# CHAPTER I

# STANDARD SPECIFICATIONS FOR CONSTRUCTION OF SANITARY SEWERS AND APPURTENANCES IN THE TOWNSHIP OF CONCORD

## SECTION 1

## SCOPE

The work covered by these specifications requires the Contractor to furnish all labor, materials, equipment, apparatus and tools, including all pipe, materials for joint connections, manholes, appurtenant structures and sewer laterals to points of connection with building drains at the side of public or private right-of ways, or beyond public utilities paralleling the sewer, including specials and fittings. The work covered also requires the Contractor to perform all operations to compete the construction of sanitary sewers, sewer laterals and appurtenances thereto, as shown on the drawings and as herein specified. The Contractor shall install, equip and adjust, and put in operation, the completed work so as to produce a satisfactory operating whole in conformance with plans and these specifications.

This specification is not intended to cover specific procedures and work sequences. Safety procedures including, but not limited to, shoring and blasting shall be in accordance with rules and regulations as set forth by O.S.H.A., and other State and Federal Agencies having jurisdiction. The Township and its representatives shall have no control over them.

# SECTION 2

# GENERAL AND SPECIAL CONDITIONS

## ARTICLE 1. Definitions

Approved, etc.: The words “approved”, “acceptable”, “satisfactory”, or of like import, shall mean approved for general conformance with design concept by the Engineer unless another meaning is plainly intended or otherwise specifically stated. This approval shall not relieve the Contractor and Developer of the responsibility for producing a complete and satisfactory end result.

Department: The Concord Township Sewer Department, acting directly or through any agent, officer or employee duly authorized to act for said party in the execution of the work required by the contract.

Engineer: The person or organization duly appointed by the Township as sewer consultant and authorized to observe the results of the work under contract by the Contractor, acting directly or through properly authorized agents, engineers, assistants, inspectors or other representatives acting within the scope of the particular duties entrusted to them. The word “Engineer” shall include the officers, agents and employees of the Engineer. When the Township does not employ a consultant, the word “Township” is substituted for “Engineer” in these specifications. Where the term “Engineer” is used in these specifications it shall mean the Township’s sewer engineer.

Completion Certificate: The certificate of the Engineer approved by the Township indicating general conformance to plans and specifications of all work performed under the Contract.

Contract: The written agreement executed between the Developer and the Contractor covering performance of the work and the furnishing of labor, materials and equipment in the construction of sewer extensions and appurtenances to the Concord Township Sewer Collection System.

Contractor: The Contractor employed by the Developer to construct sanitary sewers and appurtenances through his agents, representatives, superintendents or employees in accordance with Township approvals and specifications.

Construction Observation: The observation of the work performed by the Contractor to ascertain its conformity with Township standards and specifications.

Developer: The person, partnership or corporation which enters into a contract to install sanitary sewer improvements in and for development within the Township of Concord, acting directly or through properly authorized agents, representatives or employees appointed to act for the Developer in the execution of the work of the Contract.

Developer's Engineer: The person or organization employed by the developer to furnish plans and specifications for approval of Concord Township and to furnish construction lines and grades to the Developer's Contractor.

Plans: All plans or reproductions relating to the construction of the project and made a part of the Contract, and such additional plans as may be required from time to time in order to more fully show and clarify Contract plans and details now shown thereon.

Plans and Specifications: The Plans and Specifications are complimentary to each other, and the requirements of any one shall be considered as the requirements of all.

Project: The satisfactory completion of work under the Contract described in the Specifications and shown on the Plans incorporating performance, services and materials for the whole, entirely complete and in full.

Specifications: Contained in the specifications, inclusively, all definitions, descriptions, requirements, terms, stipulations and all written supplements made or to be made thereto pertaining to the Contract, and all materials, equipment and workmanship to be furnished under the Contract.

Subcontractor: This term, as employed herein, includes only those having a direct contract with the Contractor, and it includes one who furnishes material worked to a special design according to the Plans or Specifications of this work, but does not include one who merely furnishes materials.

Township: Township of Concord is a Township of the Second Class, governed by a five-person Council.

Work: The term "work" of the Contractor or a subcontractor includes labor or materials or both, equipment, transportation or other facilities necessary to complete the Contract.

## ARTICLE 2. Copies of Drawings Furnished

The Developer's Engineer shall furnish all necessary copies of Drawings and Specifications, and changes thereto, to the Township and the Engineer, for review. Shop drawings shall be submitted in quadruplicate to the Township by the Contractor with such promptness as to avoid delay in the work. After review of these drawings by the Engineer, the Contractor shall make any corrections required, filing with the Township four (4) corrected copies thereof, and such other copies as may be needed for proper prosecution of the work. The Engineer's approval of shop drawings shall not relieve the Contractor from responsibility for errors or discrepancies in such drawings. All shop drawings shall be identified with the name of the Project and Contractor, and numbered in consecutive order. Shop drawings will be required to be furnished for manufactured manholes, frames and covers, and other required sewer appurtenances.

The Contractor, when submitting the shop drawings for approval, shall do so with the understanding that he is considered to have checked the Drawings before submitting them, and that he is satisfied that, in their present state, they no only meet the requirements of the Plans and Specifications, but will present no difficulties in erection and completing his contract, and shall clearly note his approval on all shop drawings prior to their submission to the Township. Failure of the Contractor to note his approval on shop drawings will be reason for the Engineer to return such submission to the Contractor without review. If it appears that shop drawings submitted by the Contractor to the Township have not been properly checked, even though the Contractor's approval has been noted thereon, it will also be considered reason for the Engineer to return such submission to the Contractor without review.

If the shop drawings show variations from the Contract requirements because of standard shop practice or other reason, the Contractor shall make specific mention of such variations in his letter of submission in order that (if accepted) suitable action may be taken for proper adjustment in the Contract; otherwise the Contractor will not be relieved of the responsibility for executing the work in accordance with the Contract even though the shop drawings have been approved.

The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for proper fitting and construction of the work nor from furnishing materials and work required by the Contract which may be indicated on the shop drawings when approved.

Each submission of shop drawings must be accompanied by a letter of transmittal giving a list of the number of drawings. All drawings must be marked with the name of the Project and the name of the Contractor and be numbered consecutively. All drawings must be complete in every respect and bound in sets when submitted.

## ARTICLE 3. Order of Completion

The Contractor shall submit to the Engineer before the start of construction a schedule which shall show the order in which the Contractor proposes to carry on the work with dates at which the Contractor will start the several parts of the work and estimated dates of completion of the several parts. This schedule will be up-dated not less than each month during the time of the Contract.

## ARTICLE 4. Drawings & Specifications on the Work

The Contract shall keep one copy of all Drawings and Specifications on the work, in good order, available to the Engineer and to his representatives, representing the Township.

## ARTICLE 5. Contractor to Pay Taxes

The Contractor shall study all tax laws for the jurisdiction in which the work is being done, particularly so-called Sales and Use Taxes and shall pay all taxes for which he may be liable as a consumer or user of goods, or such taxes based on his receipts from the Owner, or a portion thereof. Contractor shall also obtain, where applicable, sales and use tax exemptions.

## ARTICLE 6. Safety and Protection: Emergencies

The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to:

A. All employees on the work and other persons who may be affected thereby;

B. All the work and all materials or equipment to be incorporated therein, whether in storage on or off the site; and

C. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He will erect and maintain, as required by the conditions and progress of the work, all necessary safeguards for safety and protection, including posting danger signs and other warnings against hazards and promulgating safety regulations.

He will notify owners of adjacent utilities when progression of the work may affect them. When the use or storage of explosives or other hazardous materials is necessary for the progression of the work, the Contractor will exercise the utmost care and will carry on such activities under the supervision of properly-qualified personnel. All damage, injury or loss to any property referred to in paragraph “B” or “C” caused, directly or indirectly, in whole or in part by the Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, or caused by theft, vandalism, malicious mischief or mysterious disappearances, will be reminded by the Contractor except damage or loss attributable to the fault of drawings or specifications or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.

## ARTICLE 7. Observation of Work

The Engineer, the Owner and their representatives shall at all times have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and for observation.

If the Contract Documents, the Engineer's instructions, laws, ordinances or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection, and if the inspection is by another authority than the Engineer, of the date fixed for such inspection. Inspections by the Engineer and Township shall be promptly made, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Engineer or Township it must, if required by the Engineer or Township, be uncovered for examination at the Contractor's expense.

Reexamination of questioned work may be ordered by the Engineer or Township and, if so ordered, the work must be uncovered by the Contractor. If such work be found in accordance with the Contract Documents, the Township shall pay the cost of reexamination and replacements. If such work be found not in accordance with the Contract Documents, the Contractor shall pay such cost.

## ARTICLE 8. Superintendence, Supervision

The Contractor shall keep on his work during its progress a competent superintendent and any necessary assistants. The superintendent shall not be changed unless he proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Important directions shall be confirmed in writing to the Contractor. Other directions shall be so confirmed on written request in each case. The Contractor shall give efficient supervision to the work, using his best skill and attention.

If the Contractor, in the course of the work, finds any discrepancy between the Drawings and the physical conditions of the locality, or any errors or omissions in Drawings or in the layout as given by points and instructions, it shall be his duty to immediately inform the Developer's Engineer, in writing, and the Developer's Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

## ARTICLE 9. Indemnity

The Contractor shall indemnify and save harmless the Township, the Council of the Township, and their representatives from and against all losses and all claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recovered against them by reason of any act or omission of the said Contractor, his agents or employees, in the execution of the work or in the guarding of it, and shall defend and pay the costs of defending any such suit or suits.

The Contractor shall, and is directed to, maintain and pay for such insurance, issued in the name of the Contractor, the Township and their representatives as will protect them and their contingent liability under this Contract.

## Article 10. Rights of Various Interests

Wherever work being done by the Township's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the work in general harmony.

## Article 11. Subcontractors

The Contractor shall, as soon as practicable after the execution of the contract by him, notify the Engineer in writing of the names of Subcontractors proposed for the work and shall not employ any that the Engineer may within a reasonable time object to as incompetent or unfit.

The Contractor agrees that he is as fully responsible to the Township for the acts and omissions of his Subcontractors and of persons either directly or indirectly employed by them, as he is for the acts and omissions or person employed by him.

## ARTICLE 12. Provisions of Law

Every provision of law (and every clause required by Federal or State Departmental Regulation) required to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion. The Contractor shall give all notices required by law or regulation and shall comply with all laws, ordinances, rules and regulations applicable to the work.

## ARTICLE 13. Workmen's Compensation Act

The Contractor shall accept, insofar as the work covered by this Contract is concerned, the provisions of the Workmen's Compensation Act, and supplements or amendments thereof, including any which may hereafter be passed, and shall insure his full liability thereunder for all parts of this Contract being performed by him, his partners, associates, employees or those of any Subcontractors he may employ hereon, or file with the Township a Certificate of Exemption from insurance from the Bureau of Workmen's Compensation of the Department of Labor and Industry.

## ARTICLE 14. Insurance – Contractual Coverage & Completed Operations Coverage

The Contractor shall not commence work under the Agreement until he has obtained all insurance required under this paragraph from a responsible insurance company or companies authorized and qualified to do business under the laws of the Commonwealth of Pennsylvania and such insurance has been approved by the Township nor shall the Contractor permit any Subcontractor to commence work on his subcontract until the insurance required of the Subcontractor has been so obtained and approved.

The Contractor shall obtain, pay for and maintain during the life of the Agreement such Employers Liability, General Public Liability with contractual indemnity coverage and Automobile Liability Insurance as shall protect the Contractor, any Subcontractor performing work covered by this Contract, the Owner, the Township and their agents from claims for damages for personal injury, including accidental death, as well as for claims for property damage which may arise from operations under this Contract whether such operations be by himself or by any Subcontractor or by anyone directly employed by either of them. In the event the Contractor is unable to obtain coverage as aforesaid in a single policy of insurance, he shall furnish a policy covering his liability and that of his Subcontractors and, in addition, an owner's protective policy with respect to the liability of the Township and their agents.

The amounts of such insurance shall, unless otherwise specified as a special term of the Contract, be as follows:

General Liability

Bodily Injury . . . . . $250,000/$500,000
Property Damage . . . . . $100,000/$300,000

Contractor's Protective Liability

Bodily Injury . . . . . $250,000/$500,000
Property Damage . . . . . $100,000/$300,000

Automobile Liability (Owner, non-owned & hired automobiles)

Bodily Injury . . . . . $250,000/$500,000
Property Damage . . . . . $100,000

Special hazards, if there is a possibility of such hazards existing in the work contemplated, shall be covered by rider or by riders to the policy or policies. One such special hazard, and amount of protection to be provided is as follows:

Blasting . . . . . $$500,000

The Contractor, during the progress of the work, shall maintain Builders' Risk Fire and Extended Coverage Insurance. Such insurance shall cover items of labor and materials connected therewith whether in or adjacent to the property insured, materials in place or to be used as part of the permanent construction, including surplus material, shanties, protective fences, bridges or temporary structures, miscellaneous materials and supplies incident to the work, and such scaffolding, staging, towers, forms and equipment as are not owned or rented by the Contractor, cost of which is included in the cost of work. This insurance shall not cover any tools owned by mechanics, any tools, equipment, scaffolding, staging, the capital value of which is not included in the cost of the work, or any cook shanties, bunkhouses or other structures erected for housing of the workmen. Such insurance shall be in the names of the Contractor, the Township, the Engineers, and the Township as their respective interests may appear. All such insurance policies shall be open to the inspection of the Township and their representatives at all reasonable times.

Policies for the foregoing insurance shall be delivered by the contractor with each executed copy of the Contract and renewal endorsements shall be delivered from time to time, as necessary, during the course of construction.

The entire care and responsibility of the work during the course of installation, the risk of damage to the construction work due to the perils required to be covered by the said insurance, as well as any other hazards which might result in damage to the construction work is that of the Contractor concerned and his surety. The Contractor shall provide insurance as required above. Failure on the part of the Contractor to maintain such insurance, or failure to collect the proceeds thereof in case of fire or other casualty shall in no way relieve the Contractor from the responsibility of completing his portion of the work in accordance with his Contract.

The Contractor shall, upon executing the Agreement, deliver to the Township proper evidence of carriage of the insurance required hereunder and under Article 9 hereof. Certificates will be acceptable proof of Public Liability, Property Damage and Workmen's Compensation Insurance. An original policy of Fire Insurance must be submitted. Certificates shall include type, amount, class of operations, effective dates and date of expiration of policies.

All policies and certificates must contain an endorsement that the policy cannot be cancelled or amended without first giving to the Township at least 10 days notice in writing.

## ARTICLE 15. Contractor's Understanding

It is understood and agreed that the Contractor has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract. No verbal agreement or conversation with any officer, agent or employee of the Township, either before or after the execution of this Contract, shall affect or modify any of the terms or obligations herein contained.

## ARTICLE 16. Surveys, Lines and Grades

The Developer's Engineer will furnish the Contractor with all the surveys, plans, measurements (workmen's lines and benches excepted), and other information necessary to properly construct the contemplated improvements as to the lines and grades and dimensions as specified and called for by the plan. The Contractor shall provide reasonable and necessary opportunities and facilities for setting points and making measurements. He shall not proceed until he has made timely demand upon the Developer's Engineers for, and has received from him, such points and instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such points and instructions. The Contractor shall protect all Engineer's stakes and reference points.

## ARTICLE 17. Responsibility Regarding Existing Utilities and Structures

The existence and location of underground utilities, whether or not indicated on the plans, are not guaranteed and shall be investigated and verified in the field by the Contractor before starting work. Excavation in the vicinity of existing structures and utilities shall be carefully done by hand. Special care must be used by the Contractor in the prosecution of the work in order to avoid interference or damage to any operating utilities or plants; however, where there is any possibility of such interference or damage, the Contractor shall make satisfactory arrangement with responsible officers or with owners of the utilities or plans, covering necessary precautions to be used as safeguards during the performance of the work by the Contractor.

The Contractor shall be held responsible for any damage to, and for maintenance and protection of, existing utilities and structures. The Contractor shall conform to all requirements of Act 287.

## ARTICLE 18. Working Conditions

No night or Sunday work requiring the presence of the Engineer or his representative will be permitted except in cases of emergency, and then only with the written consent of the Engineer and to such an extent as he may judge necessary.

## ARTICLE 19. Notice of Township and/or Engineer

The service of any notice by the Township or Engineer to the Contractor shall be considered accomplished upon completion of any one of the following procedures:

A. When delivered, in writing, to the person in charge of the office used by the addressee to conduct business.

B. When delivered, in writing, to the addressee or any of his authorized agents in person.

C. When delivered, in writing, to the addressee or any of his agents at the office used by the addressee to conduct the business of the Contract at or near the site of the work.

D. When deposited in the United States Mail, postpaid and addressed to the party intended for such service at his office used for conducting the business of the Contract at the site of the work, or his last know place of business.

## ARTICLE 20. Materials, Appliances, Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and other facilities necessary for the execution and completion of the work.

Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of a good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials, origin, composition and manufacturer of all materials used in the Project, including preliminary samples.

The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

## ARTICLE 21. Accidents

The Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first-aid service to anyone who may be injured in connection with the work.

The Contractor must promptly report in writing to the Township and Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work, whether on or adjacent to the site, which caused death, personal injury or property damages, giving full details and statements of witnesses. In addition, if death or serious injury or serious damages are caused, the accident shall be reported immediately by telephone or messenger to both the Engineer and the Township.

If any claim is made by anyone against the Contractor or any Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Engineer and Township, giving full details of the claim.

## ARTICLE 22. Preservation of Monuments

All property lines and survey monuments which may be disturbed during construction shall be properly tied into fixed points before being disturbed, and properly reset by the Contractor upon completion of the work, as directed by the Engineer.

## ARTICLE 23. Private Property

Where sewer lines cross private property, all rights-of-way and entry will be secured by the Developer. In opening trenches across such private property, the Contractor shall use every means to protect from injury or damage all property including lawns, trees, shrubbery, fences, buildings, walls, roads, water courses, natural features or any improvements thereto which may exist. All damage to any sort of property resulting from the Contractor's operation shall be repaired, without charge, to the satisfaction of the Engineer, and upon the Contractor's refusal to do so, it shall be done by the Township at the expense of the Contractor. The Contractor shall confine his operations to the width of the right-of-way.

## ARTICLE 24. Permits & Regulations

Permits and licenses of any nature necessary for the prosecution of the work such as blasting permits, trenching, etc., shall be secured and paid for by the Contractor from the State, County or Municipality.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the Drawings and Specifications are at variance therewith, he shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work. If the Contractor performs any work knowing it is contrary to such laws, ordinances, rules and regulations, and without such notice to the Engineer, he shall bear all costs arising therefrom.

## ARTICLE 25. Temporary Provisions for Public Travel

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

The Contractor shall provide suitable fences around trenches and street obstructions and shall provide yellow flashing lights at night and a watchman when necessary.

If the Contractor shall fail to provide the necessary safeguards, etc., as specified, the Township may provide the same and charge the cost to the Contractor.

## ARTICLE 26. Damage on Account of High Water, Etc.

The Contractor shall also hold himself responsible for all damage done to his work by heavy rains or floods, and he shall take all reasonable precautions to provide against damages by heavy rains to adjoining property by building such temporary channels to carry off the stormwater as the nature of the work may require.

## ARTICLE 27. Partially Completed Work

Partially completed work shall mean work which is in progress, such as trenching, pipe laying and material in place.

## ARTICLE 28. Completed Work

Completed work shall mean work which is entirely done, including removal of all tools and equipment, excess material, rubbish and debris, and clearing sidewalks, rights-of-way, and restoring street surfaces to condition as found, and same for lines if run through private property.

This act of the Engineer in giving a full release of funds for completed work shall in no way relieve the Contractor or his representative for making repairs to the work as they may develop or repairing defective work which may be detected before final acceptance of the Contract by the Township.

## ARTICLE 29. Condemned Work and Materials

The Contractor shall promptly remove from the premises all materials condemned by the Engineer as failing to conform to the Contract, whether incorporated in the work or not, and the Contractor shall promptly replace and reexecute his own work in accordance with the Contract and shall bear the expense of making good all work of other Contractors destroyed or damaged by such removal or replacement.

Failure or neglect on the part of the Engineer to condemn or reject any bad or inferior work or materials shall not be construed as an acceptance of such work or materials, or should same become evident at a later date, prior to delivery of completion certificate by the Township to the Developer.

## ARTICLE 30. Acceptance, Final Estimate and Payment

Upon the completion of the entire Contract, including clean-up, the Contractor shall notify the Township that the work is ready for final inspection by the Engineer. The Engineer will notify the Township of Satisfactory Completion so that the Township will be in a position to issue a Completion Certificate and release any outstanding funds guaranteeing completion.

## ARTICLE 31. Cleaning up

The Contractor shall, at all times, keep the Project Site free from accumulations of surplus material, rubbish and waste materials resulting from his operation. The Contractor shall also restore all cultivated lawns and shrubbery which he may have damaged in the course of construction.

## ARTICLE 32. Sanitary Facilities

The Contractor shall provide toilet facilities for the use of all personnel working on the project. Facilities shall be of the portable type and shall be kept in clean and sanitary condition.

## ARTICLE 33. "Or Equal" Clause

Any reference to an item of equipment or material by a specific manufacturer's brand or trade name in these Contract Documents is intended merely as a standard. Products or materials of other manufacturers, which in the opinion of the Engineer are the equal of that specified, considering quality, workmanship and economy of operation and are suitable for the purpose intended, will be acceptable.

The Contractor shall not substitute an alternate manufacturer's product or materials without prior written approval of the Engineer.

## SECTION 3

## SPECIAL REQUIREMENTS

Should there be any conflict with the General and Special Conditions or with the Specifications, the following requirements shall govern:

A. Where reference is made to Government Specification, or to those of well-known organizations such as A.S.T.M., A.W.W.A., etc., the latest editions shall be used, any or all references to earlier dated editions notwithstanding.

B. The Contractor will be required to maintain at all times during the construction of the work of the Contract, the flow of sewage in the existing sewerage systems to which connections are being made.

C. Connections to existing sewers shall be made in such a manner as to provide a watertight installation. Where manholes are broken into for the installation of connections, they shall be restored to their original condition using materials similar to those in the existing structure.

D. Where sewers will be constructed within State Highway rights-of-way, the Developer will make necessary applications for permits to construct such sewers through the Township Board of Supervisors. It shall be, however, the responsibility of the Contractor to construct the sewers in strict conformance with the requirements of the Pennsylvania Department of Transportation.

E. Where sewers are to be installed within the limits of streets, all removal and replacement of the street paving and restoration of shoulders shall be in strict conformance with the requirements of the Township and Pennsylvania Department of Transportation.

F. Streets shall not be unnecessarily obstructed. The Contractor shall take measures to keep the street or road open and safe for traffic outside of working hours.

G. When the sewer lines cross telephone, telegraph, electric cables, gas, oil or water lines, no excavation or pipe laying shall be done at those crossings without the presence of an authorized representative from the office of the authority having jurisdiction; i.e., Bell Telephone Co., Philadelphia Electric Co., or Chester Water Authority.

H. The Contractor should plan his work so as to provide adequate protection during storms. Certain portions of the work may be affected during storms and floods. Provisions for preventing damage should be made available at all times. Sewer lines and other work shall be protected at all times against damage from uplift due to high water levels.

I. The Contractor shall provide a competent and reliable person who is delegated to be readily available and have full authority to act I the behalf of the Contractor in case it is necessary to deal with any emergency situation which may arise in connection with this project during off-working hours.

## SECTION 4

## GENERAL SPECIFICATIONS

1. Standards

Local and State Specifications and Standards will govern in any situation not covered in these Contract Documents.

2. Pennsylvania Department of Transportation Specifications

Reference is made herein to the Pennsylvania Department of Transportation Specifications. In all cases this shall mean the latest revision of those specifications.

3. A. Traffic Control

The Contractor shall provide and maintain access to and from all properties along the line of this work. The Contractor shall also provide temporary by-passes and bridges and maintain them in a safe and usable condition whenever, in the opinion of the Engineer, detouring of traffic to parallel routes cannot be done, without hardship or excessive increase in travel by the public.

Where single lane by-passes are provided, the Contractor shall furnish signalmen to control traffic operations and minimize delays.

Where directed by the Engineer, the Contractor shall perform excavating, paving and other operations on one-half of the road at a time to allow for movement of traffic.

B. Detours

The Contractor shall set up and maintain all necessary detours to the satisfaction of the Engineer and the Pennsylvania Department of Transportation. The Contractor shall supply and erect all necessary signs along the routes approved by the Engineer and Pennsylvania Department of Transportation. The Contractor shall notify police, fire, school and Township officials, as well as adjacent municipalities. All proposed detours shall be marked clearly on a map and submitted to the Engineer two weeks in advance of the

time the detour will go into effect. The Engineer will submit the plans to the Department of Transportation for approval. Signs used for marking all detours shall be as approved by the Pennsylvania Department of Transportation and shall be securely fastened in place to prevent vandalism.

4. Safeguards

The Contractor shall provide, erect and maintain adequate barricades, warning signs and lights at all excavations, closures, detours and points of danger.

5. A. Dust Control

It will be the responsibility of the Contractor to control dust throughout the project by sweeping and/or the proper use of chemicals such as Calcium Chloride.

B. Maintenance of Public Ways

Streets, crosswalks and sidewalks shall be kept clean, clear and free for the passage of vehicles or pedestrians, unless otherwise authorized by the Engineer. Additional passageways may be required where deemed necessary.

6. Certification of Materials

The Contractor shall forward to the Engineer a certification for each material used on the site. This certification shall state that the materials used on the site conform with the specifications set forth herein and shall be signed by the person having responsible charge of the Plant or Company producing such materials.

7. Inspectors' Duties

A. Duly authorized inspectors, who will perform their duties under the direction of the Engineer, may be assigned to all or any part of the work. They shall be authorized to inspect the result of work done and materials furnished and, where any dispute arises as to the materials furnished, or the acceptability of the final work, shall have the authority to reject materials until the question at issue can be deferred to and decided by the Engineer.

B. The Contractor shall furnish the inspector with records, as required, of the materials delivered or of materials incorporate in the work.

8. All materials used in sewer construction not hereinbefore specified, or specified on the plans, shall conform to the Material Specifications of the A.S.T.M. for that material.

9. All pipe laying, concrete pouring and masonry construction shall be done only in the presence of an inspector representing the Engineer unless specifically waived by the Engineer.

10. Erosion and Pollution Control Regulations

A. The Contractor shall schedule and conduct his operations to minimize erosion of soils and to prevent silting and muddying of streams, rivers, irrigation systems and impoundments.

B. Pollutants, such as fuels, lubricants, bitumens, raw sewage and other harmful materials, shall not be discharged into or near rivers, streams and 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.

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 the contract.

C. All waterways shall be cleared as soon as practicable of falsework, piling, debris or other obstructions placed during construction operations and not a part of the finished work.

Frequent fording of live streams will not be permitted.

D. When it becomes necessary, the Engineer will inform the 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, the Township and/or Township may suspend the performance of other construction until the unsatisfactory condition has been corrected.

E. All provisions of the erosion control plan for this project shall be followed.

11. O.S.H.A. Requirements

All applicable regulations of the Occupational Safety and Health Act (O.S.H.A.) shall be complied with in the performance of the contract.

12. The safety provisions of applicable laws and regulations of the Pennsylvania Department of Labor and Industry, and building and construction codes shall be observed. Machinery, equipment and other hazards shall be guarded in accordance with safety provisions of the "Manual of Accident Prevention in Construction," published by the Associated General Contractors of America, to the extent that such provisions are not in contradiction of applicable State

13. Regulations of the Department of Labor and Industry

Special attention is drawn to the regulations of the Pennsylvania Department of Labor and Industry relating to trenches and excavations, tunnel construction, equipment, materials, labor, safety, sanitation and other regulations on which the contractor shall be fully informed and with which he shall fully comply. Observance of and compliance with said regulations shall be solely and without qualification the responsibility of the Contractor, without reliance or superintendence of or direction by the Township or Engineer. The duty of enforcing such laws and regulations lies with the said Department, not with the Township or Engineer.

## SECTION 5

## TRENCHING AND BACKFILLING

1. General

   A. Before beginning trenching, the Contractor shall clear the site of the work by removing all underbrush or any other obstructions which may be ordered removed by the Engineer.

   B. In general, trenches may be excavated and backfilled either by machinery or by hand, as the Contractor may elect, provided, however, the Contractor shall use hand excavation where necessary to protect existing structures, utilities or private or public properties, and provided, further, that backfilling shall be done by hand to the extent hereinafter specified.

   C. If the sewers are on an off-site right-of-way, no cutting or removal of trees or cutting of main tree roots may be done unless permission has been obtained from the Township. All work must be done in such a manner that the damage to the trees and other plantings is kept to a minimum. Any damage to trees, such as nicks, gouges or broken limbs, shall be trimmed and painted with tree wound paint. Any tree damaged beyond repair shall be replaced at no cost to the Township. Maximum diameter of trees used for replacement shall be four (4) inches.

2. Trenching

   A. Trenches shall be dug to the depths given by the plans. The width of the trench at the bottom shall be not less than six (6) inches nor more than eight (8) inches on each side of the pipe bell. This width shall extend not less than twelve (12) inches above the top of the pipe. When, in the opinion of the Engineer, it is necessary to lay a concrete or stone foundation, the excavation shall be made six (6) inches deeper than the bell of the pipe, or as ordered by the Engineer.

   Trenches shall be dug to the depths given by the plans adding to such depths the thickness of the wall of the pipe that is to be laid in the trench and the depth of the bedding (see detail).

B. In open trenching on State, County or Municipal highways, the Contractor shall be governed by the conditions, restrictions and regulations made by the Commonwealth of Pennsylvania, including current regulations of the Pennsylvania Department of Labor and Industry and applicable Federal regulations for regulations for excavation and construction, by the County Commissioners of the local county, and the local municipality. All such regulations shall be in addition to those set down in the Specifications.

C. Where the bottom of the trench shall, by mistake of the Contractor, have been taken out to a greater depth than above specified, it shall be refilled to the proper grade, using 2B crushed stone, said stone to be placed by the Contractor who shall receive no additional compensation whatever therefore. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted.

D. Excavation for manholes and other appurtenances shall have a minimum clearance of twelve (12) inches and a maximum clearance of twenty-four (24) inches on all sides.

E. Pavement shall be cut to neat lines equidistant from the center line of the trench, using equipment suitable for such work. The edges of the pavement shall be protected and maintained by the Contractor until the repaving is completed. If the pavement edges are not maintained to the satisfaction of the Engineer, the pavement shall be recut when the repaving is done.

F. The Contractor shall protect the street surfaces outside of the trench limits and shall repair all damage done thereto as a result of his operation.

3. Excavated Material

Excavated material shall be so placed as not to unreasonably interfere with travel on the streets and driveways by the occupants of adjoining property or with access to fire hydrants. Surface loam, sod, etc., shall be kept separate from the remainder of the excavated material and replaced in its original position after backfilling of the trench. All surplus excavation not disposed of as stated above, shall be removed from the site of the work by the Contractor, but none shall be deposited on private property, until written consent of the owners or owner thereof has been filed with the Engineer. In business districts, important thoroughfares, narrow streets or in limited working areas, material excavated from trenches may be required to be removed from the street as soon as excavated, to

temporary storage areas or as backfill within the trench excavation. When it is necessary to haul soft or wet materials over the streets, the Contractor shall provide suitable tight vehicles to prevent spillage.

4. Tunneling

In general, excavation shall be made in open cut from the surface, and the Contractor shall not be allowed to do any tunneling without obtaining permission from the Engineer. This permission will only be given where a line is to be laid behind the curb, across a paved street, under street car or railroad tracks, or where, in the opinion of the Engineer, it is necessary to tunnel short sections on account of proximity of adjacent walls or structures. Such excavations then can be made in alternate section of open cut and tunnel, the length of the tunnel sections to be specified by the Engineer and the head room in them to be not less than three (3) feet measured from the top of the sewer. These tunnel sections shall be cut underneath to a wedge with its edge horizontally across the sewer, and backfilled tightly by tamping from each end.

5. Drainage

The Contractor shall provide and place at no extra cost all necessary flumes or other channels of adequate size to carry temporarily all streams, brooks, stormwater or other water which may flow along or across the lines of the sewer. All flumes or channels thus utilized shall be tight so as to prevent leakage into trenches.

6. Protection of Utilities and Structures

Underground structures of all types shall be protected by the Contractor who shall use all necessary shoring, bracing or other appliances for the protection of same. Care must be taken not to injure in any way water mains, water service pipes, drain pipes, sanitary or stormwater sewers, gas mains, electric conduits or other structures encountered on the lines of the work. In case of accident to any such structures, the owners of the utility shall be notified immediately so that the proper steps may be taken to repair any and all damage done. When the owners do not wish to make the repairs themselves, all damage shall be repaired by the Contractor. Locations of all utilities are from existing utility records and are not guaranteed. It is the responsibility of the Contractor to have these locations verified by the utilities.

Fire hydrants shall not be obstructed.

7. Sheeting and Bracing

Trenches shall, at all times, be properly and adequately sheeted and braced to prevent accidents, caving of the sides of the trench, breaking of the ground outside of the lines of the trench proper, or damage to buildings or other structures or other structures along the lines of the sewers. No shoring shall be left in place unless so directed by the Engineer. Suitable portable steel boxes shall be utilized where conditions permit use and adequate equipment is available to handle them. The Contractor shall be solely responsible for the condition and results of all excavations made by him. All slides and cave-ins shall be removed by the Contractor whenever and wherever they occur, regardless of the circumstances.

8. Trenching Machines

Trenching machines may be used, but the Contractor will be held responsible for all damages done to private property and to State, County or Municipal highways, or to any overhead or underground structures not in private property or in State, County or Municipal highways.

9. Trenching in Advance of Pipe Laying

Trenches shall always be completed at least thirty (30) feet in advance of pipe laying except in quicksand, where pipe laying shall follow as closely as the best interest of the work may require, or unless portable steel boxes are utilized permitting lesser open trench. On public rights-of-way the Contractor may be required to completely backfill the trench at the end of daily operations and to remove equipment from the site.

10. Water-tight Construction of Pipe

A. Every precaution necessary to obtain water-tight construction of all joints in pipe must be taken. The same precaution must be taken for all connections with manholes and “Y” or “T” branches, extensions of laterals and construction of drop connections.

B. All ground water which may be found in the trenches and any water which may get into them from any cause whatsoever shall be pumped or bailed out so that the trench shall be dry during pipe laying and backfilling.

C. All water pumped from the trenches shall be disposed of in a manner satisfactory to the Engineer.

D. When standard trench dewatering methods cannot maintain proper dry trench pipe installation conditions, the Contractor shall lower the water table below the trench bottom by well points and pumping, and shall provide and operate pumps of sufficient capacity for dewatering excavations.

11. Backfilling of Trenches

A. Backfilling shall be done as promptly as is consistent with non-injury to the pipe joints, but no backfilling shall be done before the Engineer gives permission.

B. Backfilling shall be done in layers of six (6) inches in depth and each layer shall be thoroughly tamped by a vibrating compactor to optimum density. For a depth of not less than two (2) feet above the top of the pipe, fine earth or sand, free from stones, shall be placed by hand shovel. Tamping at joints shall be done by hand and with great care, so that joints will not be injured.

Backfill material consisting of 2B aggregate shall be placed around the pipe. Sufficient material shall be worked under the haunch of the pipe to provide adequate side support. Caution shall be taken to prevent movement of the pipe during placing of the material under the pipe haunch. The depth of the initial backfill shall be to no less than four (4) inches above the top of the pipe. Compaction shall be done carefully to prevent crushing or distortion of pipe.

C. The remainder of backfill material shall be placed, moistened if necessary, and compacted with gasoline driven compactor in suitable layers according to equipment used.

D. Where specified by the Engineer and in all State highways, trenches shall be backfilled with Pennsylvania Department of Transportation Specification 2 RC material which conforms to Section 7.03.3, Form 408 of the Department. Material shall be placed in suitable layers and compacted to optimum density. Trenches shall be backfilled with this material from a point twelve (12) inches above the top of the barrel of the pipe to the bottom of the paving section to be installed. Compacting of backfill in State highways by puddling or jetting will not be permitted.

The best materials excavated shall be used in backfilling in a position and manner approved by the Engineer. Frozen material shall not be used for backfilling. Selected earth, sand or gravel shall be provided in rock trenches and used as backfill in the manner hereinbefore described, to a height of two (2) feet above the top of the sewer. The balance of the backfill for the trench shall be, in all cases, good earth, sand or gravel which may contain stones not exceeding six (6) inches in largest dimension, but not exceeding 20% by proportion of backfill volume.

E. Backfilling or tamping with trenching machines is prohibited.

F. Upon completion of the backfilling, the streets or property shall be cleaned, and surplus material removed and the surface restored to the condition in which it was before ground was broken. All materials leftover in public highways shall become the property of the Contractor, and he shall promptly remove same.

G. Where traffic conditions warrant it, or work is to be stopped for an extended period, the entire trench shall be backfilled during period of nonwork to permit traffic to pass. Backfilling of the entire trench will not be required for an overnight work stoppage except in isolated instances, or for safety.

H. Irrespective of location of sewer construction, within public or private rights-of-way, backfilling shall be accomplished with an equal degree of compaction as specified in Paragraphs A through G, above.

12. Temporary Paving

A. Temporary paving in Municipal roads shall consist of two (2) inches of cold patch. On State roads, temporary paving shall conform to Pennsylvania Department of Transportation Form M948 B which states, “Temporary restoration shall consist of a minimum of eight (8) inch stone base with a coat of two (2) inch bituminous material, and shall be kept in place a minimum of ninety (90) days.” Temporary paving on trenches in State and Municipal roads shall be maintained by the Contractor until final paving is installed. The top surface of the temporary paving shall be flush with the surface of the existing paving. Any special conditions contained in the PennDOT permit for the project will take precedence.

B. Where the sewer is installed along or across a road shoulder, the top eighteen (18) inches will be 2RC material which shall be laid and compacted as part of the trench backfill. This restoration shall extend a minimum of twelve (12) inches on either side of the trench. If the length of trench exceeds fifty (50) feet, the shoulder must be sot with a .30 gal. per square yard of RT-6C bituminous material. In the event of settlement, more stone will be added to bring the ditch to the level of the surrounding shoulder.

C. The Contractor shall be responsible for the maintenance of all ditches. In the event of settlement outside of paved areas, he shall promptly fill the ditch. In the event of settlement within paved areas, the Contractor shall promptly fill the ditch to the level of the paved surface with temporary paving.

D. The Contractor shall have men available on weekends and holidays in the event that any temporary paving settles sufficiently to make travel on the road hazardous. The Contractor will be required to continuously maintain all temporary paving, without compensation, until it is replaced by the permanent paving. All unpaved areas of streets shall be regarded as soon as trenches are backfilled.

13. Opening of Roads to Traffic

Traffic must be restored promptly and no roads shall be closed to traffic during periods when there is no work being accomplished.

14. Rock Excavation

All blasting operations shall be in strict accordance with the existing ordinances of the local municipality, Pennsylvania Department of Transportation, and Pennsylvania Department of Labor and Industry governing same. All blasting operations shall be carried out by licensed persons only. Care shall be taken to protect from injury all persons, new sewers, streets, all underground structures encountered and all buildings along the lines of the sewers. Such work shall also be in accordance with the regulations of the Commonwealth of Pennsylvania.

15. Sequence of Construction

Manholes and main sewers shall be constructed and completed in sequence with service connections being constructed along with, or immediately after, completion of the main sewer.

Temporary paving in public roads shall be placed immediately after completion of trench backfill, and permanent paving shall be placed in accordance with State and local regulations. All street surfaces shall be cleaned.

Failure of the Contractor to comply with these requirements concerning installation of service connections and manholes, repaving and cleaning of streets, shall be sufficient reason for the Township to stop all other work pending compliance with these requirements.

# SECTION 6

# PIPE INSTALLATION

1. General

After the trench has been brought to the proper grade, as specified, the pipe and specials shall be laid. All pipe shall be laid with the bells or couplings upgrade. Pipe laying shall be done only in presence of an inspector and the Contractor shall give ample notice to the Engineer before laying pipe, so that an inspector may be detailed to make proper inspection. All pipe before being lowered into the trench shall be inspected, and both ends shall be cleaned. The Contractor shall not have more than two hundred (200) feet of trench open at any one time.

2. Line and Grade

A. Care shall be taken to lay the pipe to true lines and grades as given by the Developer's Engineer. All pipe shall be laid in line and grade, using the laser beam method, or the double string method. Other methods shall be as approved by the Engineer. Laser beam equipment shall be of the type that shines a beam through the pipe so that the grade and line may be checked easily. Correctness of the laser beam setting shall be verified at each manhole and in the middle of each run of pipe.

B. The grade, as shown on the profile, is that of the inside bottom of the pipe, and to which the work must conform. All pipe shall be laid true to line and grade with bells, or couplings, upgrade and under no conditions shall pipe be laid in water or on subgrade containing frost, or when trench conditions are unsuitable for such work. The Developer's Engineer will set all stakes for lines and grades which the Contractor must maintain and keep uncovered so that they can be examined at any time. Stakes for line and grade shall be placed at a maximum of every fifty (50) feet, and the Contractor shall be required to check the line and grade of pipe being laid with the stakes provided in order to insure accuracy. Lesser intervals shall be used where conditions require.

3. Pipe Bedding

A. In all trenches, both earth and rock, “Special Bedding” shall be provided for all pipe foundations. All pipe shall be laid with a smooth, uniform invert.

B. All pipe barrels and bells shall be bedded uniformly on Special Bedding. This bedding shall consist of 2B (#57) material which conforms to Section 7.03.2, Form 408 of the Pennsylvania Department of Transportation, extending a minimum of four (4) inches over the top of the pipe.

For pipe in wet areas a minimum of six (6) inches of 2B (#57) stone which conforms to Section 7.03.2, Form 408 of Pennsylvania Department of Transportation shall be required for bedding under the pipe. “Clay Dams” made with clayey soil, may be required at intervals determined by the Engineer, to prevent constant water flow through the underdrain. These dams shall be a minimum of two (2) feet thick and shall fill the entire trench cross section to a point a maximum of two (2) feet above the top of the pipe.

Depth of this special bedding shall be such that no water will reach the bottom of the pipe until backfilling is completed.

4. Pipe Mouth Stoppered

During construction, the mouth of the completed sewer shall always be kept properly closed at all times when pipe laying is not actually in progress with an expanding rubber plug to prevent the entrance thereto of any water, earth, stones or other debris. Employees shall not walk on or over the finished sewer, or otherwise disturb same. The Contractor shall also take any and all other measures to keep the sewer clean and free from deposits, etc., and protect same from injury until finally inspected and accepted by the Engineer.

5. Damage to Sewer

If the sewer is damaged from any cause, or becomes either partly or completely filled with dirt, stones, sand or other debris, the Contractor shall make all necessary repairs and remove such material to the satisfaction of the Engineer.

6. Recommendations of Pipe Manufacturer

Recommendations of manufacturer must be followed in laying pipe with special joints.

7. Laterals and Fittings

A. As shown on the plans, or as directed by the Engineer, the Contractor shall lay four (4) inch to six (6) inch PVC pipe to the road right-of-way line. If utilities (gas, water, telephone, etc.) run parallel to the road, laterals shall be extended at least twenty-four (24) inches beyond the utility. The Contractor shall make the connections to the sewer by means of wye or tee branch fittings. Cast iron saddles may be used with the permission of the Engineer and installed per the instruction of the pipe or saddle manufacturer. In private rights-of-way, pipe will be installed to the edge of the right-of-way.

B. The lateral pipe shall be properly capped with an expandable cap made especially for the size and type of pipe in use and shall be properly blocked to permit air testing. All laterals shall have a four inch (4") cleanout extended from near the end of the lateral stub to a minimum of three inches (3") below the finished surface of the ground. The clean out cap shall be of the type that screws on. Upon satisfactory completion of all required testing to assure the integrity of the system and after final grading of the entire site, there shall be immediately installed a C. I. Lamphole Cover marked "SEWER", Neenah No. R-1976 or equal around the cleanout assembly (reference CTSA Cleanout Frame and Cover Detail, attached hereto and made a part hereof as Exhibit "A"). [1]

C. All laterals shall be laid on a ¼ inch to a foot grade unless expressly approved by the Engineer to do otherwise.

8a. Concrete Cradle

A. Where directed by the Engineer or as shown on the plans, the Contractor shall carry the excavation six (6) inches deeper than the bottom of the pipe bell, and lay the pipe in 300# mix high early strength concrete. Care shall be taken in laying the pipe in the concrete so as to secure an even bearing.

[1] Subsection 7.B. of Section 6 of Chapter 1 adopted September 29, 2008 by Resolution No. 6-2008.

B. Concrete cradle shall be considered a 3000# mix high early strength concrete of a minimum thickness of six (6) inches placed around the lower two-thirds (2/3) of the pipe. See detail drawing on Construction Standards sheet.

C. All concrete in this section shall be certified, central plant mix.

8b. Concrete Encasement

A. Where directed by the Engineer or as shown on the plans, the Contractor shall carry the excavation six (6) inches deeper than the bottom of the pipe bell, and lay the pipe in 3000# mix high early strength concrete. Care shall be taken in laying the pipe in the concrete so as to secure an even bearing.

B. Pipe encased in concrete shall be considered as encased entirely in 3000# mix high early strength concrete of a minimum thickness of six (6) inches. See detail drawing.

C. All concrete in this section shall be certified, central plant mix.

9. Infiltration and Air Test Requirements

A. The Contractor shall clean all debris of whatever nature from pipes and repair all apparent leakage, after which the infiltration of water from any manhole to manhole section of the Contract shall not exceed 100 gallons per inch of inside pipe diameter per mile of sewer per twenty-four (24) hours where ground water is encountered above the sewer line.

B. Air Testing

1) In addition to infiltration testing the Township will require the performance of Line Acceptance Testing using low pressure air. The test shall be performed at the expense of the Contractor and with the full cooperation of the Contractor. It shall be performed according to stated procedures and in the presence of the Engineer.

2) Equipment: Equipment shall meet the following minimum requirements:

a) Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

b) Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

c) All air used shall pass through a single control panel.

d) Three individual hoses shall be used for the following corrections:

1) From control panel to pneumatic plugs for inflation.

2) From control panel to sealed line for introducing the low pressure air.

3) From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

3) Procedures: All pneumatic plugs shall be seal tested before used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

After a manhole to manhole reach of pipe has been completed and cleaned and the pneumatic plugs are checked by the above procedures, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed “Acceptable” if that portion

does not lose air at a rate greater than 0.03 cfm per square foot of internal pipe surface when tested at an average pressure of 3.0 psig greater than the back pressure exerted by ground water that may be over the invert of the pipe at the time of the test.

The above requirements shall be accomplished by performing the test as follows: The time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table.

| Pipe Diameter In Inches | Minutes |
|---|---|
| 4 | 2.0 |
| 6 | 3.0 |
| 8 | 4.0 |
| 10 | 5.0 |
| 12 | 5.5 |
| 15 | 7.5 |
| 18 | 8.5 |
| 21 | 10.0 |

In areas where ground water is known to exist, the Contractor shall install a one-half (1/2) inch diameter capped pipe nipple, approximately ten (10) inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11 ½ feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same.)

If the installation fails to meet this requirement, the Contractor shall determine at his own expense the source of leakage. He shall then repair or replace all defective materials and/or workmanship.

10. Final Inspection

A. Each section of installed sewer will be visually inspected by the Engineer prior to final testing. The pipe shall be true to both line and grade, shall contain no broken pipe, shall show no leaks, shall show neither obstructions or the projection of connecting pipes into the main pipe, and shall contain no debris or other deposits which shall in any way reduce the full cross section area of the pipe.

B. Any section of sewer pipe which does not comply with these inspection criteria, as determined by the Engineer, shall be promptly corrected, replaced or repaired by the Contractor at his own expense. Such methods as are employed for the correction shall be approved by the Engineer.

C. In addition, deflectometer testing shall be required for sections of PVC or Polyethylene sewer installed, as directed by the Engineer. After notification from the Contractor of the schedule for testing, the Engineer will select the lines to be tested. A deflection greater than five (5) degrees will be deemed sufficient reason to cause the work to be rejected. Work so rejected shall be corrected by the Contractor at his own expense in a manner acceptable to the Engineer.

D. If fifty (50) percent or more of the tested linear feet of PVC or Polyethylene sewer failed the deflectometer test, the Contractor shall be required to test the remaining linear feet of PVC or Polyethylene sewer a his own expense.

11. Force Mains

Force mains shall be installed if called for on the plans for the project. All specifications covering the laying of gravity sewers shall apply to the laying of force mains.

A. Cast iron or PVC pipe of the class called for on the plans shall be used. Joints may be special or mechanical and shall be installed in accordance with good practice and the manufacturer's directions. The joints used shall be approved by the Engineer. Pipe shall be bedded in 2B crushed stone.

B. Pipe shall be cut in a neat and workmanlike manner with an approved cutting device to insure a good joint.

C. Thrust Blocks: Thrust blocks shall be installed at all points were the bend is greater than ten (10) degrees and at all tees, caps, valves and reducers and where shown on the plans for the project.

1) Thrust blocks shall be constructed of 3000# concrete. Care shall be taken when pouring to prevent the inclusion of dirt and other foreign matter.

2) Care shall be taken to prevent the concrete from flowing over or near any joint in such a manner as to obstruct the use or access to the joint for future maintenance or addition of pipes.

3) At points where the bend is effected by bending the pipe at the coupling, thrust blocking shall be installed at least one (1) foot away from the coupling.

D. Incidental Items of Work: Unless thrust blocks are called for, all fittings at bends in force mains shall be firmly wedged against the vertical face of the trench in order to prevent the fittings from being blown off the line when under pressure. Where pipe ends are left for future connections, they shall be valved, plugged or capped, as directed by the Engineer. Where connections are made between new work and the old force mains, the connections shall be made in a thorough and workmanlike manner to the satisfaction of the Engineer, using proper specials and fittings to suit the actual conditions.

E. Hydrostatic Tests: The Contractor shall supply all materials and labor necessary for testing the system.

After the pipe has been laid and partially backfilled, all newly-laid pipe or valved section thereof shall be subjected to a hydrostatic pressure test. Pressure shall be maintained fifty (50) percent in excess of normal working pressure or 150 pounds per square inch, whichever is greater, for a period of one hour. Each valved section shall be slowly filled with water at the specified test pressure. This water shall be supplied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The Contractor will also be required, if necessary, to provide suitable taps in the pipe for the purpose of inserting gauges required for testing.

All pipe fittings, valves and joints shall be examined carefully during the pressure test and any leaking joints or fittings repaired or replaced. Any cracked pipe or fittings shall be removed and replaced. The test shall be repeated until satisfactory to the Engineer. Section of force main to be tested at one time shall not exceed 1000 linear feet.

F. Leakage: During the hydrostatic tests, provisions shall be made to measure the quantity of water necessary to maintain test pressure. No pipe installation shall be accepted unless and until the leakage (evaluated on a pressure basis of 150 pounds per square inch) is less than 100 U.S. gallons per 24 hours per mile per inch of diameter for pipe of twelve (12) foot lengths, 75 U.S. gallons for sixteen (16) foot lengths, and correspondingly varied for other lengths of pipe.

Evaluation of the actual leakage to the leakage under the assumed basic pressure of 150 pounds per square inch shall be calculated by the application of the ratio determined from the square root of the respective pressures.

G. Air Relief Valves on Force Main: An air relief valve shall be furnished and installed on the force main in manhole at all high points in the force main. The air valve shall be of the sewage type equivalent to Simplex type “AVS” with gate valves and flushing connection, Clow Co. or approval eqyak, See Detail Drawing.

12. <u>Connections to Manholes</u>

A. An approved manhole adaptor or coupling shall be used to form a water tight connection between the pipe and the concrete of the

manhole. It shall be a coupling or a rubber ring precast or grouted directly into the manhole, or an approved equal.

B. The pipe shall not terminate in the coupling, but shall extend into the manhole a sufficient distance to properly connect the sewer pipe entering from the side of the manhole with the main channel.

13. Anchoring Pipe on Steep Slopes

Whenever the slope of the pipe is twenty (20) percent or greater, pipe anchors are shown on the detail drawing shall be used. Spacing of anchors shall be as shown on the detail drawing.

## SECTION 7

## SEWER STRUCTURES

1. Manholes

A. Manholes shall be constructed at the points shown on the plans, or at such points as may be directed by the Engineer. Details are shown in the detail drawings.

B. Precast concrete manholes shall be used unless permission to use brick is given in writing. Precast manholes used shall be water tight and be of the eccentric cone type. All manholes shall conform to A.S.I.M. C-478-61T, or latest revision. Precast bases shall be used and shall be bedded on a minimum of six (6) inches of 2B stone or ¾ inch stone. Lengths of pipe immediately adjacent to each manhole shall have a maximum length of six and one-half (6 ½) feet. Joints of manholes and points of pipe entry shall be sealed with a round rubber gasket that is as specified in Sections 5.7 and 4.1 of A.S.T.M. C-361. Insides and outsides of joints shall then be smoothed off with mortar. Outsides of manholes shall be coated with two coats of bitumastic material. Sections of manhole shall be set so that the manhole steps form a straight ladder. Concrete under and around sewer pipes running through bottom of manholes shall be 3000# mix. In junction manholes, care shall be taken to properly connect the sewer pipes entering from the sides of the manhole with the main channel. All such connecting channels shall be molded in the concrete base of proper size, cross sections, and to the required grade and finished smooth.

C. Concrete for manhole foundations, when brick manholes are permitted, shall be 3000# mix. The Contractor shall carry the excavation from six (6) to eight (8) inches lower than the bottom of the concrete foundation, filling this space with crushed stone to act as an underdrain and cover the underdrain with a layer of paper or cloth sufficiently heavy to prevent the mortar in the concrete from penetrating into the base.

D. All brick masonry shall be carefully laid using cement mortar of thickness and dimensions as shown in the detail drawings. Bricks must be laid on a bed of cement mortar and then pushed into place, so that the mortar pushed ahead of the brick will completely fill the space to the previously laid brick of the same course. Joints shall not be more than one-half (1/2) inch in thickness, and all brick shall be thoroughly wet before laying, preferably by immersion. Brick

masonry shall not be laid or cement work of any kind done when the temperature is below 40 degrees Fahrenheit, except on written authorization from the Engineer.

E. The walls of brick manholes shall be plastered on the outside with a ¾ inch coat of cement mortar, and shall be corbelled so that there is a straight side where steps are placed, and shall be carried up to such a height that when the casting is placed thereon, it shall not project above the finished grade of the street. The two courses must be twenty-four (24) inches in inside diameter. The inside of the walls on brick manholes shall have wiped joints as noted on the detail drawings.

F. Ground Water: In constructing manholes, all ground water shall be kept away from newly-poured concrete or freshly laid brick work until cement has properly set and until a water-tight job is obtained. Manholes which admit ground water after completion must be repaired to the satisfaction of the Engineer and at such time as he may direct.

G. Shallow Manholes: Where required because of limited depth, precast manholes shall be constructed in accordance with the detail drawing.

H. Setting Castings: All manhole frames and covers shall be set true to line and grade. Frames and covers shall conform to requirements set forth under Materials. When set in a road or other paving the frame shall be sloped to conform to the surrounding paving and shall not project above the paving or below the paving. Four ¾ inch anchor bolts shall be used to secure the frame to the manhole after a minimum of one-inch diameter ring of Plastic Butyl Rubber Joint Sealant, conforming to Federal specification ss-5-00210, has been placed under the frame. The sealant ring shall be placed in such a manner that tightening of the anchor bolts will cause a continuous water-tight seal to be formed between the manhole structure and the cast iron frame.

I. Manhole Steps: Steps shall be set in the masonry along the straight side of the manhole to form a ladder, and spaced not exceeding twelve (12) inches center to center. In manholes where there are one or more drop connections of more than four (4) feet, an additional step shall be placed in the wall opposite to the step which is nearest to three (3) feet below the upper opening of each drop connection.

J. Manholes shall be constructed promptly as the sections of the sewer between them are completed; and, unless this is done, the Township shall have authority to stop trenching and pipe laying until manhole construction is brought up properly.

2. Drop Connections

A. In all junction manholes where the grade line of one sewer is two feet higher, or greater, than that of the other, or where directed by the Engineer, the connection shall be made by means of a "drop connection". See detail drawing.

B. The pipe and fittings used for the drop connection shall be of the same type and class as that used for the sewer line coming into and leaving the manhole. Concrete for encasing pipe shall be 3000# mix high early strength and shall conform to specifications for concrete. Precast drop connections will be used where possible.

C. Care shall be taken to have all pipes laid to correct lines and grades, as established by the Developer's Engineer.

3. All other appurtenances and structures will be constructed according to the detail drawing.

4. Manholes shall be installed at the end of each line, at all changes in grade, size or alignment, and at distances not greater then 300 feet between them.

5. Watertight Manhole Covers

Watertight manhole covers and frames shall be as shown on the detail drawings. This type cover and frame shall be used whenever the manhole is located within the 100 year flood plan as well as wherever dictated by good design practice.

## Section 8

## MATERIAL SPECIFICATIONS

1. Concrete

A. All concrete shall consist of plant mix of "ready mix" concrete unless job mixed concrete is authorized by the Engineer. All ready mixed cement shall conform to A.S.T.M. C-94. The producer of the concrete shall be approved by the Engineer and certificates of test, materials and proportions shall be furnished by the supplier of concrete at such times as may be required by the Engineer. The Engineer shall have the right to inspect the plant of the supplier at any time. Concrete shall be high early strength for cradle, encasement, deep-cut laterals and drop connections.

B. Job mixed concrete shall conform to all applicable specifications for ready mix concrete contained herein and all concrete shall be mixed in an approved mixer.

C. Materials:

1. Cement shall conform to A.S.T.M. C-150, Type II or A.S.T.M. C-175 for Air Entraining Cement. Air Entrained Cement shall be used for all walk and curb replacement and other exposed concrete work and shall contain three (3) to six (6) percent of air.

2. Coarse and Fine Aggregate shall conform to A.S.T.M. C-33, and shall be graded to produce a dense concrete. Maximum size of aggregate shall be ¾ inch.

3. Water shall be clean, free from deleterious amounts of acids, alkalis, or organic materials. Maximum water content shall be 6.6 gallons per sack, including free moisture in aggregate. No concrete exposed to the action of freezing weather shall have more than six (6) gallons of water per sack of cement. No frozen, lumped or caked materials shall be used.

D. Proportions: All materials for concrete shall be proportioned by weight and once the proportions required for the desired concrete are obtained, they shall not be changed without the Engineer's permission.

E. Strength of Concrete: Concrete for general use shall develop a compressive strength of 3000# when tested in accordance with the Standard Method of Making Compression Tests of Concrete of the American Society for Testing Materials. Samples of concrete shall be taken by the Contractor as and when directed by the Engineer, and tests shall be made at the expense of the Contractor by a reputable laboratory approved by the Engineer. State Department of Highways Class "B" concrete shall be used for concrete base under State Highways.

F. Slump: Slump tests shall be made by the Contractor throughout the course of the work and as required by the Engineer. A slump cone shall be provided by the Contractor for the Engineer's use. Slump of concrete shall be two (2) to four (4) inches. Slump shall be determined by A.S.T.M. C-143.

G. Temperature for Concrete Work: No concrete or cement work shall be done when the atmospheric temperature is below 40 degrees F., except under special conditions when heaters are employed. No anti-freezing ingredient shall be mixed with concrete or cement work. Freshly laid concrete shall be covered in cold weather by approved shelters, and means shall be provided for keeping the air beneath the shelters warm and moist by live steam or other methods. The Engineer shall approve the method of protecting all concrete.

H. Small Quantities of Concrete: If small quantities of concrete are mixed by hand, the fine aggregate and cement shall be mixed dry in a steel mortar box until the mixture is an even and uniform color throughout. It shall then be wet with the proper quantity of water and thoroughly mixed by means of hoes. The crushed stone shall be spread on a wooden or steel platform to make a bed of uniform thickness, and after being wet the mortar shall be added and the whole mass turned with square edged shovels until it is thoroughly mixed.

I. Concrete additives shall be used only with the permission of the Engineer and in accordance with the manufacturer's directions.

J. Curing: Provision must be made for maintaining concrete in a moist condition for a period of five (5) days after placement of the concrete, except that for high early strength concrete moist curing shall be provided for two (2) days.

White pigmented concrete curing compound shall be applied in conformance wit the manufacturer's directions to all curb and walk replacement and all other above-grade concrete work.

K. All manholes shall be installed with a heat activated high-shrink membrane encapsulating the joint between the manhole frame and cover and chimney. The membrane shall be WrapidSeal™ or equivalent approved by the Township Engineer. The membrane shall be installed by qualified personnel in strict conformance with the manufacturer's recommendations. The membrane must be installed prior to the manhole vacuum test.[2]

2. Reinforcing Steel

Reinforcing steel shall be deformed bars complying with A.S.T.M. A-15-58T, or latest revision rolled from new billets of identified heats manufactured by the open-hearth process. Welded wire fabric shall conform to A.S.T.M. A-83 or A-185 and shall be 6" X 6" X 6/6 unless otherwise shown in the details or standards.

3. Mortar

Mortar for brick work shall be one part Portland Cement to three parts sand. Hydrated lime (type S) may be substituted for not over ten (10) percent (by weight) of the cement.

Use of retempered mortar or mortar which has been mixed more than one hour will not be permitted.

4. Brick

Bricks shall be made of clay or shale and none but new, whole, sound burnt hard entirely through, straight brick, uniform in structure, with true even faces shall be used. All brick shall be free from stones, pebbles, masses of lime and checks and cracks extending into the body of the brick. When struck with a trowel bricks shall give a clear, ringing sound and a fracture shall show uniform and compact structure. Brick shall conform to A.S.T.M. C-32, latest revision, Grade MA.

[2] Section 8, Subsection 1.K. added by unanimous motion of CTSA Board on May 12, 2003

5. Manholes

Steps shall be made of one inch diameter heavily galvanized wrought iron bars unless shown differently in the detail drawings. In precast manholes and where specified, aluminum or cast iron steps shall be used. Steps shall be approved by the Engineer.

6. Cast Iron

A. The Contractor shall furnish and install all cast iron fittings and castings where needed. Unless otherwise called for, fittings shall be A.S.T.M. Standard A.-48, Class 30, and shall be coated with bitumen paint before delivery.

B. All castings shall conform to the Standards set forth in the detail drawings.

C. All cast iron must tough and have an ultimate tensile strength of 35,000 pounds per square inch with a light gray fracture. All castings shall be free from cracks, cold shuts or blow holes, straight, true to pattern and have a workmanlike finish.

D. Manhole Frames and Covers: Ferrous castings shall be manufactured by Neenah Foundry Company, Neenah, Wisconsin, or approved equal. They shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. They shall be smooth and well cleaned by shotblasting. They shall be coated with asphalt paint which shall result in a smooth coating, tough and tenacious when cold, no tacky and not brittle.

Castings shall be designed by AASHTO Highway Loading Class HS-20. Material used in manufacturing of castings shall conform to ASTM designation A48-Class 35 Gray Iron. Tensile Test Bars made from each heat, from which castings are poured, must be tested by a fully accredited laboratory. A Notarized Certificate for these Test Bars must be provided to verify minimum Tensile Strength of 35,000 p.s.i.

All castings shall be manufactured true to pattern; component parts shall fit together in a satisfactory manner. Round frames and covers shall have machined bearing surfaces to prevent rocking and rattling under traffic. Covers and frames shall be interchangeable.

Self-Sealing Lids shall be used and shall have a continuous one piece round gasket which is designed to press fit within a precisely machined Dovetail Groove in the bearing surface of the lid. The gasket material shall be Neoprene of a composition with good sealing qualities, abrasion resistance and low compression set. Gluing of gasket will be prohibited.

Manufacturer's shop drawings must be submitted to the Engineer for approval prior to manufacturer. The Engineer shall retrain the right to reject castings not conforming to this specification and or approved submittal drawings.

Where shown on the plans or required by the Engineer, the Contractor shall install a watertight manhole cover and frame in place of the regular manhole cover and frame. The watertight manhole frame and cover shall be as shown on the detail drawings.

7. Cast Iron Pipe

Where specified on the plans for the project, cast iron pipe shall be used. Cast iron pipe shall conform to Federal Specifications WW-P-421 and shall be 150 pound class. All cast iron pipe shall be of the bell and spigot type with special joints or mechanical joints. The joint shall be approved by the Engineer before use and installed in accordance with the manufacturer's instructions.

8. PVC Gravity Sewer

A. All pipe and fittings shall conform to the requirements of A.S.T.M. Specification ASTM D-3034, latest revision (SDR 35), Type PSM Polyvinyl chloride (PVC) Sewer Pipe and Fittings.

In addition Armco A-2000 PVC pipe may be used. Pipe shall conform to A.S.T.M. F 949.

B. Joints: Pipe shall be joined with a bell and spigot type of rubber gasketed joint. Each joint shall consist of a formed bell complete with a single rubber gasket. All fittings shall utilize rubber gasketed joints.

C. Material: All pipe and fittings shall be made of PVC plastic conforming to ASTM Specification D 1784, latest revision, for Rigid Poly (vinyl chloride) compounds and Chlorinated Poly (vinyl chloride) compounds.

D. Gaskets: Rubber gaskets shall comply in all respects with the physical requirements specified in ASTM D-1869, C-361 or C-443.

E. Pipe Stiffness: The pipe stiffness at five (5) percent deflection, in accordance with A.S.T.M. D-2412, shall equal or exceed 46 PSI for sizes six (6) to twelve (12) inches in diameter, and shall equal or exceed 51 PSI for four (4) inch sizes.

F. Flattening: A six (6) inch sample pressed between two parallel plates within two (2) to five (5) minutes under uniform loading shall not exhibit evidence of splitting, cracking or breaking when pressed to forty (40) percent of the outside diameter of the pipe. (ASTM D-2412)

G. Inspection: Inspection by the purchaser shall not relieve the manufacturer of the responsibility of furnishing material performing in all respects to the requirements of this standard.

9. Testing and Certification of Materials

All suppliers of materials incorporated into the project shall supply to the Engineer a notarized statement in duplicate that their material complies with the specifications set forth herein.

Notarized certification of tests made at the plant on all pipe shall be forwarded to the Engineer.

All materials will be tested periodically by the methods of test specified previously. The Contractor shall render all necessary labor, materials and equipment necessary for collecting, packaging and identifying all samples.

## SECTION 9

## REPLACEMENT OVER TRENCHES

1. Trench Paving Restoration

A. The Contractor shall meet all requirements of the Pennsylvania Department of Transportation and/or municipal regulations where the sewer crosses or is adjacent to their paving. In State highways, the requirements of the Pennsylvania Department of Transportation From 945-B and the State Highway's Inspector shall govern. Temporary paving shall be installed within 48 hours after backfilling the trench. Permanent paving shall not be replaced until a minimum of ninety (90) days has elapsed after backfilling.

B. State Roads

Restoration of all trenches in state roads shall conform to Pennsylvania Department of Transportation specifications and the requirements delineated in the Highway Occupancy Permit.

C. Township Roads

Longitudinal and Lateral: Base course for repaving on all roads of the local municipality shall be bituminous base course unless a crushed stone base course is approved in writing by the Engineer. Bituminous concrete base course shall conform to the Pennsylvania Department of Transportation Specifications, Form 408, Section 305. Just prior to placing the permanent paving, the existing paving shall be cut back six (6) inches on each side of the trench for Township Roads. This cutback shall be to a depth sufficient to contain the entire cross-section of replaced paving. The edge of the cut shall be neat and straight. Minimum depth of bituminous concrete base course laid shall not be less than five (5) inches. Prior to placement of any bituminous concrete, the edges of the cut shall be painted with Class BM-1 asphaltic cutback.

Crushed stone or slag used for base courses shall be #3A modified (A.A.S.H.T.O. #3) or #4 (A.A.S.H.T.O. #1) ballast and shall conform to the Pennsylvania Department of Transportation's Specifications. Crushed stone shall be laid in place, choked with screenings (#4

ballast only and rolled with at least ten ton roller in four (4) inch layers until a firm, stable base is obtained. Prior to laying of the bituminous concrete, the base course shall be broomed to expose the ballast and provide a bonding surface for the surface courses. Thickness shall be as shown in the detail drawings. One inch of limestone screenings shall be placed under all crushed stone base courses.

All Township roads shall be restored with a minimum of 1 ½ I.D. 2 cushion course and one (1) inch wearing course. The I.D. 2 shall be made with B.M. 1 asphalt unless the Engineer approves another. These materials shall conform to Pennsylvania Department of Transportation Specifications with respect to composition and laying procedures. Thickness of each course shall be after compaction and shall conform to the detail drawings. Finished paving shall be smooth and shall conform in grade to the surrounding paving. All compaction shall be done with at least ten ton roller.

Prior to placement of any bituminous concrete, the edges of the cut shall be painted with Class B.M. 1 asphalt cutback. Edges of the finished paving shall have hot poured Class A-1 asphalt cement applied as a sealer.

D. State Road Overlay: Where required on State roads, there shall be a complete road overlay of a minimum of one (1) inch compacted thickness of I.D. 2 surface material with tack coat. Width of paving shall conform to the existing width of paving. Length shall be as required by the PennDOT. Material and installation shall conform to Pennsylvania Department of Transportation Specifications. Where complete overlay is required, the total depth of bituminous concrete surface and base course over the trench shall not be less than seven and one-half (7 ½) inches. Trench cutbacks, track coats and sealers shall equally apply as required under Paragraph B.

E. Township Road Overlay: Where required on Township roads, there shall be a complete road overlay of one (1) inch compacted thickness of I.D. 2 surface material, with tack coat. Width of paving shall conform to the existing width of paving and shall present uniform edges throughout. Where bituminous base course is used with the one (1) inch overlay, the depth of the base paving shall be increased one and one-half (1 ½) inches and brought level to the original road paving surface. Where crushed stone or slag base is used for base course with the one (1) inch overlay a one and one-half (1 ½) inch I.D. 2 binder course shall be placed and brought

level to the original road paving surface. Trench cutbacks, tack coats and sealers shall equally apply as required under Paragraph C.

F. Paving that has been scarred or cut by the Contractor's equipment outside the trench shall be cut to a minimum depth of one (1) inch and paved with bituminous concrete wearing course. The edges of the patch will be sealed with hot poured Class A-1 asphalt sealer.

G. All paving that settles shall be placed by the Contractor. Settled paving shall be removed to the base course and the edges cut square. Paving shall then be replaced according to the above Specifications. The edges shall then be resealed.

H. Contractor shall arrange with all utilities to reset water and gas boxes, manhole frames and covers which do not conform with finish grade of paving. If necessary, the Contractor shall reset manhole frames and covers installed for the sanitary sewer.

2. Temporary Paving

Temporary paving shall be installed and maintained as specified in the Trenching and Backfilling Section, immediately upon backfilling of the trench.

3. Restoration

Prompt restoration is of the utmost importance to maintain easy access to homes and places of business and to maintain public relations. If, in the opinion of the Engineer, complete restoration is not proceeding sufficiently fast behind pipe laying operations, he shall notify the Contractor in writing to correct the situation. If, within seven (7) calendar days after date of the letter of instructions, the Contractor has not corrected the situation, the Township shall stop all excavation and pipe laying operations until restoration is brought up to date.

4. Sidewalks

A. Concrete Sidewalks: The existing sidewalk shall be broken off evenly at the nearest “groove” or “dummy joint” on both sides of the trench. The sidewalk shall be replaced using reinforcement and thickness as shown in the detail drawings. The width of the replaced sidewalk shall conform to that of the old sidewalk. The replaced sidewalk shall be finished in a workmanlike manner. Concrete used shall be 3000 pound concrete. Concrete shall be sprayed with a white pigmented membrane curing compound immediately after its initial set.

B. Bituminous Sidewalks: The ends of existing sidewalks shall be cut square on both sides of the trench and replaced according to the detail drawings. Width of the replaced sidewalk shall conform to the old sidewalk, and it shall be finished in a workmanlike manner. All bituminous sidewalks shall be rolled.

5. Curb Replacement

A. Concrete Curb: All concrete curb shall be replaced in ten (10) foot sections with expansion joints every ten (10) feet. Straight sections shall be formed with steel forms and curved sections with plywood forms. All curb shall be constructed using 3000 pound concrete and finished in a workmanlike manner. Surfaces of concrete curb shall be rubbed or brushed. All curb shall be constructed with a cross-section the same as that of the existing curb. Concrete shall be sprayed with a white pigmented membrane curing compound immediately after its initial set.

B. Bituminous Curb: Bituminous curb shall be replaced in a workmanlike manner with a cross-section equal to that of the existing curb. In the event that the curb was machine laid, the replaced curb shall be machine laid also. Bituminous material used shall be I.D. 2 wearing course.

C. Granite Curb: Granite curb shall be replaced in four (4) to eight (8) foot sections and shall consist of granite or bluestone of approved quality free from structural defects. Curb shall be cut square on the front and top and three (3) inches down in the back. Cross-section of replaced curb shall equal that of the existing curb. All joints are to be no wider than one-quarter (1/4) inch and shall be set on twelve (12) inch X twelve (12) inch 3000 pound concrete chairs. Wherever possible, the existing granite curb will be removed before construction.

D. Rubble Curb and Gutter: Shall be replaced in a workmanlike manner to conform to the existing curb or gutter. Materials shall conform to those used in the original gutter.

6. Driveway Replacement

A. Bituminous drives shall have the existing faces cut square. The subgrade shall be rolled with a 5-ton roller until hard and the paving replaced as shown in the detail drawings. Crushed stone for the base shall be 2B or 3A modified and shall conform to the Pennsylvania Department of Transportation Specifications. After the stone is in place, it shall be choked with fines and rolled until it forms a firm, stable base for the paving. The surface of the base shall be broomed until it is substantially free of fines with coarse stone exposed to provide a good bonding surface for the paving.

The paving shall consist of an I.D. 2 wearing course asphaltic concrete that conforms to the Pennsylvania Department of Transportation Specifications. The asphaltic concrete shall be rolled with a powered roller weighing a minimum of five (5) tons until it is compacted and smooth and blends with the surrounding paving. Thickness of the various layers shall be as shown in the detail drawings. Edges of the finished paving shall be sealed with hot Class A-1 asphalt cement

B. Concrete Drives: All edges shall be cut square. The concrete shall be of 3000 pound mix and shall conform to the detail drawing. Reinforcement shall be as shown in the detail drawing. The concrete shall blend smoothly with the old pavement, shall be smooth and shall have a broom finish. Concrete shall be sprayed with a white pigmented membrane curing compound immediately after its initial set.

C. Stone Drives: Shall have the subgrade thoroughly tamped and covered with four (4) inches of 2B stone. After the stone is in place, it shall be choked with fines, then broomed and tamped until it becomes stable.

7. Restoration of Grassed Areas

A. Grass areas shall be restored as soon as practical after backfilling of the trench. However, plantings will be limited to work days between the fifteenth of March and the fifteenth of October of the same year.

B. Topsoil will be placed over the trench to a minimum depth of four (4) inches and on other grassed areas damaged by the Contractors' operations to a minimum depth of two (2) inches. The topsoil and surrounding areas affected by construction shall then be raked smooth and free from all stones, wood, and other debris. A commercial 10-10-10 fertilizer shall then be applied at a rate of 10 pounds per 1000 square feet and mixed into the topsoil for a depth of two (2) inches. Grass seed of the specified composition shall then be spread evenly at a rate of six (6) pounds per 1000 square feet by means of a mechanical spreader over the trench and any surrounding area affected by the construction. All seeded areas shall be rolled with a lawn roller weighing not more than 100 pounds per foot of width.

C. Grass seed shall be mixed and certified to be as follows:

| | Lawn Mixture Parts | Percentage Purity | Germination |
|---|---|---|---|
| Kentucky Bluegrass | 35% | 90% | 85% |
| Pennlawn Fescue | 25% | 90% | 85% |
| Pennfine Ryegrass | 15% | 90% | 85% |
| Annual Ryegrass | 15% | 90% | 85% |
| Red Top | 10% | 90% | 85% |

D. Slopes and Banks: Any area to be seeded which has a slope of 5% or greater shall be mulched with seed and weed-free salt hay, not moldy or rotten, at the rate of one 75 lb. bale per 1000 square feet.

E. Sod: Sod shall be at least 60 percent perennial grass, strongly rooted and free of pernicious weeds. It shall be mowed to a height not to exceed two (2) inches before lifting and shall be of uniform thickness with not over one and one-half (1 ½) inch or less than one (1) inch of soil.

All sod shall be set, complete in place, within 48 hours after being cut. Due consideration shall be given to weather conditions. Sod which has dried out will be rejected whenever in the judgment of the Engineer its survival is doubtful.

Laying surfaces, on which sod is to be laid, will be firmed with a light roller and dampened before the sod is put down. Sod pieces shall fit snugly to prevent water from lifting them.

Tamping: Each piece of sod shall be tamped sufficiently to bring the under surface into firm contact with the soil.

Each strip or section of sod shall be staked securely with at least one wooden stake for each two (2) square feet of sod. State measuring ½ x 1" x 12" shall be driven flush with the top of the sod, with the long face parallel to the slope contour, sod strips to be 2 feet 0 inches O.C. The Contractor shall keep the sodded areas adequately moist.

F. Maintenance: Watering will depend on weather conditions, but maintaining favorable moisture conditions for seed germination is the responsibility of the Contractor.

G. Guarantee: The Contractor shall guarantee germination, maintain plantings up to and including the second cutting, and shall reseed or resod as often as necessary to insure ninety percent coverage of the affected area. It is the Contractor's responsibility to restore all seeded and sodded areas to a smooth and even surface with a dense, uniform growth of grass on them. Final payment of the Contract will not be made until these conditions are satisfied.

H. Clean Up: All rubbish and other material will be removed from the premises and the entire job will be left in a condition satisfactory to the Engineer. In areas where work has been on or near paving, the paving shall be swept or flushed clean to the satisfaction of the Engineer.

I. In a few instances it will be apparent that a particular property owner has gone to additional expense and effort to establish a fine law. In these cases the Contractor will use grass seed of the same type and quality of the surrounding lawn. See application will be at the rate of 7 pounds per 1000 square feet.

J. Hydro-Seeding: In lieu of other mechanical seeding operations, Hydro-Seeding (technique of mixing seed, fertilizer and a green fiber mulch into a homogenous slurry which is then sprayed on the area being seeded) may be substituted.

All slopes of 5% or over will be “tack-coated”. Rates and types of materials shall be approved by the Engineer before applying.

K. Special Seasonal Seeding: Should it become necessary, in the opinion of the Engineer, to perform lawn work and restoration of grassed areas beyond the normal planting cut-off of the fifteenth of October, the Contractor will be required to use the following late fall seeding formula, with mulch, as a protective winter cover only.

| Description | Application Rate |
|---|---|
| Winter Rye | 10 lbs. per 1,000 Sq. Ft. |
| Annual Rye | 6 lbs. per 1,000 Sq. Ft. |

## SECTION 10[3]

## CONCRETE MANHOLE COATING

1. General Requirement for Manhole Coating

   A. Any new manhole which is constructed or installed as a part of the sanitary sewer system, in the opinion of the Township, must be coated with a protective liner in accordance with this Section.

   B. Whenever a force main from a pressure sewer system or pump station is connected to the gravity collection system, the connection manhole and the following downstream manhole or any structure affected by the connection, in the opinion of the Township, must be coated with a protective liner in accordance with this Section.

2. Quality Assurance

   A. The materials used shall be designed, manufactured, and intended for manhole and sewer structure rehabilitation and the specific application in which they are used.

   B. The contractor shall be qualified in the field of concrete repair and protection with a proven track record of five (5) years or more. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.

   C. Installation of all materials shall be in accordance with all safety and weather conditions required by manufacturer or as modified by applicable rules and regulations of the sewer department and also those of any local, state or federal authority having jurisdiction. Material Safety Data Sheets shall be consulted for complete material handling recommendations.

3. Delivery, Storage and Handling

   A. All materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer’s identification and printed instructions. All material shall be stored and handled in accordance with recommendation of the manufacturer and the American Concrete Institute.

[3] New Section 10 added by unanimous vote of CTSA Board on April 12, 2010

B. Storage of all materials shall be off of the ground and protected from rain, freezing or excessive heat until ready for use.

C. Material shall be conditioned as recommended by the manufacturer.

4. Job Conditions

A. Material may not be applied if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature shall be 45ºF (7ºC) and rising.

B. Precautions shall be taken to avoid damage to any surface near the work zone due to mixing and handling of the materials.

5. Submittals to Township

Prior to commencing any work two (2) copies of manufacturer's literature, including without limitation: Product Data Sheets, and Material Safety Data Sheets (MSDS) shall be submitted to the Township.

6. Warranty

A. A written warranty from the manufacturer(s) warranting all materials against defects for a period of not less than five (5) years, beginning with date of substantial completion of the project shall be provided to the Township.

B. A written warranty from the contractor(s) warranting against defects in workmanship for a period of not less than eighteen (18) months, beginning with the date of substantial completion of the project shall be provided to the Township.

7. Material Specifications

A. Materials shall at a minimum meet the following specifications:

(1) Cure Time 24 hours.
(2) Compressive Strength 19,500 psi (ASTM D-695).
(3) Tensile Strength 8,000 psi (ASTM D-638).
(4) Flexural Strength 12,700 psi (ASTM D-790).
(5) Elongation 4.3% min. (ASTM D-638).
(6) Adhesion Substrate Failure (ASTM D-4541), Concrete >1,500 psi Steel (SSPC-10).
(7) Hardness, Shore D 88 (ASTM D-2240).

(8) Water Vapor Transmission 3.6 gms/sq.m per 24 hrs (ASTM-1653), Method B.
(9) Taber Abrasion, CS17 Wheel <110 mg loss (ASTM D-4060), 1000 g load/1000 cycles.
(10) Temperature Resistance >220°F Steel, unprimed and concrete.
(11) Such other specifications which may be required by the Township based on the particular application.

B. PARSONPOXY SEL-80 as manufactured by Parsons Environmental Products, Inc., Reading, Pennsylvania, is considered (as of the date hereof) to conform to the requirements of this subsection; provided that the Township may approve other materials which comply with the specifications of this subsection.

8. Surface Preparation

A. Surface preparation shall consist of water blasting (minimum 3500 psi) of the interior of the manhole or structure and the removal of all loose mortar, paints, protective coatings, efflorescence, all contaminants, laitance and curing components, leaving a clean, structurally sound substrate. Wire brushing or sand blasting may be required by the Township.

B. At all times during any preparation or other work the contractor shall make sure that the sanitary sewer system is adequately protected, to the satisfaction of the Township, so that no debris is discharged into the sanitary sewer system.

9. Mixing and Application

Rehabilitation shall be accomplished in accordance with this Section and such other requirements of the Township as may be required for a particular application. After completion and inspections of work accomplished under this Section, application of a monolithic lining with an integral corrosion barrier topcoat of PARSONPOXY SEL-80 (80 mils minimum thickness) or approved equal shall be applied.

10. Cleaning

A. Uncured polymer-modified Portland cement mortar may be cleaned from tools with water. Cured polymer-modified Portland cement mortar shall only be removed mechanically.

B. Finished work and work area must be left in a neat, clean condition without evidence of spillovers onto adjacent areas.

C. Under no circumstances shall any debris be discharged into the sanitary sewer system.