified in such reference. The standards referred to except as modified in AGREEMENT shall have full force and effect as though printed therein.

8. Location and Protection of Existing Utilities

- 8.1 Since it is the desire of AUTHORITY to disturb the area of construction only during the performance of WORK pursuant to time limitations of AGREEMENT and because all of the necessary equipment and materials are more readily available to CONTRACTOR during the construction, these Specifications provide that all utilities be located by CONTRACTOR before construction.
- 8.2 CONTRACTOR shall be held responsible for locating, in advance of the structures to be built under CONTRACT DOCUMENTS, all underground structures, such as water and gas mains; water and gas services; sanitary sewers and laterals, storm sewers and telephone and electric conduits; etc., which may be encountered during construction. CONTRACTOR shall either dig test holes to determine the position of the underground structures, or CONTRACTOR shall arrange with the owners of such underground structures to assign a representative to mark the locations. CONTRACTOR shall fulfill all requirements under the LAW regarding CONTRACTOR'S responsibilities during excavation and demolition operations, as set forth in Act 287 as amended by Act 181 or the latest amendment as enacted by the General Assembly of the Commonwealth of Pennsylvania. CONTRACTOR shall pay the cost of digging test holes and likewise CONTRACTOR shall pay the cost of the services of the representative of the owners of such utilities for locating said utilities. The cost of determining the locations shall be included in CONTRACTOR'S unit or lump sum prices bid. The location of utility lines as shown on the plans is for guidance only. CONTRACTOR shall not be entitled to any claim for damage or extra compensation because of any delay caused by CONTRACTOR'S failure to arrange for the location of utilities in advance of WORK.

9. Observation of WORK

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- 9.1 AUTHORITY may appoint such persons as it deems necessary to observe, at any time, materials and equipment furnished and WORK performed under CONTRACT DOCUMENTS and these Specifications. ENGINEER shall be notified of the time and place of all WORK. It is MANDATORY for all pipe laying operations that a designated observer be on the job site to provide surveillance during the actual pipe laying. If CONTRACTOR lays pipe without a designated observer present, all pipe shall be removed from the trench and discarded and new pipe shall be laid when a designated observer is present.
- 9.2 AUTHORITY'S designated observers shall be authorized to observe all WORK performed and materials furnished. Such observation may extend to all or any part of WORK and to the preparation or manufacturer of the materials to be used. Observers shall be stationed on WORK to report to ENGINEER as to the progress of WORK and the manner in which it is being performed; to report whenever it appears that the materials furnished and WORK performed by CONTRACTOR fails to fulfill the requirements of AGREEMENTS and to call to the attention of CONTRACTOR any such failure or other default, but no observation nor any failure to observe, at any time or places shall relieve CONTRACTOR from any obligation to perform all WORK strictly in accordance with the requirement of these Specifications and CONTRACT DOCUMENTS. In case of any dispute arising between CONTRACTOR and any observer as to materials furnished or the manner of performing WORK, the observer shall have the authority to reject materials or suspend WORK until the unresolved issue can be referred to and decided on by ENGINEER. The observers shall not be authorized to revoke, alter, enlarge, relax, or release any requirements of the AGREEMENTS, nor to approve or accept any portion of the WORK, nor to issue instructions contrary to the STANDARD DETAIL DRAWINGS, CONTRACT DOCUMENTS, and Specifications. Observers shall in no case act as foremen or perform other duties for CONTRACTOR nor interfere with the management of WORK by the latter. Any instructions which the observers may give CONTRACTOR shall in no way be construed as releasing CONTRACTOR from fulfilling the terms of AGREEMENTS.
- 9.3 When CONTRACTOR has fully completed WORK provided for under CONTRACT DOCUMENTS and so notified ENGINEER, in writing, ENGINEER will make a final inspection of the completed WORK and if, in ENGINEER'S judgment, CONTRACTOR has fully completed WORK and it is in accordance with all terms, provisions, and stipulations of CONTRACT DOCUMENTS, ENGINEER will issue a Certificate of Completion to AUTHORITY showing the entire amount of WORK performed and the compensation earned by CONTRACTOR, including any additional WORK, approved in writing by AUTHORITY, and the compensation therefore.

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10. Possession after Testing

10.1 After any section of PUBLIC WATER SYSTEM has been tested and approved in accordance with these Specifications, AUTHORITY may use the completed section. Possession prior to completion, however, shall not imply final acceptance. CONTRACTOR shall be responsible for the maintenance of all completed portions of the PUBLIC WATER SYSTEM, whether used by AUTHORITY or not, until the final inspection is made and the WORK is accepted by and dedicated to AUTHORITY. The first inspection shall be within the three (3) month period immediately prior to dedication and then final inspection shall be made fifteen (15) months after dedication. Newly constructed water lines shall be sterilized prior to connection to the existing system.

11. Labeling Facilities

11.1 All paints shall be Rustoleum 340 High Performance Alkyd Enamel 3400 System. Manufacturer's instructions shall be followed.

Safety Green – No. 3433 for sewer lines
Marlin Blue – No. 3423 for water lines
Safety Red – No. 3464 for electric and hydrant bodies
Safety Yellow – No. 3444 gas/petroleum
Safety Orange – No. 3455 for telecommunications/cable
High Gloss White – No. 3492 for hydrant bonnets

Note: Any usable excess paint shall be turned over to AUTHORITY.

11.2 The locations of sanitary sewer laterals shall be labeled and identified by a six (6") inch square of Safety Green No. – 3433 on both the face and top of curb with a black letter "S" stenciled in the center of the green squares.

11.3 The locations of water services shall be identified by a six (6") inch square of Marlin Blue No – 3423 on both the face and top of curb with a black letter "W" stenciled in the center of the blue squares. Water service curb boxes and valve boxes shall be painted with Marlin Blue No. –3423.

11.4 The locations of the water valves behind curbs shall be identified by a six (6") inch square of Marlin Blue No. – 3423 on both the face and top of curb with a black letter "V" stenciled in the center of the blue squares. Valve box covers shall be painted with Marlin Blue No. – 3423 whether located in the street or behind the curb.

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- 11.5 All fire hydrants shall have the body of the hydrant painted with Safety Red No. - 3464. The bonnet of the fire hydrant shall be painted with High Gloss White No. - 3492.
- 11.6 The location of the air release manholes, blow-offs, and all other water service fittings shall be identified by a six (6") inch square of Marlin Blue No - 3423 on both the face and top of curb. If there are air release valves in sanitary sewer force mains, they shall be marked as above but using Safety Green No. - 3433 in lieu of the blue paint.
- 11.7 All black stencil letters shall be three (3") inches high.

12. Maintenance after Completion

- 12.1 CONTRACTOR shall, after final inspection and for a period of eighteen (18) months (twenty- four (24) months when under a PennDOT permit) from the date of dedication to AUTHORITY, repair, rebuild, or replace any and all items which fail to function in accordance with design or is otherwise in need of repair, replacement, or improvement. Upon written NOTICE from AUTHORITY or ENGINEER, CONTRACTOR shall immediately make any repairs that may be necessary as determined by AUTHORITY or ENGINEER, or such repairs shall be made by AUTHORITY, or its agents, at the expense of CONTRACTOR. In the case of an emergency as, determined by AUTHORITY, delay that would cause serious loss or significant damage, AUTHORITY, in its sole discretion, may undertake to repair any defect or other condition without previous NOTICE, and the expense of such repairs shall be borne by CONTRACTOR. All inspections shall be witnessed by a designated observer.

13. Shop Drawings

- 13.1 CONTRACTOR shall check and verify all field measurements and shall submit with such promptness as to cause no delay in WORK or in that of any other party performing WORK on behalf of AUTHORITY or related to the PUBLIC WATER SYSTEM or other AUTHORITY facility, six (6) copies, checked and approved by CONTRACTOR, of all shop or setting drawings and schedules required for WORK of various trades. ENGINEER shall check and approve, with reasonable promptness, such schedules and drawings only for conformance with the design concept of the project and compliance with the information given in CONTRACT DOCUMENTS. CONTRACTOR shall make any corrections required by ENGINEER, file with ENGINEER four (4) copies and furnish such other copies as may be needed. ENGINEER'S approval of such drawings or

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schedules shall not relieve CONTRACTOR from responsibility for deviations from CONTRACT DOCUMENTS or these Specifications, unless CONTRACTOR has, in writing, called ENGINEER'S attention to such deviations at the time of submission, and secured written approval of ENGINEER, nor shall it relieve CONTRACTOR from responsibility for errors in shop drawings or schedules.

14. Design and Construction

- 14.1 All design and construction of items specified in CONTRACT DOCUMENTS shall meet all applicable LAWS.
- 14.2 During pipe laying, backfilling, and paving operations, full time observation shall be conducted by AUTHORITY and/or ENGINEER to assure compliance with these Specifications. No trench shall be backfilled until all WORK and facilities have been observed and approved by ENGINEER.
- 14.3 RECORD DRAWINGS shall be provided by CONTRACTOR that show actual field conditions and measurements. WORK shall not be considered complete until all AS-BUILT drawings have been provided by CONTRACTOR and approved by AUTHORITY.

15. Mutual Responsibility of CONTRACTORS

- 15.1 If, through acts of neglect on the part of CONTRACTOR, a SUBCONTRACTOR shall suffer loss or damage on WORK, CONTRACTOR shall settle with SUBCONTRACTOR by agreement or arbitration, if such SUBCONTRACTOR will so settle. If such SUBCONTRACTOR shall assert any claim against AUTHORITY on account of any damage alleged to have been so sustained, AUTHORITY will notify CONTRACTOR, who shall defend, at CONTRACTOR'S own expense, any suit based upon such claims and, if any judgment or claims against AUTHORITY shall be allowed, CONTRACTOR shall pay or satisfy such judgment or claim and pay all costs and expenses incurred by AUTHORITY in connection therewith.

16. Fitting and Coordination of WORK

- 16.1 CONTRACTOR shall be responsible for the proper fitting of WORK and for the coordination of the operations of all trades, SUBCONTRACTORS or material men engaged in WORK. CONTRACTOR shall be prepared to guarantee to each SUBCONTRACTOR the locations and measurements which they may require for the fitting of WORK to all surrounding WORK.

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17. Superintendence by CONTRACTOR

- 17.1 CONTRACTOR shall at all times keep on WORK during its progress a competent resident Superintendent, who shall not be replaced without written NOTICE to AUTHORITY and ENGINEER, except under extraordinary circumstances. The Superintendent shall be CONTRACTOR'S representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to Superintendent shall be as binding as if given to CONTRACTOR.
- 17.2 AUTHORITY may require CONTRACTOR to dismiss from WORK such employee or employees as AUTHORITY or ENGINEER may deem, at AUTHORITY'S sole discretion, incompetent, careless, or insubordinate.

18. Permits, Licenses, and Taxes

- 18.1 CONTRACTOR shall give all NOTICE required by and comply with all applicable LAWS, Ordinances, Codes and Regulations of governing authorities. WORK and/or utility installations shall comply with all LAWS including all written waivers. Before installing any WORK, CONTRACTOR shall examine CONTRACT DOCUMENTS for compliance with applicable LAWS and shall immediately report any discrepancy to AUTHORITY. Where the requirements of CONTRACT DOCUMENTS fail to comply with such applicable LAWS, AUTHORITY will submit CHANGE ORDER to conform to such LAWS (unless waivers, in writing, covering the difference have been granted by the governing body or department) and make appropriate adjustment to CONTRACTOR, if applicable.
- 18.2 CONTRACTOR shall not commence WORK until all required permits, including those issued by Pennsylvania Department of Environmental Protection (PaDEP), Pennsylvania Department of Transportation (PennDOT), and TOWNSHIP, have been secured.
- 18.3 Should CONTRACTOR fail to observe the foregoing provisions and proceed with WORK and/or install any utility varying with any applicable LAWS, including any written waivers (notwithstanding the fact that such installation is in compliance with these Specifications and CONTRACT DOCUMENTS), CONTRACTOR shall remove such WORK without cost to AUTHORITY and make full restoration of the WORK as AUTHORITY shall request.

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- 18.4 Permits for the opening and/or occupation of TOWNSHIP roads shall be obtained by CONTRACTOR and PennDOT Highway permits shall be obtained by AUTHORITY. However, all inspection fees and/or any other charges shall be borne by CONTRACTOR, whether same is billed directly to him or to AUTHORITY. Should any such bill be left unpaid by CONTRACTOR, AUTHORITY shall be empowered to pay such bills and the cost thereof deducted from any moneys payable or to become payable to CONTRACTOR.
- 18.5 Whenever the proposed construction requires a sales, consumer use, or other similar tax, CONTRACTOR shall pay for same.

19. Provisions Required by LAW

- 19.1 Each and every provision of LAW and clause required by LAW to be inserted in CONTRACT shall be deemed to be inserted herein and CONTRACT shall be read and enforced as though it were included herein; and, if through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon the application of either party, CONTRACT shall forthwith be physically amended to make such insertion.

20. Temporary Provision for Public Travel

- 20.1 CONTRACTOR shall perform his WORK in such a manner as to interfere as little as possible with the use of intersecting roads or adjoining property. No excavation shall be left open or other obstruction allowed to remain longer than is absolutely necessary, and CONTRACTOR shall provide all safeguards and temporary passageways that may be necessary for the convenience and protection of all persons using said property either day or night.

21. Protection of Work and Property

- 21.1 CONTRACTOR shall provide adequate protection against injury or loss arising in connection with WORK and the property of AUTHORITY. CONTRACTOR shall make good any such damage, injury, or loss. CONTRACTOR shall adequately protect adjacent property as provided by LAWS and CONTRACT DOCUMENTS. CONTRACTOR shall provide facilities for protection, such as passageways, guard fences, lights, and similar such property, as required by AUTHORITY or local conditions.
- 21.2 CONTRACTOR shall preserve and protect all trees, shrubs, and grass on or adjacent to the site which do not reasonably interfere with the construction as may be determined by ENGINEER. CONTRACTOR shall be responsible for all

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unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stockpiling of materials, or tracking of grass areas by equipment. CONTRACTOR shall remove only those trees designated by ENGINEER to be removed.

22. Inconsistent Specifications and Drawings

22.1 Anything mentioned in CONTRACT DOCUMENTS and not shown on Contract Drawings or STANDARD DETAIL DRAWINGS, or shown on Contract Drawings or STANDARD DETAIL DRAWINGS and not mentioned in CONTRACT DOCUMENTS, shall be of like effect as if shown on or mentioned in all of them. In case of difference between Contract Drawings and STANDARD DETAIL DRAWINGS and CONTRACT DOCUMENTS, the better quality or greater quantity of WORK or materials and the more stringent requirements shall be included in the proposal, and unless otherwise ordered in writing, shall be performed or furnished.

23. Use of Premises

23.1 CONTRACTOR shall confine equipment, storage of materials, and construction WORK to the limits as shown on Contract Drawings and as prescribed by LAWS, or as may be directed by AUTHORITY, and shall not unreasonably encumber the site or public rights-of-way with materials and construction equipment of CONTRACTOR

23.2 CONTRACTOR shall comply with all instructions of AUTHORITY and LAWS of TOWNSHIP and other governmental authorities regarding but not limited to signs, advertising, traffic, fires, explosives, danger signals, and barricades.

24. Possession Prior to Completion

24.1 AUTHORITY shall have the right to take possession of or to use any completed or partially completed part of WORK, but such possession or use shall not be deemed an acceptance of WORK not completed in accordance with CONTRACT.

25. Samples, Certificates and Tests

25.1 CONTRACTOR shall submit all material or equipment samples, certificates, affidavits, and the like, as called for in CONTRACT DOCUMENTS or required by ENGINEER, promptly after award and acceptance of CONTRACTOR'S Bond. No such material or equipment shall be manufactured or delivered to the site, except at CONTRACTOR'S own risk, until the required samples or

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certificates have been approved, in writing, by ENGINEER. Any delay in WORK caused by late or improper submission of samples or certificates for approval shall not be considered just cause for an extension of time under AGREEMENT.

- 25.2 Each sample submitted by CONTRACTOR shall carry a label giving the name of CONTRACTOR, the project for which it is intended, and the name of the manufacturer. In the accompanying certificates or letters, CONTRACTOR shall state that the sample complies with these Specifications and CONTRACT DOCUMENTS, shall give the name and brand of the product, its place of origin, the name and address of the producer and all specifications or other detailed information which will assist ENGINEER in determining the acceptability of the sample promptly. It shall also include the statement that all materials or equipment furnished for use in the project shall comply with the samples and/or certified statements.
- 25.3 Approval of any materials shall be general only and shall not constitute a waiver of AUTHORITY'S right to demand full compliance with these Specifications and CONTRACT DOCUMENTS. After actual deliveries, ENGINEER will have such check tests made as ENGINEER deems necessary in each instance and may reject materials and equipment and accessories for cause, even though such materials and articles have been given general approval. If materials, equipment, or accessories which fail to meet check tests have been incorporated in WORK, ENGINEER shall have the right to cause their removal and replacement by proper materials or to demand and secure such reparation by CONTRACTOR as is equitable.

26. Changes in Equipment and/or Materials

- 26.1 In these Specifications and on STANDARD DETAIL DRAWINGS, there may be specified and shown certain pieces of equipment and/or materials which are deemed most suitable for service anticipated. This is not done to eliminate other equipment and material equally as good and efficient. CONTRACTOR shall prepare his bid on particular material and equipment specified. Following award of Project to CONTRACTOR, should CONTRACTOR desire to use some other make of machinery, equipment, or material, he shall submit to ENGINEER a written request for such change and in same shall state advantage to AUTHORITY and saving or additional cost involved by substitution. Determination as to whether or not such change will be permitted rests solely with ENGINEER.
- 26.2 If the requested change results in added costs (including engineering), CONTRACTOR and AUTHORITY will be notified within seventy-two (72)

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hours of the magnitude of increased costs by ENGINEER, and the change will only be processed upon agreement of CONTRACTOR to pay for the added costs. If CONTRACTOR refuses to pay said added costs, CONTRACTOR shall supply the equipment and/or materials specified.

27. Patents

27.1 CONTRACTOR shall hold and save AUTHORITY, its officers and employees, harmless from liability of any nature or kind including costs and expenses for, or on account of any patented or unpatented inventions, process, article, or appliance manufactured or used in the performance of WORK including its use by AUTHORITY unless otherwise specifically stipulated in CONTRACT DOCUMENTS.

28. Warranty of Title

28.1 No material, supplies, or equipment for WORK shall be purchased subject to any chattel mortgage or under a conditional sale or other agreement by which an interest therein or in any part thereof is retained by any party not a party to AGREEMENT. CONTRACTOR and SUBCONTRACTORS shall warrant good title to all materials, supplies, and equipment installed or incorporated in WORK and upon completion of WORK, shall deliver the same, together with all improvements and appurtenances, to AUTHORITY free from any claim, liens, or charges. Neither CONTRACTOR nor any person, firm, or corporation furnishing any material or labor for WORK shall have any right to a lien upon any improvement or appurtenance thereon. Nothing contained in this paragraph, however, shall defeat or impair the right of persons furnishing materials or labor to recover under any bond given by CONTRACTOR for their protection or any rights under any law permitting such persons to look to funds due CONTRACTOR in the hands of AUTHORITY. The provisions of this paragraph shall be inserted in all sub-contracts and material contracts and NOTICE of its provisions shall be given to all persons furnishing materials for WORK when no written agreement is entered into for such materials.

29. Authority's Right To Do Work

29.1 If CONTRACTOR should neglect to prosecute WORK properly or fail to perform any provision of AGREEMENT, AUTHORITY, after three (3) days written NOTICE to CONTRACTOR, may, without prejudice to any other remedy AUTHORITY may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due CONTRACTOR, provided,

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however, that ENGINEER shall approve both such action and the amount charged to CONTRACTOR.

30. Damages

30.1 Should either party to AGREEMENT suffer damages because of any wrongful act or neglect of the other party, claim shall be made in writing to the party liable within a reasonable time of the first observance of such damage and not later than the final payments, except as expressly stipulated otherwise in the case of faulty WORK or materials, and shall be adjusted by agreement or arbitration.

31. No Estoppel or Waiver of Legal Rights

31.1 AUTHORITY or ENGINEER shall not be precluded or estopped by any measurement, estimate, or certificate made or given by either of them or by any agent or employee of AUTHORITY under any provision or revisions of these Specifications and CONTRACT DOCUMENTS at any time, either before or after the completion and acceptance of WORK and payment thereof pursuant to any measurements, estimate, or certificate is untrue or incorrectly made in any particular or that WORK or materials or any part thereof, do not conform in fact to these CONTRACT DOCUMENTS. AUTHORITY shall have the right to reject the whole or any part of WORK or materials should said measurements, estimate, certificate, or payment be found or be known to be inconsistent with these CONTRACT DOCUMENTS or otherwise improperly given. AUTHORITY shall not be precluded or estopped notwithstanding any such measurements, estimate, certificate, and payment in accordance therewith, from demanding and recovering from CONTRACTOR such damages as may be sustained by reason of failure of CONTRACTOR to comply with the terms of CONTRACT. Neither the acceptance nor any certificate by ENGINEER for payment of moneys nor any payment for, nor acceptance of the whole or any part of WORK by AUTHORITY or ENGINEER nor any extension of time, nor any possession taken by AUTHORITY, shall operate as a waiver of any portion of AGREEMENT or of any power herein reserved by AUTHORITY, or any right to damages herein provided, nor shall any waiver of any breach of AGREEMENT be held to be a waiver of any other or subsequent breach.

32. Safety and Health Regulations (OSHA)

32.1 Safety on the job site and during all phases of WORK shall be paramount at all times. CONTRACTOR shall comply with the Department of Labor's Safety and Health Regulations promulgated under the Occupational Safety and Health Act of 1970 together with any or all appropriate amendments and/or successive Acts.

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32.2 WORK shall be in compliance with all Local, State and Federal Occupational Safety Regulations. CONTRACTOR shall be familiar with all of the above.

33. Indemnification

33.1 CONTRACTOR shall indemnify and hold harmless AUTHORITY and ENGINEER and their agents and employees from and against all claims, damages, losses, and expenses, including attorney's fees arising out of or resulting from the performance of WORK, provided that any such claim, damage, loss, or expense (a) is attributed to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than WORK) including the loss of use resulting there from and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, SUBCONTRACTOR, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

33.2 In any and all claims against AUTHORITY, ENGINEER or any of their agents or employees by any employee of CONTRACTOR or SUBCONTRACTOR and anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or SUBCONTRACTOR under Workers' Compensation acts, disability benefit acts, or other employee benefit acts.

33.3 The obligations of CONTRACTOR shall not extend to the liability of ENGINEER, his agents or employees arising out of (a) the preparation or approval of maps, drawings, opinions, reports, surveys, CHANGE ORDERS, designs, or Specifications, or (b) the giving of or the failure to give directions or instructions by ENGINEER or his agents or employees provided such giving or failure to give is the primary cause of injury or damage.

34. Emergency WORK

34.1 In emergencies affecting the safety or protection of persons or WORK or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER or AUTHORITY, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written NOTICE if CONTRACTOR believes that any significant changes in WORK or variations from these Specifications and CONTRACT

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DOCUMENTS have been caused thereby. If ENGINEER determines that a change in CONTRACT DOCUMENTS is required because of the action taken in response to an emergency, CHANGE ORDERS will be issued to document the consequences of the change or variations.

35. Explosives and Blasting

- 35.1 Blasting may be used to remove rock which cannot be excavated by other methods only after obtaining written permission from TOWNSHIP and AUTHORITY. Blasting shall be performed by experienced blasters approved by and licensed by the Commonwealth of Pennsylvania. All blasts shall be carried out in strict accordance with applicable LAWS. AUTHORITY reserves the right to regulate the time of blasting. The use of explosives and blasting liability insurance shall be as specified by ENGINEER and AUTHORITY'S Broker of Record.
- 35.2 CONTRACTOR shall give written NOTICE to each owner of record having lines or structures in proximity to the blasting site, of CONTRACTOR'S intention to use explosives in these areas. NOTICE shall be given sufficiently in advance to enable such owners to take the steps they deem necessary to protect their facilities. Such NOTICE shall not relieve CONTRACTOR of his responsibilities to carry out WORK in a safe and satisfactory manner. AUTHORITY shall have the right to require that all rock within five (5') feet of any existing pipe, main, or conduit be removed by methods other than blasting. CONTRACTOR shall notify the Police Department and Fire Marshall as to time of blasts.
- 35.3 CONTRACTOR shall use the utmost care when using dynamite or similar explosives, particularly during freezing weather, and with particular regard for the protection of life and property, whenever the use of explosives is necessary to the prosecution of WORK. Whenever directed by AUTHORITY, the number and size of the charges shall be reduced. In thawing dynamite or similar explosives, instructions given by the manufacturer shall be strictly followed. Only such amounts of explosives, as determined by the Fire Marshall, shall be kept in any one place. All explosives shall be stored in a secure manner and all such places shall be marked clearly "DANGEROUS EXPLOSIVES" and shall be kept under lock and key to be only in the hands of persons under the direct control of CONTRACTOR.
- 35.4 No larger quantity of explosives shall be kept on the line of WORK than will actually be required for twelve (12) hours of WORK next ensuing, and such supplies shall be divided into as small lots as practicable. Caps and exploders

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shall not be kept in the same place with dynamite and other explosives. CONTRACTOR shall become familiar with all LAWS pertaining thereto.

35.5 All blasting shall be performed under the direct on-site supervision of a competent, licensed blasting expert, and subject to the State, County, and TOWNSHIP Regulations and LAWS for blasting. Whenever any pipe, main, or conduit is encountered in the trench, the right is reserved to direct that all rock within five (5') feet of the same shall be removed by some method other than blasting.

35.6 CONTRACTOR shall indemnify and hold AUTHORITY and ENGINEER harmless from any liability arising from the use of explosives and shall reimburse AUTHORITY and/or ENGINEER for any fees, costs, or expenses incurred related thereto.

36. Night, Weekend, and Holiday WORK

36.1 When required by the nature of WORK and/or upon specific instruction of ENGINEER, CONTRACTOR shall perform WORK on weekends and holidays. TOWNSHIP has "Nuisance Abatement" LAWS that restrict activities during certain hours. Only in extreme emergencies shall WORK be conducted during these hours.

37. Sanitary Facilities

37.1 CONTRACTOR shall furnish, install, and maintain ample sanitary facilities for the workers. As the needs arise, a sufficient number of enclosed temporary toilets shall be conveniently placed as required by sanitary LAWS.

38. Water

38.1 All water for construction purposes shall be potable and shall be provided and paid for by CONTRACTOR. Supply connections shall be installed by CONTRACTOR as approved by AUTHORITY and ENGINEER. Fire hydrants shall not be used unless approved by AUTHORITY.

39. Act 287 of 1991

39.1 CONTRACTOR'S attention is directed to the provisions of Act 287 as amended by Act 181, or the latest amendment as enacted by the General Assembly of the Commonwealth of Pennsylvania which specifies CONTRACTOR'S

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responsibilities during excavation and demolition operations in areas of underground utilities.

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SECTION II

MATERIALS

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SECTION II

MATERIALS

1. General

- 1.1 Unless otherwise specified, all materials used in WORK shall conform to the requirements of the current Specifications of the American Society for Testing Materials (ASTM), and shall be tested in accordance with the current Specifications or current methods of testing of the American Society for Testing Materials, where Specifications and methods of testing have been adopted, revised, or proposed for such materials. It is understood and agreed that wherever the word “current” is used relative to the Specifications and methods of testing of the American Society for Testing Materials, it refers to the Standards or Tentative Standards of that Society bearing the latest date up until the Bid opening date.
- 1.2 No material shall be used until it has been inspected and approved on the site of WORK. When required by AUTHORITY, any or all materials entering into the construction of the PUBLIC WATER SYSTEM shall be tested by a reputable testing laboratory. Such inspection shall not relieve CONTRACTOR of any of his obligations in this respect, and any defect in material or workmanship which may have been passed by AUTHORITY shall be at all times liable to rejection when discovered, until the final acceptance of WORK or at the end of the maintenance period whichever comes later.
- 1.3 Where a manufacturer’s name is used in these Specifications, it is used to designate a standard of quality. The use of said manufacturer’s name does not eliminate other manufacturer’s equipment and materials equally as good and efficient.
- 1.4 Provide all pipe, pipe fittings, pipe flanges and connections; joint material including gaskets, nuts, bolts and washers; miscellaneous small diameter piping, valves, fittings, and accessories; cutting and patching; temporary piping and temporary pumping; all abandonments, removals, and relocations; piping, equipment and all other items required to perform WORK and as required for a complete and operational installation.
- 1.5 Furnish all materials and equipment to do all plain and reinforced concrete WORK shown on Contract Drawings or herein specified. Cement, aggregates, concrete admixtures and reinforcing steel shall be stored at the site in such a manner as to prevent deterioration and intrusion of deleterious materials. The

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manner of storage and location of storage areas shall require the approval of AUTHORITY.

2. Submittals – Shop Drawings

- 2.1 Submit the following for acceptance prior to fabrication, if specifically required by AUTHORITY:
 - a. Pipe and joint details.
 - b. Fitting and coupling details.
 - c. Laying and installation schedule.
 - d. Mock ups of walls and samples of paint colors.
- 2.2 Before WORK is started, Certificates of Conformance for all materials shall be submitted to AUTHORITY, proving conformance with Specifications. All pipe shall be covered by a guarantee certificate furnished by CONTRACTOR and signed by an officer of the pipe manufacturer with the manufacturer's corporate seal affixed.
- 2.3 Certificates of Compliance: Furnish the following prior to shipment:
 - a. Certificate of Compliance with applicable standards.
 - b. Test Certificates.

3. Ductile Iron Pipe and Fittings

- 3.1 The standard pipe for the PUBLIC WATER SYSTEM shall be ductile iron pipe with ductile iron fittings. Where specifications of the American Water Works Association (AWWA), American National Standards Institute (ANSI), or other specifications are referred to herein, it shall be understood to refer to the latest issue or revision thereof as of the date of Bid opening.
- 3.2 Ductile iron pipe shall be manufactured in accordance with ANSI A21.56-76 (AWWA C151-76) for ductile iron pipe centrifugally cast in metal molds. All pipe shall be push-on type joint, except where detailed otherwise on the drawings.
- 3.3 Push-on joints for ductile iron pipe shall be of a type which employs a single rubber gasket to effect the joint seal.
- 3.4 The class of pipe shall be thickness Class 52 for six (6"), eight (8"), and twelve (12") inch pipe and thickness Class 53 for sixteen (16") inch pipe unless otherwise directed by ENGINEER.

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- 3.5 All ductile iron pipe shall be cement lined and coated inside and outside with a bituminous seal coat in accordance with ANSI 21.4-74 (AWWA c104-74). The thickness of the linings shall not be less than one-eighth ($\frac{1}{8}$ ") inch for six (6") inch through twelve (12") inch diameter pipe and not less than three-sixteenths ($\frac{3}{16}$ ") inch for sixteen (16") inch diameter pipe.
- 3.6 All ductile iron pipe shall be furnished in lengths of sixteen (16'), eighteen (18'), or twenty (20') feet with the year of manufacture stamped on it.
- 3.7 Fittings shall be suitable for working pressure of two hundred-fifty (250) psi, ductile iron standardized mechanical joint fittings, ANSI Specifications A21.10-77, with mechanical joints conforming to ANSI Specifications A21.11-79, complete with bolts, nuts, glands, and plain rubber gaskets, tar-coated outside, except where detailed otherwise.
- 3.8 All water pipe shall in general be a minimum of eight (8") inches in diameter. In all cases, the actual size of the pipe to be placed shall be directed by ENGINEER.
- 3.9 Pipe shall be as manufactured by U.S. Pipe, Griffin Pipe, American Cast Iron Pipe Co., or APPROVED EQUAL All pipe and fittings for each specific CONTRACT shall be from the same manufacturer unless APPROVED otherwise by ENGINEER.

4. Marking

4.1 The weight, class, or nominal thickness and casting period shall be shown on each pipe. The manufacturer's mark, the year in which the pipe was produced, and the letters "DI" or "DUCTILE" shall be cast or stamped on the pipe. Marking shall be clear and legible and all cast marks shall be on or near the bell.

5. Joints

- a. Mechanical and Push-On Type:
- (1) Provide mechanical or push-on type joints for all buried pipe unless otherwise specified or indicated.
 - (2) Joints shall conform to AWWA C111.
- b. Flanged:
- (1) Provide flanged joints for all interior, exposed exterior and submerged pipe except where otherwise specified or indicated.
 - (2) Flanges for pipe shall be ductile iron and conform to the applicable provisions of AWWA C110 and C115 and shall be drilled according to ANSI B16.1, Class 125.

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- (3) Pipe with victaulic-style couplings may not be substituted for flanged pipe except where indicated or approved by ENGINEER.
- c. Sleeved or Coupled:
 - (1) Provide sleeves or couplings where indicated or where required for field closures necessitated by pipe laying sequence.
 - (2) Furnish pipe ends suitable for receiving style of sleeve or coupling indicated or specified.
 - (3) Provide anchored couplings where restraint is required to withstand hydrostatic test pressure and where indicated.
- d. Restrained:
 - (1) Furnish where joint restraint is required to offset internal pipe line forces.
 - (2) Provide restrained joints of following approved types:
 - (a) Restrained mechanical joint. Mechanical joint retained glands are not acceptable.
 - (b) Restrained push-on joint.

6. Fittings

- a. Fittings shall conform to AWWA C110 and shall have a pressure rating of 250 psi.
- b. Fittings shall be ductile iron.
- c. Fittings for pipe with mechanical joint shall have mechanical joints.
- d. Fittings for pipe with push-on joints shall be mechanical joint or push-on type joint.
- e. Include all taps, plugs, flanges, and wall fittings as required.
- f. Provide openings for drain, sensing, testing, etc., and furnish connections with threaded bosses or flange outlets.

7. Valves and Valve Boxes

- 7.1 Gate valves shall be utilized for all size pipe up to and including twelve (12") inch.
- 7.2 Gate valves shall be either:
 - a. Manufactured in accordance with the American Water Work Association Gate Valve Specification No. C-500-71, or latest revision thereof, and shall be suitable for use with 150 psi working pressure. These valves shall be iron body, bronze mounted, double disc, parallel seat, non-rising stem, with wedge and bronze stem nut operating independently of the gates. Wedging surfaces shall be bronze to bronze. Pins and bolts in the wedging

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- mechanism shall be made of bronze. The valves shall have a two (2") inch square operating nut. The valve stem shall have O-ring seals.
- b. Resilient seated manufactured to meet or exceed the requirements of AWWA C509, or latest revision. Valves shall have an unobstructed water way when fully opened equal in diameter to at least one-quarter (1/4") inch greater than the nominal valve size. (Example: Six (6") inch valves shall have a water way at least equal to six and one-quarter (6-1/4") inches diameter).
- 7.3 All internal and external surfaces shall be coated with epoxy to a minimum thickness of eight (8) mils. Said coating shall be non-toxic, impart no taste to water and shall conform to AWWA C550, latest revision. Said coating shall be applied prior to assembly such that all exposed external areas, including end connection bolt holes, body to bonnet bolt holes, etc., shall be coated with epoxy.
- 7.4 Valves shall be provided with two (2) O-ring stem seals with one (1) O-ring located above and one (1) O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. One (1) antifriction washer shall be located below and one (1) antifriction washer above the thrust collar. All seals between valve parts such as body and bonnet, bonnet and bonnet cover, shall be O-rings. The stem shall be provided with an external dirt and weather seal independent of the O-ring pressure seal.
- 7.5 The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction, and shall consist of a cast iron gate having a vulcanized synthetic rubber coating with no rubber to metal seams or edges to the water way when in the fully closed position. Further, it shall be designed such that no sliding of rubber on the seating surfaces is required to compress the rubber. It shall also be designed such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is applied to either side of the gate.
- 7.6 The valve shall be so designed that no metal fasteners or screws other than the stem and stem nut are exposed to water.
- 7.7 The stem nut shall be independent of the gate and shall be provided with a spherical bearing surface to eliminate binding of the stem and to provide a self-aligning seating mechanism.
- 7.8 All valves shall be seat tested at the rated working pressure and shall be tested at twice the rated working pressure in accordance with Section 6 of AWWA C509.

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All valves shall open by turning in a counterclockwise direction and shall have mechanical joint ends suitable for use with push-on joint pipes. All gate valves shall be mounted vertically. The valves shall be Metropolitan Type, New York Pattern, or Mueller Compression Resilient Seated.

- 7.9 All valves larger than twelve (12") inch shall be butterfly valves. Butterfly valves shall be designed and manufactured in accordance with AWWA C-504 specification for rubber seated butterfly valves and including the following features:
- a. The valve body and the valve disc shall be made of ductile iron ASTM A536 Grade 65-45-12.
 - b. The valve shall be designed so that the seating surfaces are a continuous three hundred-sixty (360°) ring at ninety (90°) degrees to the port axis and with the shafting offset from the plane of the seat.
 - c. The valve body shall be made with flange ends, unless otherwise specified. Flange end valves shall have end-to-end dimensions in accordance with the short laying length in AWWA C504, Table 2.
 - d. The seating surfaces shall be Type 304 stainless steel mating with synthetic rubber compounded for water service. The rubber seat may be located on the disc or in the body.
 - e. A rubber seat on the disc shall be retained by a 304 stainless steel clamp ring and 302 stainless steel screws passing through the rubber seat. If located in the body, the rubber seat shall be retained by 304 stainless or bronze fittings. In either location, the rubber seat ring shall be replaceable and adjustable with respect to seat compression at the installation site without valve disassembly. The use of mating flanges to retain the rubber seat or sealing ring shall not be permitted. The use of epoxy agents or vulcanizing agents shall not be permitted to retain the rubber seat.
 - f. The 304 stainless seat ring if located in the body, shall be permanently and mechanically retained. If located on the disc, the 304 stainless seat ring shall be mechanically retained. The use of spray metal and welded overlays shall not be permitted.
 - g. The disc shall be rigidly attached to the shafting with taper keys to eliminate relative motion between the disc and shaft. Shaft keys shall be made of heat treated 410 or 416 stainless steel to prevent deformation of keys in service. Taper keys shall be wedged into contact and retained in place by 302 stainless steel nuts.
 - h. Valve shafts shall be made from 18-8 stainless steel and be offset from the disc and body seats so that the shafting does not intersect the disc or body seats. Valve shafts three (3") inches and smaller in diameter shall be one (1) piece through shafts with factory set thruster to center the disc in the

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- seat. Valve shafts larger than three (3") inches shall be stub shafts each rigidly keyed to the disc. Shaft diameters shall conform to Class 25B, 75B, or 150B, as listed in AWWA C504, Table 3. The smaller diameters of Class 25A, 75A, or 150A shall not be permitted.
- i. Valve operators shall be of the traveling nut type, with adjustable stops and sized for the maximum torque for the applicable size and pressure class (Class 25B, 75B, or 150B), as listed in AWWA C504, Table 1.
 - j. Certificate of "Proof of Design" tests in accordance with paragraph 13.4 of AWWA C500 shall be submitted for record and file.
- 7.10 All buried valves shall be furnished with a Mueller Co. Buffalo screw type three-piece valve box No. 10357, or Alabama Pipe Co. Buffalo screw type three-piece valve box No. E-3002. Valve boxes shall be centered over the bonnet and operating nut and of sufficient length to reach the surface of the ground, but not extend above the ground surface and shall be installed in such a manner as not to transmit shock or stress to the valve. The word "WATER" shall be cast in the top of the valve box cover. Backfill material around the valve boxes shall be AASHTO No. 57 crushed stone.
- 7.11 Valves shall be placed in accordance with STANDARD DETAIL DRAWING titled Valve Box Installation

8. Fire Hydrants

- 8.1 All fire hydrants shall be Kennedy Valve Guardian K-81D Fire Hydrant, Open left (counterclockwise), AWWA standard pentagonal operating and nozzle cap nuts, National standard thread, two (2) two and one-half (2 ½") inch nozzles and, one (1) four and one-half (4-1/2) inch NST outlet.
- 8.2 Six (6") inch mechanical joint shut-off valves, as specified, shall be furnished and installed at each hydrant location with a roadway box mounted to grade over the shut-off valve for access to the operating nut. The roadway boxes shall be as specified and the word "WATER" shall be cast in the covers of the roadway boxes. Backfill material around the valve boxes shall be AASHTO No. 57 crushed stone.
- 8.3 The water pipe shall conform to Section 1 of these Specifications.
- 8.4 The hydrant installation shall conform to STANDARD DETAIL DRAWINGS.
- 8.5 Concrete thrust blocks and stone bedding shall be placed at each hydrant installation.

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- 8.6 Hydrant standpipe below grade together with all buried metal and internal ferrous surfaces shall be given two (2) coats of black asphaltum coating. The exposed surfaces above grade, including nozzle caps and bonnet, shall be given two (2) coats of Rustoleum 340 High Performance Alkyd Enamel, 3400 System.

Bonnet	High Gloss White, No. 3492
Body	Safety Red No. 3464

9. Air Release Valves

- 9.1 Air release valves shall be installed at locations shown on the Drawings and in accordance with STANDARD DETAIL DRAWINGS, the air release valve body and cover shall be constructed of cast iron ASTM No. A48, Class 30, stainless steel trim, stainless steel floats ASTM No. A240, with shock-proof synthetic seats for thirty (30) psi maximum test pressure.
- 9.2 The valve shall be APCO Model No. 200, as manufactured by Valve and Primer Corporation, or Val-Matic VM-45, with all stainless steel internal parts, as manufactured by Val-Matic Corporation, or APPROVED EQUAL. The size shall be as indicated on the Drawings.

10. Repair Clamps

- 10.1 Where permitted by ENGINEER, to repair a damaged water main, a Full Circle Repair Clamp Coupling may be used. On water mains up to twelve (12") inches in diameter, Smith-Blair Type 227 Full Circle Clamp Couplings with a minimum width of fifteen (15") inches shall be used. On all water mains over twelve (12") inches in diameter, Smith-Blair Type 228 Full Circle Clamp Couplings with a minimum width of fifteen (15") inches shall be used.

11. Tapping Sleeve and Valve

- 11.1 Tapping valves shall be mounted vertically and shall be of the same construction and type as specified in Section 7.
- 11.2 Inlet ends of tapping valves shall have an inlet flange Class 125 for attaching to the sleeve and the outlet of the valve shall have a mechanical joint end.
- 11.3 The tapping sleeves shall have an outlet flange Class 125. The tapping sleeves shall be made in two (2) halves and shall be designed for one hundred-fifty (150) psi working pressure. The sleeves shall be the mechanical joint type.

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12. Corporation Stops

- 12.1 Corporation stops shall be at least three-quarter ($\frac{3}{4}$ ") inch and shall be installed under pressure, as shown in STANDARD DETAIL DRAWING.
- 12.2 Corporation stops shall be Mueller No. H-15008 (Pack Joint), as manufactured by the Mueller Corporation, or No. FB1000 (Pack Joint), as manufactured by the Ford Meter Box Company, or McDonald No. 4701 B-22 (Pack Joint), as manufactured by the McDonald Manufacturing Company.

13. Curb Stops and Curb Boxes

- 13.1 Curb stops shall be at least three-quarter ($\frac{3}{4}$ ") inch and shall be installed with each corporation stop. Curb stops shall be Ford No. B44-333 (Pack Joint), as manufactured by the Ford Meter Company, or Mueller No. 15209 (Pack Joint), as manufactured by the Mueller Company, or McDonald No. 6100-22 (Pack Joint), as manufactured by the McDonald Manufacturing Company.
- 13.2 Curb boxes with lids shall be supplied with each curb stop. **Curb boxes shall not be placed in sidewalks or driveways.**
- 13.3 Curb boxes shall be of cast iron of sufficient length to reach the surface of the ground, but shall not extend above the surface. The boxes shall have the word "WATER" cast in the lid. Curb boxes shall be Mueller No. H10314, as manufactured by the Mueller Company, or Ford Arch Base Pattern and optional HS lid with two-hole Erie Pattern, as manufactured by the Ford Meter Company, or McDonald No. 5639 with HS lid, as manufactured by the McDonald Manufacturing Company.

14. Service Pipe

- 14.1 Between all corporation stops and curb stops, there shall be installed copper service pipe, Type K soft temper, having the same diameter as the stop, suitable for underground service. A minimum cover of four (4') feet shall be maintained. See STANDARD DETAIL DRAWINGS. No couplings are permitted in service pipes.
- 14.2 A minimum horizontal distance of ten (10') feet shall be maintained between the water service pipe and sanitary sewer laterals.

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SECTION III

INSTALLATION AND TESTING

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SECTION III

INSTALLATION AND TESTING

1. General

1.1 All materials of whatever type or size required shall be installed in accordance backfill shall be in accordance with Section IV of these Specifications.

2. Erosion and Sedimentation Control

2.1 CONTRACTOR shall be responsible for Erosion and Sedimentation (E&S) in accordance with State, County and TOWNSHIP LAWS and regulations. It shall be the responsibility of CONTRACTOR to review and conform to the Soil Conservation District regulations including notification of the District prior to commencement of WORK. In addition, CONTRACTOR shall become thoroughly familiar with the PaDEP "Erosion and Sediment Pollution Control Manual" (latest edition). CONTRACTOR shall conduct his WORK in accordance with those directives, including Best Management Practices (BMP's). The following sections shall be considered reminders for certain, but not all, of the E&S requirements.

2.2 CONTRACTOR shall schedule and conduct his operations to minimize erosion of soils and to prevent silting and muddying of streams, rivers, storm sewers, irrigation systems, and impoundments (lakes, reservoirs, detention and retention basins, etc.). Construction of drainage facilities and performance of WORK which will contribute to the control of erosion and sedimentation shall be carried out in conjunction with earthwork operations or as soon thereafter as practicable. The area of bare soil exposed at any one time by construction operations shall be kept to a minimum.

2.3 Prior to suspension of construction operations for appreciable lengths of time, CONTRACTOR shall shape the earthwork in a manner that will permit storm run-off with a minimum of erosion. Temporary erosion and sediment control measures such as berms, dikes, slope drains, or sedimentation basins deemed necessary by ENGINEER shall be provided and maintained until permanent drainage facilities and erosion control features are completed and operative.

2.4 CONTRACTOR shall also conform to the following practices and controls:

- a. When borrow material is obtained from other than commercially operated sources, erosion of the borrow site shall be so controlled both during and

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- after completion of WORK that erosion shall be minimized and sediment shall not enter streams or other bodies of water. Waste or disposal areas and construction roads shall be located and constructed in a manner that shall keep sediment from entering streams.
- b. Fording of live streams shall not be permitted; therefore, temporary bridges or other structures shall be used wherever stream crossings are necessary. Mechanized equipment shall not be operated in live streams.
 - c. When WORK areas or gravel pits are located in or adjacent to live streams, such areas shall be separated from the main stream by a dike or other barrier to keep sediment from entering a flowing stream. Care shall be taken during the construction and removal of such barriers to avoid the muddying of a stream.
 - d. All waterways shall be cleared as soon as practicable of falsework, pilings, debris, or other obstructions placed during construction operations and not a part of the finished WORK.
 - e. Water from aggregate washing, dewatering, or other operations containing sediment shall be treated by filtration, a settling basin, or other means sufficient to reduce the sediment content to not more than that of the stream into which it is discharged.
 - f. Pollutants such as fuels, lubricants, bitumens, sewage, and other harmful materials shall not be discharged into or near rivers, streams, or impoundments, or into natural or manmade channels leading thereto. Wash water or waste from concrete mixing operations shall not be allowed to enter live streams.
 - g. All applicable regulations of fish and wildlife agencies and statutes relating to the prevention and abatement of pollution shall be complied with in the performance of AGREEMENT.
 - h. Any area that is disturbed and is to be left bare for twenty (20) days or more shall have temporary seeding applied. If construction takes place during the winter months when it is impossible to seed, the disturbed area shall be mulched. Temporary seeding and mulching shall be done within twenty-four (24) hours of the time the area is disturbed.
- 2.5 When it becomes necessary, ENGINEER shall inform CONTRACTOR of unsatisfactory construction procedures and operations insofar as erosion control and water pollution are concerned. If the unsatisfactory construction procedures and operations are not corrected promptly, ENGINEER may suspend the performance of other construction until the unsatisfactory condition has been corrected. There shall not be any adjustment of Contract Time for suspension of WORK in the event it is necessary to suspend WORK until correction of unsatisfactory control of erosion and water pollution has been accomplished.

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3. Handling

- 3.1 All pipe, fittings, valves, etc. shall be rolled or lifted. They shall not be thrown, slid, or dropped. Earth and foreign matter shall be kept out of the pipe, fittings, valves, etc. interiors. The ends shall be protected from damage and kept clean to assure quick assembly of permanently tight joints. If pipe is distributed along the trench, it should, where possible, be placed on the side opposite the excavated earth.
- 3.2 All materials shall be so handled that the coating and/or linings shall not be damaged. If any part of the coating or lining is damaged, it shall be replaced by CONTRACTOR at no cost to AUTHORITY.

4. Laying

- 4.1 Prior to the installation of the water lines, the location of the PUBLIC WATER SYSTEM shall be staked-out. All stake-out WORK shall be performed by registered surveyors or engineers or people under the supervision of same.
- 4.2 After stake-out, CONTRACTOR or CONTRACTOR'S SUBCONTRACTOR shall have a choice of two (2) construction methods:
- a. The roads shall be rough-graded (to ± 6 " of sub-base grade). Then, one (1) utility, probably the deepest, shall be staked-out. Construction of this utility must be completed before the stake-out of the next can begin. This procedure shall continue until all of the facilities are constructed. For installation of the curb stops and boxes, the right-of-way stakes shall be placed. After installation of the curbs, the water main shall be located by electronic devices or other approved methods to verify the water main's location in relation to the curb.
 - b. As in "a" above, the roads shall be rough-graded. The sanitary sewer and, possibly, the storm sewer shall be installed in accordance with "a" above. Then the curbing on the side of the street opposite the water main shall be installed. Once the curb is installed, the water main can be installed with reference to the curbing. The remaining curb can be installed after the water main construction is completed.
- 4.3 All materials shall be carefully lowered into the trench piece by piece by suitable tools or equipment in such a manner as to prevent damage to the materials and coatings.

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- 4.4 All materials shall be carefully examined for cracks and other defects immediately before installation. Any damaged material shall be replaced to the satisfaction of ENGINEER.
- 4.5 At all times foreign material shall be prevented from entering the pipe. At the end of each day's work, the open end of the pipe shall be securely blocked with a water-tight plug to prevent the entrance of mud, water, or other foreign matter.
- 4.6 The laying conditions shall be a flat bottom trench, without blocks. The cover over the pipe shall be four (4') feet minimum. The trench bottom shall be excavated to a sufficient depth to allow a six (6") inch bedding of AASHTO No. 57 crushed stone below the barrel of the pipe.
- 4.7 The sections of the pipe shall be laid and fitted so that, when completed, the pipe shall have a smooth and uniform bore. Each length of pipe shall be laid in a dry trench. The pipe sections shall rest their entire length upon uniform firm foundation. Bell holes shall be excavated to accommodate the bells of the pipe.
- 4.8 Before joining materials, all lumps, blisters, and excess coating materials shall be removed from the ends of the materials. The surfaces to be joined shall be thoroughly cleaned to remove oil, grit, or other foreign matter.
- 4.9 The cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe or cement lining so as to leave a smooth end at right angles to the axis of the pipe.
- 4.10 Field cutting shall be done in accordance with the pipe manufacturer's instructions.

5. Setting Valves

- 5.1 All gate valves shall be set with stems above the centerline of the pipe. Special care shall be taken to avoid closing valves with sand, stones, or other substances lodged in the valve seat. All buried valves shall be furnished with a valve box. Valves and valve boxes shall be set plumb, with valve boxes placed directly over the bonnet and operating nut. **Valves shall not be located in driveways or sidewalks.** ENGINEER shall be notified of any conflicts. A valve box operating nut extension shall be required whenever the operating nut will be five (5') feet or greater below final grade.

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5.2 Gate valves and valve boxes shall be installed in accordance with the STANDARD DETAIL DRAWINGS

6. Setting Fire Hydrants

6.1 All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to the curb, and with the pumper nozzle facing the curb or edge of road pavement. Hydrants shall be located as shown on the STANDARD DETAIL DRAWINGS, or as directed by ENGINEER, and in a manner to provide complete accessibility and that the possibility of damage from vehicles or injury to pedestrians shall be minimized. The bottom of the break-a-way flange shall be two (2") inches above finished grade.

6.2 A six (6") inch gate valve with valve box shall be installed at each hydrant location. Each hydrant shall be installed with an anchoring tee, tie bolts, tie rods and thrust blocking in accordance with the STANDARD DETAIL DRAWINGS.

7. Service Connections

7.1 Corporations, service pipe, curb stops, and curb boxes shall be installed after the water main has been installed in accordance with STANDARD DETAIL DRAWINGS. A minimum cover of four (4') feet shall be maintained. Curb boxes with lids shall be installed with each curb stop. **Curb boxes shall not be placed in sidewalks or driveways.**

7.2 Service piping shall be continuous from corporation stop to curb stop and shall be loosely laid without kinking. Service lines shall not be laid under an existing or planned driveway. Where service lines are required to cross any Township or PennDOT roadway, the service lines shall be installed by boring, jacking, or driving methods, unless the existing soil conditions prevent such a method of installation. In that case, the service lines may be installed by the open-cut method.

8. Thrust Blocking

8.1 Concrete thrust blocks shall be provided on all lines at tees, plugs, hydrants, and at curves deflecting eleven and a quarter ($11\frac{1}{4}^{\circ}$) degrees or more. Blocks shall be poured against undisturbed earth and shall be in accordance with the STANDARD DETAIL DRAWINGS of these Specifications. Additional points for thrust blocking or joint restraints may be determined by ENGINEER. For pipe

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diameters smaller than six (6") inch, use the six (6") inch instructions unless otherwise ordered by ENGINEER.

9. Leakage Test

- 9.1 Before being tested, all buried pipes shall be backfilled to a safe level. Pipe lines shall be thoroughly flushed to remove all foreign materials which may have entered the piping during construction.
- 9.2 Pressure and leakage tests shall conform to AWWA C600.
- 9.3 Test separately in sections between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs. CONTRACTOR shall furnish and install test plugs. CONTRACTOR shall provide all anchors, braces, and other devices to withstand hydrostatic pressure on the plugs. ENGINEER shall specify location of test plugs and may require larger sections to be tested at no extra cost to AUTHORITY.
- 9.4 The pipe line under test shall be slowly filled with water and brought to test pressure by means of a pump connected to the pipe in a manner satisfactory to ENGINEER, so as to obtain the specified hydrostatic test pressure at the highest point in the section of piping under test. Test pressure shall be defined as twice the operating pressure, but no more than two hundred (200) psi unless specifically directed otherwise by ENGINEER.
- 9.5 The pump, pipe connection, and all necessary apparatus shall be furnished and paid for by CONTRACTOR. AUTHORITY reserves the right to furnish gauges for the test but all necessary assistance for conducting the test shall be furnished and paid for by CONTRACTOR. All air must be expelled from the pipe line prior to the test period. The test pressure shall be maintained for a period of two (2) hours.
- 9.6 The leakage test shall be conducted concurrently with the hydrostatic test, for a minimum duration of two (2) hours. The leakage test shall measure the quantity of water pumped into the pipe to maintain the specified pressure within five (5) psi. The leakage L, shall not exceed the quantity as calculated in the following formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

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Where L = allowable leakage, in gallons per hour
S = length of pipe tested, in feet
P = average test pressure, in psi. gauge
D = nominal diameter of pipe, in inches.

- 9.7. Should any test on a section of pipe disclose an inability to hold the stipulated test pressure or leakage in an amount greater than that specified above, CONTRACTOR shall, at his own expense, locate and correct any defects. The tests shall be repeated until satisfactory performance of the tests and to the satisfaction of ENGINEER. It is expected that new pressure pipe systems shall have zero (0) leakage.

10. Leaking Terminal Valve

- 10.1 If the leakage exceeds the allowable leakage, the excessive leakage must be corrected and may require the following:
- a. Exposing all joints of the pipeline being pressure tested to verify that no leakage is occurring; and/or
 - b. Utilizing a leak detector to determine leak location(s). If leaks are detected, they must be uncovered for verification and repair.
- 10.2 A new valve shall always be installed and CONTRACTOR shall disable the existing valve in the open position in a manner satisfactory to ENGINEER. Do not remove existing valve
- 10.3 All costs associated with the installation of a new valve or exposing all joints shall be borne by CONTRACTOR.

11. Repairing Damaged Lines

- 11.1 Where any existing pipe is damaged or broken by CONTRACTOR or where defective or damaged pipe is discovered after installation by CONTRACTOR, the ways acceptable for correcting that damage are:
- a. Where ENGINEER certifies in writing it is feasible, CONTRACTOR shall be required to remove the broken pipe or fitting and fold in a new section of pipe. This shall not apply to failure of the pressure test. ENGINEER shall make decision as to corrective measures to be taken;

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- b. On all water mains up to twelve (12") inches, Smith-Blair 227 Full Circle Clamp Couplings with a minimum width of fifteen (15") inches shall be used. For all water mains over twelve (12") inches Smith-Blair 228 Full Circle Clamp Couplings with a minimum width of fifteen (15") inches shall be used;
- c. Cast iron mechanical joint sleeve, long pattern, with a minimum length of fifteen (15") inches as manufactured by U. S. Pipe shall be used.

12. Sterilization

- 12.1 All new water lines shall be disinfected, as herein defined, before water is used for domestic consumption.

One of the following procedures shall be used to accomplish disinfection.

12.2 Acceptable Procedures

- a. By introducing a mixture of calcium hypochlorite comparable to commercial products known as HTH or Perchloron and water. Either of these powders contains approximately seventy (70%) percent available chlorine. A five (5%) percent solution of HTH or Perchloron can be made by mixing five (5%) percent of the powder with ninety-five (95%) percent of water, by weight. This mixture, first made into a paste, can then be thinned to a slurry by the addition of water and introduced into the newly laid pipe.
- b. By placing in the joints of the newly laid pipe, as it is being laid, a predetermined amount of dry HTH or Perchloron.
- c. By fastening the required number of HTH, high-test calcium hypochlorite tablets to each pipe.

12.3 Points of Application

- a. For a solution containing HTH or Perchloron, the preferable point of application is at the beginning of the water main extension or any valved section of it. Application may be through a corporation stop.
- b. When applied as a dry powder, the powder should be placed at each joint starting with the first and progressing as each additional section is laid.
- c. When tablets are used, they shall be fastened carefully to the inside top of every length of pipe laid. Each tablet shall be fastened with 70B enamel or Mirical Black Adhesive, a paste soluble in water, as manufactured by Mirical Black Adhesive Corporation, Bellmawr, New Jersey, or APPROVED EQUAL.

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12.4 Rate of Dosage

- a. Water for filling the lines shall be furnished by AUTHORITY from their supply system. Valves shall be operated by AUTHORITY personnel only. CONTRACTOR shall furnish and install all bulkheads, pipes, valves, taps, plugs, labor, and other equipment required to sterilize the lines.
- b. Water for filling mains, or storage units shall be introduced slowly and the quantity of chemical applied proportionately to the rate of water introduced. This proportion should be equivalent to one (1) pound of HTH or Perchloron to each one thousand-six hundred-eighty (1680) gallons of water. This is equivalent to a dosage of fifty (50) ppm of chlorine.
- c. For each seventy (70') feet when HTH or Perchloron is used, the following quantities of chemical shall be applied for the respective pipe sizes noted:

Pipe Diameter	4	6	8	10	12	16	20	24	30	36
Ounces	½	1	2	4	5	10	15	22	34	50

(As a guide in measuring small quantities of the chemical, take one (1) heaping tablespoonful of hypochlorite as weighing approximately one-half (½) ounce.)

- d. For each twenty (20') foot length of pipe, the following number of tablets shall be utilized:

Pipe Diameter	6	8	10	12	16	20	24	30	36
No. of Tablets	6	8	12	14	16	18	20	35	45

12.5 After chlorine has been in contact with the mains for three (3) hours or longer, samples collected from the extremities of the mains should indicate a residual chlorine content of fifty (50) ppm or more.

12.6 If less than fifty (50) ppm residual chlorine is indicated, the system shall be drained and the disinfection treatment repeated.

12.7 If the samples collected at the extremities indicated a residual chlorine of fifty (50) ppm or more, the system shall be thoroughly flushed at its extremities until the replacement water throughout its length shall, upon test, prove comparable in quality to the water served the public from the approved water supply source and approved by the Public Health Authority having jurisdiction. This satisfactory

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quality of water delivered by the new mains should continue for a period of at least two (2) full days, as demonstrated by laboratory examination of samples taken from taps free from outside contamination. CONTRACTOR shall provide dechlorination of wasted water as required, at his expense.

- 12.8 The cost of testing and sterilization of mains, including laboratory analysis of water samples, shall be the responsibility of CONTRACTOR.
- 12.9 The cost of the water used for flushing shall be borne by CONTRACTOR.
- 12.10 CONTRACTOR shall dechlorinate and dispose of water wasted in testing and sterilizing lines in a manner approved in writing by ENGINEER. ENGINEER'S approval shall be secured prior to the sterilization procedure.

13. Connections to Existing Mains

- 13.1 Whenever it is required to connect new water mains to existing water mains, it shall be the responsibility of CONTRACTOR to determine the outside diameter of the existing pipe at the point of connection in order to determine what type of fittings or joints shall be required to make the connection. In addition, it shall be the responsibility of CONTRACTOR to determine the exact location of existing pipe prior to starting WORK on the connections.
- 13.2 When CONTRACTOR is ready to make these connections, he shall contact AUTHORITY for approval prior to the connection being made. Forty-eight (48) hours minimum notice shall be given to all homeowners whose water will be turned off or affected in any way by the connection process.
- 13.3 When connecting to an existing water main, CONTRACTOR shall add a new valve at the point of connection, if one does not exist at the end of the line. A new valve shall always be installed. If there is an existing valve in place, it shall be disabled in the fully open position and shall not be removed.
- 13.4 Upon exposing the end of the existing main, if any water flow is evident or some other evidence that the existing terminal valve leaks is observed, CONTRACTOR shall install a new valve before installing any new pipe. ENGINEER shall determine type of valve to be used.
- 13.5 All costs associated with the installation of a new valve or exposing all joints shall be borne by CONTRACTOR.

14. Dead End Pipes

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14.1 Fire hydrants shall be required at all dead ends and shall be installed in accordance with the STANDARD DETAIL DRAWINGS. On every dead end main, a valve shall be installed after the fire hydrant. The valve shall be secured by tying the valve back with tie rods and bolts. Thrust blocks shall be used at all dead ends. Standard size hydrants as shown on the STANDARD DETAIL DRAWINGS shall be used. "Peanut" hydrants are not permitted.

15. Flushing

15.1 AUTHORITY personnel shall flush all water mains constructed by CONTRACTOR in anticipation of bacteria testing. However, if water mains must be flushed when the ambient air temperature is below thirty-two (32°) degrees F, CONTRACTOR shall provide a way of channeling the water off the street and away from houses in a manner satisfactory to ENGINEER.

16. Bacteria Testing

16.1 AUTHORITY personnel shall collect all water samples and deliver same to an approved laboratory for the appropriate bacteria test(s) to verify that the water main has been properly disinfected. The costs of all these tests shall be borne by CONTRACTOR. In order to facilitate the collection of the water sample(s), CONTRACTOR shall provide as many water services (with the end of the service above the ground surface) as needed by AUTHORITY.

17. Magnetic Detectable Underground Marking Tape

17.1 For all water mains, regardless of location or type of pipe, a magnetic detectable underground marking tape shall be installed no deeper than one (1') foot below final grade and directly over the centerline of the pipe. The tape shall be continuous over the pipe and for the entire length of the main. Magnetic detectable underground marking tape shall be as made by Schonstedt, 3M, Presco or APPROVED EQUAL. Tapes for use over water lines shall be blue in color and shall be lettered "Caution: Buried water line below".

18. Restoration

18.1 Restoration involves the repair or replacement of all items disturbed by construction except those items specifically indicated by ENGINEER to be

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removed. Restoration when complete shall render the disturbed area EQUAL to or better than its original condition prior to construction.

- 18.2 Restoration under CONTRACT includes but is not limited to: driveways, curbs, street signs, sidewalks, lawns, mailboxes, retaining walls, shrubs, bushes and plantings. CONTRACTOR shall include the cost of restoration in his unit cost bid for pipe.
- 18.3 Particular care shall be taken relative to the removal and replacement of shrubs, bushes and plantings to be affected by construction. CONTRACTOR shall be responsible to provide new shrubs and bushes should those that are disturbed during construction die during the guarantee period.

19. Replacing Paving

- 19.1 All paving removed or damaged by construction operations, shall be replaced in kind and/or repaired as specified herein. All paving damaged beyond limits herein specified, shall be replaced with new paving at CONTRACTOR'S expense.
- 19.2 Repaving of PennDOT roads shall be done in strict accord with regulations and requirements of Pennsylvania Department of Transportation (PennDOT).
- 19.3 Repaving of all TOWNSHIP roads and streets shall be done in strict accord with their respective regulations and requirements and according to STANDARD DETAIL DRAWINGS.
- 19.4 Arrangements for the adjustment of manholes, valve boxes and any other such facility shall be made by CONTRACTOR in advance of any paving operations. If the adjustments are not made by owners of such facilities CONTRACTOR shall make the adjustments at CONTRACTOR'S expense and it shall be considered that CONTRACTOR has checked this with the utilities and made allowance for same in CONTRACTOR'S bid.
- 19.5 All openings or holes cut through any paving for test holes, borings, well points, or any other reason shall be replaced in accordance with these Specifications at CONTRACTOR'S expense.
- 19.6 An application of PennDOT approved joint and crack sealant shall be provided at all locations where new bituminous paving joins existing bituminous paving and other structures. At required locations, a paving notch a minimum of one (1') foot in width shall be cut to feather the new paving into the old paving. All joints shall be coated along their vertical face before placement of paving and then sealed

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over the joint surface after placement of paving. Driveways shall be sealed only with the owner's permission.

20. Landscape WORK

- 20.1 Furnish all labor, supervision, materials and equipment to do all grading, topsoiling, and seeding of the areas disturbed by construction.
- 20.2 Only material that is acceptable to ENGINEER shall be used to do finished grading. Fills shall be carefully made, solidly compacted, and graded to walks and roadways. All excess excavation not required for grading shall be removed from the site.
- 20.3 Upon completion of finish grading, topsoil shall be spread to a finished six (6") inch minimum depth.
- 20.4 If sufficient topsoil is not available from topsoil stock piled on site, CONTRACTOR shall furnish additional topsoil from outside sources.
- 20.5 Topsoil shall have a pH between five (5) and seven (7), shall be friable loam, free of clods of grass, old roots, vegetation debris or material that would require raking after spreading.
- 20.6 During all operations following topsoil spreading, surface shall be kept free from stones or any rubbish, debris, or other material which will be detrimental to seeding, growth or maintenance.
- 20.7 Lime in form of raw ground limestone shall be applied at a rate of one hundred (100) lbs. per one thousand (1,000) square feet of area. At least one (1) full week after lime has been spread, 5-10-5 fertilizer shall be spread uniformly at rate of thirty (30) lbs. per one thousand (1,000) square feet. Peat moss shall then be added one quarter (1/4") inch deep (approximately 643 square feet per large bale). Area shall be gone over with a spike drag or Rototiller, and hand raked to a smooth even grade.
- 20.8 Depending upon completion date of the Project and the weather encountered and subject to approval of ENGINEER, the following times for seeding shall be followed:
 - a. Spring seeding shall be permitted between April 1st and May 15th with preliminary operations for seed bed preparation completed as early as March 15th or as ground operations permit.

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- b. Fall seeding shall be permitted between September 1st and October 10th with preliminary operations for seed bed preparation completed as early as August 1st.
- 20.9 Seed shall be of finest quality, as recommended by local authorities for this location and shall be sown at a rate of eight (8) lbs. per one thousand (1,000) square feet of area, sowing four (4) lbs. in one direction and four (4) lbs. in direction at right angles to first operation.
- 20.10 Brush or rake to obtain a light covering of earth over seed and rake out all stones and all other debris. After seed has been raked or brushed in, areas shall be rolled lightly in two (2) directions.
- 20.11 All seeded areas shall be kept wet to a soil depth of three (3") inches for ten (10) days immediately following seeding. All areas and spots which do not show a prompt catch of grass shall then be reseeded and this operation repeated until a complete coverage is obtained. When area does not need to be reseeded it shall be wet to a depth of three (3") inches every time surface shows evidence of drying out and this shall continue through entire period of maintenance.
- 20.12 When average height of grass is about two and one-half (2½") inches, it shall be cut to a height of one and one-half (1½") inches with approved mowing equipment and, at that time, any depressions or other irregularities in lawn surface shall be leveled and reseeded. CONTRACTOR'S maintenance shall cease after third cutting, providing all areas are grassed and free from bare spots or large "off color" areas.
- 20.13 No separate payment shall be made for landscape restoration WORK, the cost thereof being included in the unit prices bid for pipe line construction.

21. Sod

- 21.1 Sod shall be used when ordered by ENGINEER. This WORK shall consist of furnishing, placing, and maintaining cultivated sod on designated areas in accordance with these Specifications and within reasonably close conformity to the lines and dimensions shown on the CONTRACT DRAWINGS, or as directed by ENGINEER. All other areas that are unnecessarily disturbed shall be sodded at CONTRACTOR'S expense, when so directed by ENGINEER.
- 21.2 Sod shall be predominantly K-31 Fescue and contain not more than ten (10%) percent of other acceptable fine turf species. It shall be entirely free from all weeds (as defined in the Pennsylvania Seed Act of 1965), all harmful insects and

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disease and shall be of mineral soil origin. All sod shall meet the certification requirements of the Pennsylvania Department of Agriculture.

- 21.3 A sample of the sod to be installed shall be supplied to AUTHORITY or its authorized representative for approval prior to delivery.
- 21.4 Bluegrass or other sod may be substituted only at direction of AUTHORITY or ENGINEER.
- 21.5 Sod shall be cut in rectangular sections measuring twelve (12") inches to twenty-four (24") inches wide and two (2') feet to six (6') feet long in order to permit handling without tearing or breaking. The minimum thickness of the section shall be three-quarters (¾") inch.
- 21.6 If the grass is longer than two (2") inches at the sod farm, it shall be mowed to a height of one and one-half (1½") inches prior to removal of the sod. All sod shall be in a well-moistened condition when delivered to the site.
- 21.7 All sod shall be placed within forty-eight (48) hours after being cut. Should temporary storage be required, sod shall be protected from direct sunlight and drying. Dried-out sod shall not be accepted.
- 21.8 Prior to placing any sod, all grading and soil preparation shall have been completed as previously specified. Soil shall be moist prior to placing sod.
- 21.9 Sod shall be placed at times when moisture and temperature conditions are suitable. Sod shall not be cut or placed when the temperature is lower than thirty-five (35°) degrees Fahrenheit.
- 21.10 Sod shall be carefully placed by hand and with tight joints and no overlap. Pitchforks or other tools which tend to damage the sod shall not be used and dumping from vehicles shall not be permitted. Transverse joints shall be broken or staggered. All sod shall be thoroughly watered to the point of saturation immediately after placing.
- 21.11 After watering, the sod shall be sufficiently tamped with an approved tamper to close all joints and insure close contact between sod and sod bed. After tamping, the sod shall present a smooth even surface free from bumps and depressions. If so directed, a light roller, weighing not more than sixty-five (65) lbs. per foot-width, shall be used to complete firming and smoothing the sod. On all slopes, sod shall be placed with the long axis parallel to the contour starting at the bottom of the slopes. Joints shall be staggered.

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- 21.12 In ditches and on slope areas, each strip of sod shall be staked securely with at least one (1) wood stake for each two (2) square feet of sod. Stakes shall be one-half (½”) inch by one (1”) inch with a length of eight (8”) to twelve (12”) inches, as directed. Stakes shall be driven flush with the top of the sod and with the long face parallel to the slope contour.
- 21.3 When the average height of grass is about two and one-half (2½”) inches, it shall be cut to a height of one and one-half (1½”) inches with approved mowing equipment. Any areas of sod which fail to show a uniform growth of grass or which are damaged in any way shall be replaced. Any and all maintenance and replacements of dried-out or damaged sod shall be performed at no extra cost to AUTHORITY.

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TRENCH EXCAVATION AND BACKFILL

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SECTION IV

TRENCH EXCAVATION AND BACKFILL

1. General

- 1.1 CONTRACTOR shall excavate, protect, and backfill all trenches that may be necessary for completing WORK in compliance with all Federal, State, County, and TOWNSHIP LAWS. All excavation shall be in open trenches, except where and to such extent as ENGINEER may authorize or direct that same be done by tunneling, or where such is specified in these Specifications or CONTRACT DOCUMENTS. The use of excavation machinery shall be permitted except in places where operation of same will cause damage to trees, buildings, or existing structures above or below ground; in which case, hand methods shall be employed. No tunneling, boring, or forcing shall be allowed without special permit from ENGINEER. The excavated material shall be so piled as not to encroach on private property, endanger WORK, obstruct sidewalks, or interfere with traffic or proper drainage. Trenches may be, in general, excavated and backfilled either by machinery or by hand as CONTRACTOR may elect, provided, however, that ENGINEER shall be empowered whenever ENGINEER shall decide that such necessity exists to direct that hand excavation shall be done to the extent specified.
- 1.2 The term “sub-grade”, as used herein, shall mean the bed of the trench, prepared as specified to receive the water pipe.

2. Removal of Existing Pavement and Storage of Materials

- 2.1 CONTRACTOR shall remove all pavements, road surfaces, curbing, driveways, and sidewalks within the lines of excavation. Portland cement concrete pavements and asphalt pavements shall be opened by saw cutting. All such WORK, as above designated, shall be done at CONTRACTOR’S expense and in accordance with the Rules, Regulations, and LAWS of TOWNSHIP. The use of wrecking balls or weights dropped on pavement for breaking shall not be allowed.
- 2.2 CONTRACTOR shall grub and clear the surface and remove all surface materials, of whatever nature, over the line of the trench; and he shall properly separate and classify the materials removed, store, guard, and preserve said materials as may be required for use in backfilling, resurfacing, repaving, or for other purposes. All rock, earth, sand, curbing, gutters, flagstones, etc. and all sectional paving units which may be removed together with all materials taken from the trenches shall be stored in such parts of the street or roadway if permitted by PennDOT or

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TOWNSHIP or such suitable place and in such manner as shall be approved or directed by ENGINEER. CONTRACTOR shall be responsible for any loss of, or any damage to, paving materials through his own or his employees' careless removal or neglect of waste storage, disposal, or use of same.

- 2.3 CONTRACTOR shall have no property right regarding any materials taken from the excavations.
- 2.4 In the business districts or in streets that are important thoroughfares, or in narrow streets, or other places so designated by ENGINEER, material excavated from the first one hundred (100') feet of any opening, or from such additional length as may be required, shall, upon order of ENGINEER, be removed from the roadway as soon as excavated. The material subsequently excavated shall be used to refill the trench if it meets these Specifications.
- 2.5 All surplus excavated material shall be removed and deposited upon lands abutting the improvement if such fill is requested by the property owners. If no filling on abutting property is desired, CONTRACTOR shall dispose of such surplus wherever he can arrange for rights to fill.
- 2.6 In case more material is excavated from any trench than can be backfilled over the completed water line or can be stored on the street or within the limits of the right-of-way, leaving space for the traffic and drainage as herein provided, the excess material shall be removed to some convenient place, provided by CONTRACTOR. CONTRACTOR shall, at his own cost and expense, bring back so much of the material so removed, as may be required to properly backfill the trench, if of the proper kind; or, if so directed by ENGINEER, CONTRACTOR shall, at CONTRACTOR'S own cost and expense, furnish such other material as may be necessary.
- 2.7 When it is necessary to haul soft or wet material over the streets, CONTRACTOR shall provide suitable tight vehicles of a pattern approved by ENGINEER for this purpose.

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3. Width and Depth of Trenches

- 3.1 Banks of trenches shall be kept as nearly vertical as possible, and the trenches shall be eight (8") inches wider on each side than the outside diameter at the barrel of the pipe to be laid therein. The trenches shall be excavated true to line so that a clear space eight (8") inches in width is provided on each side of the barrel of the pipe to a height not less than the top of the pipe. If sheeting is required at the level of the pipe, the dimensions in the foregoing sentence shall be applicable to the inside faces of the sheeting.
- 3.2 The width of a non-sheeted trench shall be sixteen (16") inches wider than the outside diameter of the pipe at the spring line.
- 3.3 Except at locations where unsuitable material is encountered, care shall be taken not to excavate below the specified depths of six (6") inches below the bottom of the pipe. When rock is encountered, it shall be removed to a depth six (6") inches below the bottom of the pipe and the excavation and bedding shall be included in the cost of laying water pipe. When the material encountered at sub-grade is unstable, it shall be removed from under the pipe and on each side of the pipe for a distance of one (1) diameter of the pipe. Such unstable material excavated below sub-grade shall be backfilled with AASHTO No. 57 crushed stone, and the bed thus formed and shaped as required above. In rock excavation, if trenches are shattered by blasting below or beyond the lines of excavation specified herein, the trench shall be refilled to specified lines of excavation with 3500 psi concrete, if required by ENGINEER, at CONTRACTOR'S expense.
- 3.4 Wherever necessary to prevent caving, excavation in sand, gravel, sandy soil, or other unstable material shall be adequately sheeted and braced. Where sheeting and bracing is used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid and the earth around it compacted to a depth of two (2') feet over the top of the pipe.
- 3.5 In all excavations, unless otherwise specified, or called for on the Plans, the bottom of the trench shall be excavated to a depth of six (6") inches below the bottom of the water pipe. AASHTO No. 57 crushed stone cradles shall be formed to fit the lower two (2") inches of the outside periphery of the pipe, with holes being dug for the bells and the pipe having full bearing on the stone bedding throughout its length. Should the trench not be excavated neatly, all space below the stone bedding shall be filled with crushed stone or 3500 psi concrete as determined by ENGINEER and CONTRACTOR shall pay for the costs incurred.

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- 3.6 In rock, shale, or any unyielding material, or where called for on the Plans, or when ordered by ENGINEER, requiring the bottom of the trench to be excavated in excess of six (6") inches below the outer bottom of the pipe, the space below the outer bottom of the pipe shall be filled with AASHTO No. 57 crushed stone or 3500 psi concrete as determined by ENGINEER.
- 3.7 The trench shall be constructed so that no water can run through newly laid pipe at any time nor shall water be allowed to accumulate in the trench. All concrete shall be allowed to set up hard before any backfilling is started. Well points or other methods shall be used to keep the trenches dry.
- 3.8 Foreign material shall be prevented from entering the pipe. At the end of each day's WORK, or any prolonged cessation of WORK the open end of the pipe shall be securely blocked with a water-tight plug to prevent the entrance of mud, water, or any other foreign material.
- 3.9 Frozen materials shall not be used in the backfilling of any trenches.

4. Length of Open Trench

- 4.1 In no case shall more than two hundred (200') feet of trench be opened at any one place in advance of the completed water line. Trench excavation shall be fully completed, except for the shaping of the bottom of the trench, at least twenty (20') feet in advance of the pipe placement, and shall be kept free from obstructions, except that at the close of WORK at night, or the discontinuance of WORK, the pipe laying may be completed to within five (5') feet of the end of the opened trench. The amount of pipe laid in advance of backfilling shall not exceed one hundred (100') feet.
- 4.2 ENGINEER shall be empowered, at any time, to require the refilling of open trenches over completed pipelines if, in his judgment, such action is necessary.

5. Miscellaneous Excavation

- 5.1 CONTRACTOR shall do such miscellaneous excavating WORK as may be necessary or directed by ENGINEER. Such excavation shall be subject to the same conditions and requirements as specified herein for trench excavation.

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5.2 Miscellaneous excavation shall include excavation for abandoned trenches or for any special structures outside of specified trench, which may not be shown on the drawings or described in Specifications, where such excavation is done at direction of ENGINEER.

6. Obstructions and Maintenance of Services

6.1 CONTRACTOR shall arrange with all utility companies for any relocation, temporary removal and restoration of their facilities when required for prosecution of WORK. CONTRACTOR shall uncover and support said structures within the limits of the trench.

6.2 A continuous flow shall be maintained at all times in all existing gas, water, sewers, electric power, cable services and telephone lines, and any other pipes or structures encountered in prosecution of WORK under this CONTRACT, whether above or below ground surfaces.

6.3 At track crossings, any expenses to which the owner of the tracks spent, such as those incurred in shoring up tracks or in maintaining traffic, shall be borne by CONTRACTOR, whether same is billed directly to him or to AUTHORITY. Should any such bill be unpaid by CONTRACTOR before completion of CONTRACT, AUTHORITY shall be empowered to pay said bill and retain costs thereof from any moneys due or to become due to CONTRACTOR.

7. Test Pits

7.1 Test pits may be ordered by ENGINEER or by CONTRACTOR along line and site of WORK to determine character of subsurface materials or the exact location of utilities. No extra compensation shall be paid for test pits.

8. Accommodation of Traffic

8.1 WORK on all PennDOT streets and highways shall be governed by Bulletin 43 of the Pennsylvania Department of Transportation (PennDOT) and CONTRACTOR shall familiarize himself with this Bulletin. WORK on all local streets shall be in accordance with TOWNSHIP specifications

8.2 Streets shall not be unnecessarily obstructed and, unless ENGINEER, in writing, shall authorize the complete closing of the street, CONTRACTOR shall take such measures, at his own expense, as may be necessary, to keep the street or road open and safe for traffic.

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- 8.3 CONTRACTOR shall construct and maintain adequate and proper bridges over excavations, as may be necessary, or as directed, for the safe accommodation of pedestrians or vehicles. CONTRACTOR shall furnish and erect, without cost to AUTHORITY, substantial barricades at crossings of trenches, or along the trench, to protect the traveling public.
- 8.4 Driveways shall be bridged across open trenches where shown on the Plans, or as directed.
- 8.5 CONTRACTOR shall not obstruct fire hydrants.
- 8.6 The roadway on one side of the line of WORK shall be kept open at all times.
- 8.7 A straight and continuous passageway on sidewalks and over crosswalks, at least three (3') feet in width, shall be preserved from all obstruction, where WORK to be performed does not lie under the sidewalk.
- 8.8 Where deemed necessary, such additional passageway as may be directed shall be maintained free of obstruction.
- 8.9 In narrow or congested streets or alleys, when so directed, CONTRACTOR shall complete his WORK up to a point designated by ENGINEER before opening the WORK ahead, in order to give access to garages and other places.
- 8.10 CONTRACTOR shall, in all cases, so arrange his WORK as to cause the least inconvenience to property owners consistent with the proper prosecution of WORK, as determined by ENGINEER.

9. Accommodation of Drainage

- 9.1 The water main trench shall, in all cases, be kept free from storm, surface, and subsoil water or sewage, so that all masonry and joints shall have ample time to set and harden. No joints shall be made under water.
- 9.2 Gutters, sewers, drains, and ditches shall be kept open at all times for surface drainage. No damming or ponding of water in gutters or other waterways shall be permitted, except where stream crossings are necessary and then only to an extent which ENGINEER shall consider necessary. CONTRACTOR shall not direct any flow of water across or over pavements except through approved pipes or properly constructed troughs and he shall, when so required, at his own cost and expense, provide pipe or troughs of such sizes and lengths as may be required and

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place same as directed. The grading in the vicinity of water trenches shall be controlled so that the ground surface is properly pitched to prevent water from running into the trenches.

- 9.3 In open water courses, ditches, or pipes encountered during the progress of WORK, CONTRACTOR shall, at his own expense, provide for their protection and assure a continuous flow in such courses or pipes and shall repair any damage that may be done by any reason to them.

10. Dewatering

- 10.1 CONTRACTOR, at his own expense, shall keep all excavations free from water while WORK is in progress, and to such extent as may be necessary while excavation WORK is being carried on. CONTRACTOR shall build all dams and other devices necessary for this purpose, including lowering the water table below trench bottom by well points and pumping, and provide and operate pumps of sufficient capacity for de-watering the excavations. CONTRACTOR shall provide for the disposal of the water removed from excavations in such manner as shall not cause injury to public health, or public or private property, to WORK of other CONTRACTORS or SUBCONTRACTORS, to any portion of WORK completed or in progress, or produce any impediment to the use of highways, roads, lanes, and streets by the public.
- 10.2 There shall be provided and maintained at all times during construction ample means and devices, including all necessary equipment, power and labor to pump, bail or otherwise promptly remove and properly dispose of all water and/or sewage entering or found in the excavations, trenches, or other parts of WORK. Well points shall be utilized wherever necessary to maintain dry conditions throughout working areas. In case of a question as to the need for dewatering, ENGINEER'S decision shall be final. Dewatering shall be included in CONTRACTOR'S bid price and shall not be paid as an extra.
- 10.3 Water shall be removed from the trench before final grading of the bedding foundation. The trench shall be kept dry during all phases of pipe installation. Acceptable methods of dewatering shall include the following:
- a. Over-excavate the trench bottom and fill with AASHTO No. 57 crushed stone to provide a french drain under the pipe. This drain shall carry the water to interceptor sumps where it shall be pumped to the ground surface and shall be disposed of without creating an erosion problem or spreading contaminated water over the area.

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- b The ground water table can be lowered with well points wherever soil conditions permit. They should be located at intervals dictated by soil properties, placed reasonably close to the trench walls and be sunk to a depth below the elevation of the trench bottom. Several well points may be joined together so that one pump can handle a group of points.

10.4 **Concrete Encasement**

- a. When a water main crosses a flowing stream or an intermittent waterway, pipe material shall be concrete encased Ductile Iron. Depending on site conditions, ENGINEER may require other utility crossings to follow these specifications. Pipe lengths shall be as long as possible to minimize the number of joints to be encased in concrete. Pipe shall be placed in a dewatered trench and no joints shall be made under water. Cofferdams or temporary stream bypassing shall be utilized. The pipe trench shall be of sufficient depth to allow for six (6") inches of concrete under the pipe and over the pipe plus six (6") inches of cover over the encasement. Concrete encasement shall not be in the path of flowing water. It shall not act as a dam in the stream. Concrete shall be Class A.
- b. The encased water main shall extend at least six feet (6') into the stream bank on each side and shall have four (4') foot minimum cover over the pipe. Ductile Iron fittings of no more than forty-five degrees (45°) may be used to bring the pipe up to the proper grade line.
- c. Observation is required as is normal for all pipe laying WORK. ENGINEER may make changes during the pipe WORK including increasing concrete thickness or changing alignment of the pipeline.
- d. There may be times when a pipe cradle may be required to span unsuitable ground. Construction shall be similar to full encasement but concrete shall be poured up to the spring line only. Reinforcing bars may be required. CONTRACTOR shall inform ENGINEER any time there appears to be unsuitable bedding under the proposed pipe location.

11. Explosives and Blasting

- 11.1 Blasting may be used to remove rock which cannot be excavated by other methods only after obtaining written permission from TOWNSHIP and AUTHORITY. Blasting shall be performed by experienced blasters approved by and licensed by the Commonwealth of Pennsylvania. All blasts shall be carried out in strict accordance with applicable LAWS. AUTHORITY reserves the right to regulate the time of blasting. The use of explosives and blasting liability insurance shall be as specified by ENGINEER and AUTHORITY'S Broker of Record.

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- 11.2 CONTRACTOR shall give written NOTICE to each owner of record having lines or structures in proximity to the blasting site, of CONTRACTOR'S intention to use explosives in these areas. NOTICE shall be given sufficiently in advance to enable such owners to take the steps they deem necessary to protect their facilities. Such NOTICE shall not relieve CONTRACTOR of his responsibilities to carry out WORK in a safe and satisfactory manner. AUTHORITY shall have the right to require that all rock within five (5') feet of any existing pipe, main, conduit or structure be removed by methods other than blasting. CONTRACTOR shall notify the Police Department and Fire Marshall as to time of blasts.
- 11.3 CONTRACTOR shall use the utmost care when using dynamite or similar explosives, particularly during freezing weather, and with particular regard for the protection of life and property, whenever the use of explosives is necessary to the prosecution of WORK. Whenever directed by AUTHORITY, the number and size of the charges shall be reduced. In thawing dynamite or similar explosives, instructions given by the manufacturer shall be strictly followed. Only such amounts of explosives, as determined by the Fire Marshall, shall be kept in any one place. All explosives shall be stored in a secure manner and all such places shall be clearly marked "DANGEROUS EXPLOSIVES" and shall be kept under lock and key to be only in the hands of persons under the direct control of CONTRACTOR.
- 11.4 No larger quantity of explosives shall be kept on the line of WORK than will actually be required for twelve (12) hours of WORK next ensuing, and such supplies shall be divided into as small lots as practicable. Caps and exploders shall not be kept in the same place with dynamite and other explosives. CONTRACTOR shall become familiar with all LAWS pertaining thereto.
- 11.5 All blasting shall be performed under the direct on-site supervision of a competent, licensed blasting expert, and subject to the State, County, and TOWNSHIP Regulations and LAWS for blasting. Whenever any rock, pipe, main, conduit or structure is encountered in the trench, the right is reserved to direct that all such items within five (5') feet of the same shall be removed by some method other than blasting.
- 11.6 CONTRACTOR shall indemnify and hold AUTHORITY and ENGINEER harmless from any liability arising from the use of explosives and shall reimburse AUTHORITY and/or ENGINEER for any fees, costs, or expenses incurred related thereto.

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12. Tunneling and Jacking

- 12.1 Tunneling will be allowed when permission is granted by ENGINEER or when it is called for in the Specifications or shown on the STANDARD DETAIL DRAWINGS.
- 12.2 Tunnels for laying pipelines shall be of sufficient size to allow the joining of pipes and the compacting of backfill around them. Tunnels shall be timbered where necessary, in accordance with approved methods. All methods of tunneling used shall be subject to approval of ENGINEER.
- 12.3 Tunnels for the laying of pipelines shall be of sufficient size to allow access to all points along the pipe and proper joining of pipes, and proper compacting of the backfill around them.
- 12.4 Tunnels in earth shall be properly braced and timbered in accordance with the most approved of methods of soft ground tunneling.
- 12.5 Where ordinary timber lining is used, the space between such timber and the outer surface of the pipe shall be completely filled with good gravelly earth or other approved material, rammed solidly between the pipe and the timber lining.

13. Backfilling

13.1 Extent of Backfill

- a. Backfilling includes all backfilling, ramming, or rolling as required, regrading adjacent disturbed areas, replacing of drains and other surface and subsurface structures, placing and maintaining of temporary sidewalks and driveways, furnishing of suitable backfill material, if necessary, reseeding lawns and replacing trees and shrubbery damaged by CONTRACTOR and all appurtenant work incidental thereto.

13.2 Backfill Material

- a. No backfilling shall be performed before the joints in the pipelines are set and inspected by ENGINEER.

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- b. Any pipe, including service connections, backfilled prior to inspection and approval of ENGINEER, shall be uncovered by CONTRACTOR for ENGINEER'S inspection.
- c. In pipe trenches, after joints have been inspected, tested, where required, and approved, backfilling may commence.
- d. Only AASHTO No. 57 crushed stone shall be used for backfilling over the top of the pipe. The backfill material shall be brought up evenly on both sides of the pipe and thoroughly compacted by tamping or ramming.
- e. No pieces of rock larger than the AASHTO No. 57 crushed stone shall be used in backfill.
- f. No backfilling of the trench shall be made with frozen material or deleterious material of any kind
- g. After the water line has been laid, backfill the trench to a height of two (2') feet above the top of the pipe using AASHTO No. 57 crushed stone in six (6") inch layers, in such manner as not to disturb the structure. The stone shall be solidly tamped around the pipe and under it, with mechanical tampers.
- h. The remainder of the trench shall be filled with AASHTO No.57 crushed stone deposited in twelve (12") inch layers, in such a manner as to not disturb the structure. The backfill shall be solidly compacted with a mechanical compactor approved by ENGINEER.
- i. In rock trenches, refilling shall be done with AASHTO No. 57 crushed stone in the manner described above to a height two (2') feet above the top of the pipe. The refilling for the balance of the trench in all cases shall be AASHTO No. 57 crushed stone
- j. All surplus earth or other material wasted on unimproved streets or highways, or on public property, shall be removed to a suitable fill area.

14. Backfill within PennDOT Highway Rights-of-Way

- 14.1 All WORK within PennDOT Highway Rights-of-Way shall be done in accordance with Pennsylvania Code, Title 67, Chapter 459, Occupancy of Highways by Utilities and all other applicable LAWS.
- 14.2 All openings made in the improved area (cartway or improved shoulder) shall be backfilled with AASHTO No. 57 crushed stone, compacted throughout its full width in layers not to exceed four (4") inches, if a tamper or wacker is used, or in layers not to exceed eight (8") inches, if approved vibratory compaction equipment is used.

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- 14.3 All openings within PennDOT Highway Rights-of-Way but not in the improved area shall be backfilled with AASHTO No. 57 crushed stone in layers not to exceed eight (8") inches, if approved vibratory compaction equipment is used.
- 14.4 Compaction shall be completed to the bottom elevation of the existing pavement. However, if sub-base is part of the pavement structure, compaction shall be completed to within eight (8") inches of the sub-base and an approved impervious material shall then be placed to the bottom elevation of the existing sub-base in four (4") inch compacted layers, prior to replacing the sub-base to its existing elevation.

15. Backfill within TOWNSHIP Road Rights-of-Way

- 15.1 All backfill within TOWNSHIP Road Rights-of-Way shall be done in accordance with the requirements for backfill within PennDOT Highway Rights-of-Way. See Section 14 above.

16. Responsibility for Condition of Excavation

- 16.1 CONTRACTOR shall be responsible for the condition of all excavations made by CONTRACTOR. All slides and cave-ins shall be removed immediately at whatever time and under whatever circumstances that may occur.
- 16.2 The neglect, failure, or refusal of ENGINEER to order the use of bracing or sheeting, or a better quality, grade, or section, or larger sizes of steel or timber, or to order sheeting, bracing, struts, or shoring to be left in place, or the giving or failure to give orders or directions as to the manner or methods of placing or driving sheeting, bracing, jacks, wales, rangers, etc., shall not in any way, or to any extent, relieve CONTRACTOR of any responsibility or shall any delay caused by any action of AUTHORITY resulting in the keeping of an excavation open longer than would otherwise have been necessary, relieve CONTRACTOR from the necessity of properly and adequately protecting the excavation from caving or slipping, or from any of CONTRACTOR'S obligations relating to injury of persons or property.

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17. Protection of Property and Structures

- 17.1 CONTRACTOR shall, at CONTRACTOR'S own expense, sustain in their places and protect from direct or indirect injury, all pipes, tracks, walls, buildings, and other structures or property in the vicinity of WORK, whether above or below the ground, or that may appear in the trench. CONTRACTOR shall at all times have a sufficient quantity of timber, planks, chains, ropes, etc. on the ground and shall use them as necessary for sheeting the excavation and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened.
- 17.2 CONTRACTOR shall take all risks attending the presence or proximity of pipes, poles, tracks, walls, buildings, and other structures and property of every kind and description, in or over the trenches, or in the vicinity of WORK, whether above or below the surface of the ground; and CONTRACTOR shall be responsible for all damages and assume all expenses for direct or indirect injury, caused by his WORK, to any of them, or to any person or property by reason of injury to them, whether such structures are or are not shown on the STANDARD DETAIL DRAWINGS.
- 17.3 Where necessary, in order to keep one side of the street or roadway free from any obstruction, or to keep the material piles alongside the trench from falling on private property outside the right-of-way, a safe and suitable fence shall be placed alongside the trench.
- 17.4 ENGINEER reserves the right to stop the excavation or any other part of WORK and to require CONTRACTOR to complete the laying of pipe and the backfilling up to such a point as ENGINEER may direct before proceeding further with the excavation.

18. Removal of Obstructions

- 18.1 CONTRACTOR shall not interfere with any persons, firms, or corporations, or with AUTHORITY in protecting, removing, changing, or replacing their pipes, conduits, poles, or other structures; but he shall suffer said persons, firms, or corporations, or AUTHORITY to take all such measures as they may deem necessary or advisable for the purpose aforesaid, and CONTRACTOR shall thereby be in no way relieved of any of CONTRACTOR'S responsibilities.

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19. Clearing Street, Cleaning-up, and Repairs

- 19.1 CONTRACTOR shall remove surplus excavated material or construction material as WORK progresses and shall keep the street in a safe and convenient condition for travel.
- 19.2 All surplus material, tools, equipment, and temporary buildings shall be removed from the site of WORK, and all street surfaces, gutters, walks, lawns, rights-of-way, or other property shall be restored to as good a condition as originally found.
- 19.3 CONTRACTOR, at CONTRACTOR'S own expense, shall repair any and all damage caused to the street, sidewalk, or adjoining property.

20. Sheeting, Bracing, and Shoring

- 20.1 All timber plank used for sheeting and sheet piling and all timber used for braces, shores, and stringers, or waling-strips shall be sound, straight, free from cracks, shakes, and large or loose knots, and of the required dimensions throughout. Plank shall be tongue and groove and splined, if so required.
- 20.2 Material for sheet piling, sheeting, bracing, and shoring shall be furnished and driven or set in place by CONTRACTOR, where necessary. If, in the opinion of ENGINEER, the material furnished by CONTRACTOR is not of proper quality or sufficient size or not properly placed to insure the safety of WORK or of adjacent structures and property, CONTRACTOR shall, upon NOTICE from ENGINEER, forthwith procure, furnish, and set in place or drive other and satisfactory material in a satisfactory manner; if CONTRACTOR shall fail or neglect to do so, ENGINEER may order all or any part of WORK to be stopped until such material is so furnished and used or placed. The neglect, failure, or refusal of ENGINEER to order the use of sheeting or sheet piling or a better quality or larger sizes of timber, or to order sheeting, sheet piling, bracing, or shores to be left in place, or the giving, or the failure to give, any orders or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, or shores shall not in any way, or to any extent, relieve CONTRACTOR of any or all of CONTRACTOR'S obligations.
- 20.3 CONTRACTOR shall support sides and ends of all excavations or structures, when necessary or directed, with braces, sheeting, shores, or stringers of quality and character required. All timbering or underpinning shall be placed or driven by workers skilled in such WORK and shall be so arranged that it may be withdrawn as backfilling proceeds, without injury to structures built, adjacent structures or properties. If, in the opinion of ENGINEER, the material furnished for timbering

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excavations is not of proper quality or size, or is improperly placed, CONTRACTOR shall, upon NOTICE, procure and place satisfactory timbering, or place said timbering in a satisfactory manner. Upon CONTRACTOR'S failure to do so, WORK may be ordered stopped until said NOTICE shall have been complied with.

- 20.4 Timbering in excavations may be withdrawn as the backfilling is being done, except to such extent as ENGINEER shall order that said timbering be left-in-place. CONTRACTOR shall cut off any sheeting left-in-place at least twelve (12") inches below finished grade where ordered by ENGINEER, and shall remove cut-off material.
- 20.5 No pipe shall be laid in soft, unstable soil or soil tending towards quick sand conditions.
- 20.6 Vertically cut trench walls must be supported by proper sheeting, bracing, or suitably sized movable shields. Federal (OSHA), State and local regulations for minimum safety standards must be observed at all times.
- 20.7 According to OSHA, trenches in unstable soil, five (5') feet or more in depth, shall be supported or sloped to protect the persons working in them. Trenches in stable soil above the five (5') foot level may be sloped to preclude collapse but shall not be steeper than a one (1') foot rise to each one-half (1/2) foot horizontal. ENGINEER shall review site and see if an alternate location is feasible. Polyvinyl Chloride Pipe (PVC) shall not be used where the specified top trench width is increased.
- 20.8 Where solid timber sheeting is driven, it shall not be removed after the pipe has been installed. It may be cut off at the level of the pipe, if cutting it off can be accomplished without damaging the pipe, or adjacent utilities or endangering personnel.
- 20.9 If the trench is over-excavated, it must be brought back to grade. This shall be done by placing AASHTO No. 57 crushed stone on the trench bottom and thoroughly compacted as specified in CONTRACT DOCUMENTS or as directed by ENGINEER to restore correct grade.

21. Photographic Record

- 21.1 **Prior to beginning WORK**, CONTRACTOR shall take either videos or photographs of all areas that will involve removal of shrubs, structures, property such as driveways or fences or any condition that may require restoration equal to

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or better than the original condition. One set of videos and/or photographs shall be given to AUTHORITY before WORK is started.

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1. General

- 1.1 All pavements, road surfaces, sidewalks, driveways, or curbs which CONTRACTOR is required to replace shall be replaced in the same manner as the original installation, or as specified by ENGINEER. CONTRACTOR shall become aware of any requirements other than those set forth herein which may affect the type, quality, and manner of carrying out the restoration of surfaces.
- 1.2 ENGINEER shall make an examination of all surfaces where water lines have been constructed and shall note any depressions due to breakage, settlements, washouts, or other causes that may be attributed to the construction of water lines.
- 1.3 Upon written order from ENGINEER, CONTRACTOR shall repair breaks, refill depressions, remove any surplus that had previously been left upon the trenches, or make other repairs or replacements which are necessary to place all WORK in first class condition.

2. Materials

- 2.1 Materials used in replacing pavements, walks, curbs, and gutters shall be at least equal to the same quality as those in the original construction, or as called for in the Specifications. Before use, samples of all materials shall be submitted for testing and no material shall be used until approved by ENGINEER.

3. Restoration of PennDOT Highways

- 3.1 Restoration of PennDOT Highway flexible base or concrete base pavements shall be done in accordance with PennDOT Regulations.

4. Restoration of TOWNSHIP Roads

- 4.1 Restoration of TOWNSHIP Roads shall be done in accordance with the ninety (90) day temporary method for PennDOT Highways.
- 4.2 All other paved surfaces shall be restored to a condition at least equal to that existing before excavation was commenced, or called for in these Specifications, including sidewalks, gutters, and curbs.

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- 4.3 The foregoing requirement shall also apply to the replacement of road shoulders and guide rails.
- 4.4 Ninety (90) Day Temporary Restoration Method - Prior to making the permanent restoration, one (1') foot from each edge of the trench shall be sawed in a neat straight line to the bottom elevation of the existing base course and the detached material shall be removed. Drilling shall not be permitted.
- a. Temporary restoration shall be made and kept in place for a minimum of ninety (90) days. The base material shall consist of either a minimum eight (8") inch stone base, a minimum five (5") inch aggregate bituminous base, a minimum five (5") inch aggregate lime pozzolan, or a minimum four (4") inch bituminous concrete, with a surface of two (2") inch bituminous material. Where the existing pavement structure includes a course of sub-base material, it shall be replaced to a depth equal to the existing course depth with material meeting the requirements of Section 305, Form 408.
 - b. After the minimum ninety (90) day period, but before two hundred-ten (210) days, the temporary restoration shall be removed and permanent restoration made.
 - c. The permanent base course shall consist of Superpave meeting the requirements of Section 305, Form 408, and having a minimum depth of five (5") inches or a depth equal to the existing base course, whichever is greater.
 - d. The permanent binder and surface course shall be placed in accordance with the depths of the existing bituminous surface but, in no case, shall the binder course be less than two (2") inches Superpave and the wearing course be less than one and half (1½") inch Superpave.

Restoration of State Highway plain or reinforced cement concrete pavements shall be done in accordance with the following.

Prior to the replacement of the base, one (1') foot from each edge of the trench shall be sawed in a neat straight line to a depth of at least three (3") inches and the detached material shall be removed. Drilling shall not be permitted.

- (1) The replacement base shall consist of high early strength concrete equal in depth to the original concrete pavement.
- (2) On existing reinforced cement concrete pavements, reinforcing steel and expansion tie bolts shall be placed in accordance with Roadway Construction Standard RC-26.
- (3) The surface shall be restored as follows:

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- (a) The surface shall be cured in accordance with Section 501.3(n), Form 408. After surface corrections have been completed and just before the concrete becomes non-plastic, the surface shall be given a textured finish in accordance with Section 501.3(m), Form 408.
- (b) Surface restoration of a cement concrete pavement which has a bituminous surface shall be done in accordance with subsection (h) (1).

Shoulder restoration shall comply with the following:

- (1) Paved and Stabilized Shoulders - Paved and stabilized shoulders shall be reconstructed and restored to a serviceable condition of the same type as existed before the start of WORK.

~END~

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