

RULES AND REGULATIONS GOVERNING
CONSTRUCTION OF AND CONNECTION TO
SANITARY SEWERAGE FACILITIES
IN
EAST BRADFORD TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA

Adopted by the Board of Supervisors
of East Bradford Township on
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SECTION 1

GENERAL PROVISIONS

1.1 Purpose

These rules and regulations govern the connection to all sanitary sewage facilities to be installed in East Bradford Township, Chester County, Pennsylvania, and provide specifications for the design and construction of those facilities. The rules and regulations are promulgated pursuant to Section 17 of Ordinance No. 40 which ordinance among other things requires connection to the Township sewer system and establishes other regulations and charges relative to the use of the said sewer system. Section 17 of the ordinance provides that these regulations become a part of the said ordinance.

SECTION 2

DEFINITIONS

2.1 Meaning of Words

The following words and phrases shall be defined as stated herein.

As used these rules and regulations, words in the singular include the plural and those in the plural include the singular. The word "person" includes a corporation, unincorporated association, and a partnership, as well as an individual. The word "may" is permissive; and the words "shall" and "will" are mandatory.

Building Sewer. The sewer extension from the sewage drainage system of any structure to the service lateral of a sanitary sewer system.

Collection Sewer. A collection sanitary sewer located under highways, roads, streets, or rights of way with branch service laterals that collects and conveys sanitary sewage or industrial wastes or a combination of both; and into which storm, surface and ground waters or unpolluted industrial waters or liquids are not intentionally admitted.

Connecting Sewer. A sanitary sewer specifically used to convey sanitary sewage or industrial wastes or a combination of both from a remotely located subdivision to a connecting point with an existing sanitary sewer and into which storm, surface and ground water or unpolluted industrial waters or liquids are not intentionally admitted.

Independent Sanitary Sewer System. A sanitary sewer system, complete with collection sewers, service laterals, building sewers and a sewage treatment plant in accordance with Township specifications and permits issued by the Pennsylvania Department of Environmental Resources.

Industrial Wastes. Any solid, liquid or gaseous substance discharged, permitted to flow or escaping in the course of any industrial, manufacturing, trade or business process or in the course of the development, recovery or processing of natural resources, as distinct from sanitary sewage.

Plan, Official. A comprehensive plan of sewerage facilities showing provisions for adequate sewer needs for rural, suburban and urban areas of the Township.

Sanitary Sewer. A sewer that conveys sewage or industrial wastes or a combination of both; and into which storm, surface, and ground waters or unpolluted industrial wastes are not intentionally admitted.

Sanitary Sewer Plan. A plan or map showing all present and proposed sanitary sewers and facilities for the proposed subdivision of land development for the collection and conveyance of sanitary sewage and industrial wastes.

Sanitary Sewer System. All facilities, as of any particular time, for collecting, pumping, treating and disposing of sanitary sewage and industrial waste situated in the sewered area.

Service Lateral. That part of the sewer system extending from the collection sewer to a point one foot inside the boundary of the property to be served.

Sewage Treatment Plant. The plant and facilities operated for such purpose to which the sanitary sewer system is connected.

Sewerage. The system of sewers and appurtenances for the collection, transportation, pumping, treating and disposing of sanitary sewage and industrial wastes.

Sewered Area. That portion of East Bradford Township designated on the Official Plan of the Township in which there is, or shall be, constructed a public or privately owned sanitary sewer system in accordance with plans approved by the Township, as from time to time constructed and extended.

Trunk Sewer. A main sewer located under highways, roads, streets or rights of way with branch collection sewers that collects and conveys sanitary sewage or industrial wastes, or a combination of both, and into which storm, surface and ground waters or unpolluted industrial waters or liquids are not intentionally admitted.

2.2 Additional Definitions

The definition of words and terms defined in the East Bradford Township Subdivision and Land Development Ordinance shall apply where appropriate to the same words and terms in this ordinance.

2.3 Definitions of Standards

Where the following abbreviations are used in these regulations, they shall stand for the institute, society or association listed thereafter.

ANSI: American National Standards Institute
ASTM: American Society for Testing Materials
AWWA: American Water Works Association.

SECTION 3

EXTENSION OF EAST BRADFORD TOWNSHIP SEWERAGE FACILITIES

3.1 Official Plan

The Official Plan of East Bradford Township shall be published and, from time to time, revised by resolution of the Board of Supervisors to show the sewered areas of the Township and the major trunk sewers, pumping stations, and treatment plants proposed to serve these areas. The said Official Plan shall be appended to and made a part of these regulations.

3.2 Installation of Sewerage Facilities

The development of a subdivision or land development including Planned Residential Development within the sewered areas shown on the aforesaid Official Plan shall not proceed without a sanitary sewer system as herein set forth.

When an East Bradford Township sanitary sewer system is available within one thousand (1,000) feet of a proposed subdivision or land development in the sewered areas, all collection sewers, all service laterals, and all necessary building sewers as shown on the approved final plan shall be installed and connected to the existing Township sanitary sewer system by the developer, at his expense, subject to inspection and approval thereof by the Township.

When an East Bradford Township sanitary sewer system is not available within one thousand (1,000) feet of a proposed subdivision or and development in the sewered areas, but the subdivision or land development is in an area of the Township to be sewered in the future, then the Board of Supervisors shall require one of the following:

- 1) In the event that the Board shall determine the said East Bradford Township sanitary sewer system is not available or, if it is available, the connection thereto would create unnecessary hardship on the developer; and that the Board shall determine that the sites proposed for development are suitable for on-site sewage disposal in accordance with the regulations of the Chester County Health Department and the Pennsylvania Department of Environmental Resources, then the Board shall require that a sanitary sewer system complete with collection sewers and service laterals, and with the sewer and service laterals capped in accordance with these rules and regulations, be installed by the developer in addition to the installation by the developer of temporary individual on-lot sanitary disposal systems. These collection sewers and service laterals shall be installed before the streets and roads shown in the

approved final plan are constructed. The aforementioned determinations of the Board shall be made at a public meeting of the Board.

- 2) In the event that the Board determines that the site proposed for development is not suitable for on-site sewage disposal, a sanitary sewer system complete with collection sewers, service laterals and building sewers shall be installed and connected to the Township sanitary sewer system with the connecting sewer, trunk sewer, and/or pump station between the proposed subdivision or land development and the Township sanitary sewer system to be installed by the developer. These collection sewers and service laterals shall be installed before the street and roads shown in the approved final plan are constructed.
- 3) In lieu of the foregoing procedures provided in Subsections 1 and 2 above, the Board may approve by resolution the construction of an independent sanitary sewer system to be installed by the developer in accordance with the Official Plan; collection sewers and service laterals shall be installed before the streets and roads shown in the approved final plan are constructed. The said independent sanitary sewer system shall be installed according to the provisions of Section 19 of the Ordinance.

3.3 Extension of Sewer Service by Other Parties

Persons requiring public sewer service to existing buildings may apply to the Township for permission to extend the Township sewer system within the sewered areas shown on the Official Plan. Said extension shall be made on the same terms and conditions as those applicable to developers of subdivision or land development.

3.4 Revisions to the Official Plan

Persons owning land outside of the sewered areas on the Official Plan of East Bradford Township may request that the Official Plan be revised in accordance with the rules and regulations of the Pennsylvania Department of Environmental Resources, as administered by the Chester County Health Department. Such parties shall obtain the necessary forms or modules from the Pennsylvania Department of Environmental Resources pertaining to the revisions to the Official Plan. Such revisions shall be considered by the Board of Supervisors at a public meeting in accordance with the rules and regulations of the Pennsylvania Department of Environmental Resources. Revisions calling for the discharge of sewage to East Bradford Township sewer system shall be subject to the availability of

capacity under the terms of the East Bradford Township sewage treatment agreement and to the terms of that agreement.

3.5 General Requirements

The specifications and details of design and construction of all items of the sanitary sewer system to be constructed shall be in accordance with the latest requirements and standards for sewerage facilities of the Pennsylvania Department of Environmental Resources, and in accordance with the design standards established by the rules and regulations contained herein.

All construction work of the sanitary sewer system shall be completed under the inspection of the Township. Construction work requiring inspection and testing shall not be backfilled without approval of the Township, and construction work backfilled without such approval or consent shall be uncovered, the cost of uncovering and replacing to be borne by the applicant or his contractor.

3.6 Sanitary Sewer Plan

Prior to the start of construction, the applicant shall furnish a Sanitary Sewer Plan of the sanitary sewer system and treatment plant (if any) for the proposed subdivision or land development for review and written approval by the Board of Supervisors.

The Sanitary Sewer Plan and Profile shall include the following:

- 1) Sheet size for all plans shall be thirty four (34) inch by forty four (44) inches. The minimum horizontal scale shall be one (1) inch equals fifty (50) feet. Vertical scale for profiles shall be at a ratio of ten to one (10:1) with the horizontal scale.
- 2) All streams, large trees or tree masses, exposed rock and other significant features, manmade or natural.
- 3) Location of existing and proposed streets, property lines current property owners.
- 4) Location of existing and proposed utilities should be shown on both plan and profile.
- 5) Location of existing and proposed buildings, each identified by lot number or other means.
- 6) Location of point of connection to East Bradford Township sewer system or end of capped sewer.

- 7) Project location on a vicinity map, suggested scale one (1) inch equals eight hundred (800) feet.
- 8) The profile and plan shall be on the same sheet, corresponding portions of the profile below the plan.
- 9) The ground line on the profile shall represent the elevation along the centerline of the proposed pipeline. Indicate where final grade will differ from present grade.
- 10) Basement and first floor elevations of all buildings to be served shall be shown on the profile, locations on the plan.
- 11) Indicate lengths of runs between manholes, slope (in percent), and size and type of pipe.
- 12) Indicate special features such as drop manholes, concrete encasement, special bedding materials, waterproof manhole covers, special fill, etc.
- 13) Indicate all invert elevations to two (2) decimal points.
- 14) Indicate any special paving or sod replacement.
- 15) The applicant must design and build system to the point of connection to Township system.
- 16) Laterals shall be built to property line and at least three (3) feet inside curbs.
- 17) An Erosion and Sediment Control Plan prepared in accordance with criteria established by the Chester Conservation District.

Plans for sewage pump stations and sewage treatment plants, including conventional sewage treatment systems discharging into surface waters, spray irrigation systems or subsurface disposal systems, shall be prepared in accordance with the requirements of the Pennsylvania Department of Environmental Resources, but shall be subject to review and approval by the Board of Supervisors as hereinbefore provided. The Board may require such reasonable changes in design and to protect the public interest in preventing odors or discharge of incompletely treated wastes.

If any rights of way are required for the proposed construction, legal descriptions, an indication of ownership, and a report of status of negotiations, for acquisition shall be included with the Sanitary Sewer Plan.

Before proceeding to final design, a preliminary report, should be made to the Township in each instance of the proposed

use of a sewage treatment and/or disposal system. The preliminary report shall outline the treatment concept and contain data showing the feasibility of the proposed treatment system for the purposed intended.

In addition, the preliminary report shall address the following:

- 1) The applicant shall determine the following:
 - a. The proposed point of connection.
 - b. Anticipated initial flow.
 - c. Rate and frequency of discharge.
 - d. Anticipated ultimate flow.
- 2) If any industrial waste is to be discharged, the following is required:
 - a. A detailed description of origin and nature of waste.
 - b. A process plan for pretreatment of waste if required to bring it to East Bradford Township specifications and any applicable state and federal requirements.
 - c. A plan for construction of plant (consult the Township Engineer).
 - d. A plan for operation of plant and testing of effluent.
- 3) Where connection to the sewer served by East Bradford Township is contemplated:
 - a. Type of control and/or metering service.
 - b. Estimated cost of downstream improvement, if required.
 - c. Available capacity of receiving sewers.

No point of interconnection will be approved where the proposed discharge will overload the receiving sewer unless there is an agreement to compensate adequately the party receiving the flow for corrective measures necessary to make the receiving sewer adequate for the proposed discharge. If limited, receiving discharge will be limited to the available spare capacity until such time as adequate capacity is made available. The applicant shall consult with the Township in this regard.

The consulting engineer of the Township shall have the right to approve the plans and to inspect the manner of the making of such connections between the Township sewers; the same shall not be used until such time as the Township shall receive written notice from the Township's consulting engineer that the construction of such connections has been accomplished in accordance with the approved plans and specifications.

Each application shall include a realistic estimate of the cost of the sewerage project (materials, cost of installation, including excavation and restoration of unpaved surfaces and repaving of existing roads, engineering, supervision and inspection).

All plans must be prepared under the supervision of or by a Pennsylvania registered professional engineer acceptable to the Township whose seal, signature and registration number shall appear on each sheet of the plans.

3.7 Permits

Before the construction or installation of any sanitary sewer system, a permit shall be obtained from the Pennsylvania Department of Environmental Resources and from any other governmental authorities having jurisdiction. If facilities are to be dedicated to the Township, the applicant shall prepare permit applications in the name of East Bradford Township and shall submit the same, with the necessary application fees and supporting documentation to the Board of Supervisors for review and execution. If by agreement with the Township an independent sanitary sewer system is to be constructed, said applications shall be prepared in the name of the proposed owner, but shall be submitted for review by the Board of Supervisors.

3.8 Guarantees, Construction of Sanitary Sewer Systems

Upon approval of final plans, the applicant shall be required to post a bond or monies in escrow with the Township equal to one hundred ten percent (110%) of the construction costs plus Township inspection fees as estimated by the Township Engineer to assure satisfactory completion of the proposed sanitary sewer system. Said bond or escrow shall be valid for one year after approval. The Township may increase the guarantee in part or in total by an amount not to exceed ten percent (10%) each year thereafter. The applicant shall construct the sanitary sewer system without cost to the Township in accordance with the approved plans and specifications and under the inspection of the Township as hereinbefore provided.

3.9 Inspection by East Bradford Township

The Township has reserved the right to inspect and test all sewer extensions and house connections to the Township collection system where these connections drain to the Township. Said

inspections will be conducted in accordance with a schedule to be mutually agreed upon by the Township and the applicant.

3.10 Acceptance of Sanitary Sewer Systems

Upon final inspection and approval by the Township of any sanitary sewer system, including independent sanitary sewer systems, said system shall be offered for dedication to the Township in its entirety, including collection lines, laterals and rights of way and easement for said system without charge to the Township. The Township may, at its option, accept dedication of the system but shall not be required to do so at any given time.

The Board shall require that an eighteen (18) month guarantee, in the form of a bond, be provided from the date of acceptance of all sewerage facilities to be dedicated to the Township. The bond shall be furnished under such conditions and form with surety as shall be approved by the Board to guarantee the maintenance of these facilities against failure due to improper workmanship for eighteen (18) months and shall be in the amount equal to fifteen percent (15%) of the cost of such improvements or Five Thousand Dollars (\$5,000) whichever is greater.

If the Township does not accept dedication, an independent sanitary sewer system may, by agreement with the Township, be owned and operated by a public utility or by a Homeowners Association, provided that the offer of dedication shall remain open to the Township for acceptance at any time, in accordance with the terms of said agreement.

3.11 Costs to be Borne by Applicant

The costs of all reviews and approvals by the Township and all inspection required and for the construction work for the sanitary sewer system for the proposed construction shall be paid by the applicant.

Each application must include a deposit of two percent (2%) of the estimated cost of the project against which will be charged any engineering and legal expenses of checking the application, processing permits, etc. The minimum fee is One Hundred Dollars (\$100). Fees in excess of this amount will be billed to the applicant and will be required to be paid to the Township before authorization is given to begin construction. Amounts not required will be refunded.

3.12 Safety Requirements

The applicant and/or his contractor is responsible for all matters pertaining to construction safety and all rules and regulations appurtenant thereto.

3.13 As-Built Drawings

A condition for acceptance of dedication of sanitary sewerage facilities by the Township will be the preparation and submission to the Township of a mylar reproducible drawing(s) showing the as-built condition of the facilities. Among other things, the drawing(s) shall show the actual distance between manholes, actual invert elevations and the location and type of each lateral connection to the sewer.

SECTION 4

DESIGN

4.1 General

The design of sanitary sewerage facilities will conform to the Standards of the Pennsylvania Department of Environmental Resources as contained in the Sewerage Manual or to these Specifications whichever is most restrictive.

4.2 Location of Sewers and Force Main

To the maximum extent possible, sewers and force mains shall be located within the right-of-way lines of public streets. Where this is not feasible, the facilities shall be located in easements provided for this purpose.

4.3 Easements

Easements for sanitary sewers and force mains shall have an overall width of twenty (20) feet centered in the facility. Additional widths to a total of thirty (30) feet shall be acquired as a temporary easement for construction purposes.

4.4 Relationship to Facilities Being Served

To the maximum extent possible, gravity sewers shall be located at an elevation which will provide service by gravity for plumbing fixtures in the lowest floor or basement of the houses or establishments being served. However, if the Township Engineer determines in his or her sole discretion that this requirement would require the sewer to be unreasonably deep to serve one or two houses or if some similar undesirable situation would be created, the sewer may be designated to serve by gravity only the first floor and above.

Where gravity sewer service to one or more properties is clearly impractical, grinder pump facilities will be permitted to convey sewage directly from one or more households to the public sewer system. Design of these systems will be subject to the further requirements of Section 4.9.

Each situation where full service by gravity is not practical will be considered on a case by case basis and will be subject to the approval of the Township Engineer. Plans for property development should clearly indicate those facilities where there is some limitation to complete service by gravity.

4.5 Minimum Cover

The minimum cover over sanitary sewers shall be five (5) feet and over force mains shall be four (4) feet.

4.6 Service Laterals

Service lateral wye-fittings and the laterals shall be a minimum of four (4) inch diameter when installed for single family residential properties. Service laterals for multi-family, commercial or industrial properties shall be sized according to project flows subject to the approval of the Township Engineer. All service laterals shall extend one (1) foot into the property which they serve or three (3) feet beyond an existing or proposed curb, whichever is the greater and shall be suitably capped for air pressure testing. Where the sewer is in an easement outside of the street right-of-way, the service lateral connections shall be a wye-fitting, suitably capped.

4.7 Building Sewers

Building sewers and fittings shall be a minimum of four (4) inch diameter when installed for single family residential properties. Building sewers for multi-family, commercial or industrial shall be sized according to projected flows subject to the approval of the Township Engineer. Building sewers shall include an approved clean out within ten (10) feet of the building wall. Where building sewers are longer than fifty (50) feet, an additional clean out shall be installed for each fifty (50) feet or part thereof of length. Building sewers shall run straight from the inside of the wall of the building which they service to the sanitary sewer and on a grade of not less than one quarter (1/4) inch per foot unless approved by the Township Engineer.

4.8 Township Standards

The various elements of the sewerage system shall conform to the standards contained in the Appendix.

4.9 Grinder Pump Systems

When a pressure sewage system to serve residential or commercial properties discharges to the sanitary sewer system of East Bradford Township, a grinder pump system shall be used and shall be subject to the following specifications:

Grinder pumps shall be provided in a duplex package and shall be one of the following models manufactured by Aurora Pump Inc., Hydromatic Models SPGA-200, SPGH-300, SPGH-500 or SPGH-750. The exact model selected for each application shall depend upon projected flow and total dynamic head on the system and shall be subject to the approval of the Township Engineer. If the above models do not meet the application, the Township Engineer shall be notified and alternate models of equal quality shall be presented for approval by the Township Engineer.

The pumping system shall be provided with a manufacturer supplied electrical control panel which shall contain the following alarm functions:

- 1) Lead pump failure.
- 2) High water level.
- 3) Pump seal failure.

The alarm shall be indicated by a red flashing light which is to be integral with the control panel and shall be clearly visible. The panel shall be a NEMA 4X type and contain a lightning suppressor, convenience outlet with GFI and appropriately sized circuit breaker for each pump. The control panel shall provide for true pump alternation and contain hand-off automatic control options.

Float switches shall be supplied to control sump level and alarm signal. A total of three (3) floats shall be provided which shall have the following functions:

- 1) Lowest float - Pump off.
- 2) Intermediate float - Lead pump start.
- 3) High level float - Lag pump start and high water alarm function.

All floats shall be adjustable for level setting from the surface and shall be Hydromatic Pump Model No. 3900 as manufactured by Aurora Pump Inc.

The duplex package shall contain a manufacturer supplied fiberglass basin of the necessary size for proper pump cycling and detention times. The minimum net storage volume shall be fifty (50) gallons. The basin shall be supplied with an anti-flotation system and shall contain an intergally cast inlet to receive the discharge from the facility.

The duplex system shall be provided complete with rail systems, pumps, fiberglass basin, control panel, discharge piping with a ball check valve, gate valve, gate valve extensions, top valve stem brace, top guide rail brace, pump base and the pump guide kit assembly.

Electrical power shall be either single phase or three phase, 60 hertz, with either 120 volt or 230 volt as available at the site and as necessary for the pump application.

Force mains from grinder pump stations to the sewage collection system shall be sized so that discharge from the pump will maintain a minimum velocity of two (2) feet per second in the force main, but in no case shall the velocity exceed ten (10) feet per second. Force mains may be ductile iron or PVC SDR21.

Specifications and drawings shall be submitted to the Township Engineer for review which shall contain, at a minimum, the following information:

- 1) Calculation showing projected flow and total dynamic head.
- 2) Pump selection including pump motor size, basin size, electrical power and location of system with respect to collection system.
- 3) Calculations on basin storage capacity in the event of a power failure and normal pump cycling times.
- 4) Drawings and specifications from the manufacturer showing the above information.

4.10 Installation and Maintenance of Private Sewage Pumping / Systems

No privately owned grinder pump system shall be connected to the public sewer system until the applicant or proposed owner has: (a) fully complied with regulations and other rules and regulations of East Bradford Township and the Pennsylvania Department of Environmental Resources and (b) receive prior written approval of the Township through the issuance of a sewer connection permit.

Installation, operation, maintenance and service of all privately owned pumping systems shall comply with the technical specifications of the Township then in effect.

The owner of the property served by a privately owned pumping system shall have the responsibility for maintaining, operating and repairing and replacing privately owned grinder pumps.

The Township shall have no responsibility for the purchase, operation, repair or replacement of any privately owned grinder pumps.

Where the pressure sewer line only serves one property and is connected directly from the household to the gravity sewer line in the adjacent street, the property owner shall be fully responsible for the sewer line connection including those portions of the connection in the public road right of way. Where the pressure sewer line serves more than one (1) property, the point of connection of two (2) or more lines shall be located in the public road right of way; and the pressure sewer line from that point of connection to the point of connection with the Township sewer collection system shall be owned, operated and maintained by the Township.

Where a pressure sewer line lies within a public right of way and parallel to the street lines and where such a line serves more than one (1) property, that portion of the line in a public right of way shall be dedicated to the Township and the Township shall be responsible for the ownership and maintenance of such a line.

4.11 Municipal Responsibility

The Township shall be responsible for the enforcement necessary to abate any nuisance or public health hazard that may occur in privately owned pressure sewer lines or pumping units. In order to discharge this responsibility, all owners of privately owned sewage grinding pumps as specified in these regulations are hereby required by the Township to:

- 1) Engage the services of a qualified contractor to perform routine maintenance on the pumping system in accordance with the manufacturer's recommendations.
- 2) Upon indication of any malfunction of the pumping system including back ups, the exhibiting of an alarm or any other indication of malfunction, promptly engage a qualified contractor to make repairs to the pumping system,
- 3) Notify the Township of any failure of the pumping system on the next regular business day after the failure occurs. The owner shall further notify the Township upon completion of repairs so that an inspection can be conducted on the timing of any pump replacements or completion of repairs to make certain that the pumping system conforms to the Township regulation. If pump replacement is required, the pump shall be replaced in kind.
- 4) In order to assist the property owner in this, the Township will maintain a list of contractors qualified to install and maintain the specified pumping systems.
- 5) Upon discovery by the Township of any malfunctions in pumping systems and after due notice, if repairs are not completed immediately upon complete failure of the pumping system or within three (3) days upon failure of any individual pump in a duplex system, the Township shall have the right but not the duty to enter upon the property, make such repairs as are required, [and] charge the cost of such repairs against the property owner, file a municipal claim against the property in the amount of such repair costs to secure repayment of same, and to proceed to

collect same per the laws of this Commonwealth
pertaining to municipal claims and liens, or by other
appropriate legal means.

SECTION 5

GENERAL REQUIREMENTS FOR CONSTRUCTION

5.1 Selection of Contractor

The applicant and/or Developer shall select a Contractor to construct the sewage system who is skilled in the work proposed to be done and who is equipped in all respects to insure the proper and complete construction of all elements of the system. The work Contractor used hereinafter shall mean the contractor selected by the Applicant and/or Developer.

5.2 Township Engineer's Duties, Examination and Inspection

The Township Engineer and his assistants are the representative of the Township during the construction of the work. The word Engineer as used hereinafter shall mean the Township Engineer for East Bradford Township or his authorized representative. When so authorized by the Township, it shall be the duty of the Engineer to see that all materials and work conform fully to the requirements of these Specifications. He shall in no case act as foreman or perform other duties for the Contractor or Applicant nor interfere with the management of the work done by the Contractor.

The work shall at all times be subject to the examination and inspection of the Engineer, who shall have free access to the work, and be furnished by the Contractor with every reasonable facility for examination of the work, to the extent of uncovering, testing or removing finished portions thereof. The Contractor shall provide all labor and equipment necessary for such examination. The Engineer may require the Contractor to uncover for examination, or to remove any work done or placed in violation or disregard of instructions issued to the Contractor by the Engineer.

All inspections and tests shall be performed without unnecessarily delaying the work. The Engineer shall have the right to reject defective material or workmanship, or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material and the Contractor shall promptly segregate and remove rejected material from the premises. Failure or neglect on the part of the Engineer to condemn or reject any bad or inferior material or work becomes evident at any time prior to the acceptance of the work by the Township. If the Specifications, the Engineer's instructions, laws, ordinances, or any public authority require the work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection.

The Engineer shall have full authority to decide all questions which may arise under the Contract relative to the

quality and acceptability of materials furnished and the manner, quality and acceptability of work performed, and the interpretation of any or all Plans and Specifications.

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

5.3 Drawings and Specifications

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

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

Shop drawings shall be submitted in quadruplicate to the Engineer 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 Engineer five (5) 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.

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 not 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 Engineer. Failure of the Contractor to note his approval on Shop Drawings will be reason for the Engineer to return such submission to the Contractor unchecked.

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 not be indicated on the Shop Drawings when approved.

5.4 Engineering Stakes

The Contractor shall furnish, set and maintain without cost to the Township, suitable stakes, grade boards temporary structures, templates, and other materials for establishing and maintaining points, marks and lines, and shall furnish the Engineer with such assistance as he may require in setting or checking such points, marks or lines, and in making or checking measurements necessary in the prosecution of the work. The Contractor shall be held responsible for the preservation of all stakes and marks.

5.5 Materials

The Contractor shall furnish the Engineer, promptly after the award or execution of the Contract, with a complete statement of the origin, composition, and manufacture of all materials to be used in the construction of the Project. Only materials conforming to the requirements of these Specifications and the Plans shall be used in the work.

5.6 Observance of Laws

The Contractor at all time shall observe and comply with all Federal and State laws and regulations, and local bylaws, ordinances and regulations in any manner affecting the conduct of the work or applying to the employees on the Project, as well as all safety precautions and orders or decrees which have been promulgated or enacted, or which may be promulgated or enacted, by any legal bodies or tribunals having authority or jurisdiction over the work, materials, equipment, or employees; such observance and compliance shall be solely and without qualification the responsibility of the Contractor without reliance on superintendence or direction by the Township or Engineer. The duty of enforcement of all of said laws, ordinances, regulations, orders or decrees lies with the body or agency promulgating them, not with the Township or Engineer.

5.7 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.

5.8 Sanitary Conveniences

Sanitary conveniences complying with the regulations of the Pennsylvania Department of Health or other bodies having jurisdiction therewith, shall be provided for the use of the workmen and their exclusive use shall be strictly enforced or temporary conveniences provided under this Article shall be removed.

5.9 Permits and Licenses

The Contractor or Applicant and/or Developer shall, unless otherwise specified elsewhere herein, procure all necessary permits and licenses, pay all charges and fees therefor, and shall give all notices necessary and incident to the proper and lawful prosecution of the work.

If the Pennsylvania Department of Transportation requires any of their personnel to be on hand during the construction of the work, payment for such personnel shall be borne by the Contractor, Applicant or Developer.

Where work is to be done by the Contractor in placing any pipe or other construction under railroad tracks, or within the right-of-way of any railroad company, the Contractor shall be governed by the requirements of the railroad company involved, and shall consult with the officials thereof relative to the installation. If the railroad company requires any of their personnel to be on hand during the construction of the work, payment for such personnel shall be borne by the Contractor, Applicant or Developer.

5.10 Care of Public and Private Property

The Contractor shall take all necessary precaution to prevent damage to all overhead and underground structures and to protect and preserve property within or adjacent to the Project and shall be responsible for damage thereto. Attention is directed to the provisions of Act No. 287 (1974) of the Commonwealth of Pennsylvania, and full compliance therewith is required. 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 arrangements with responsible officers or with the owners of the utilities or plants, covering the necessary precautions to be used as safeguards during the performance of the work by the Contractor. Such arrangement shall be made before work is started. The Contractor shall protect all land monuments and property markers which will be affected by the construction until they have been correctly referenced. Monuments and markers which are disturbed by the Contractor during the construction of the Project or otherwise, shall be satisfactorily reset by him when directed.

5.11 Preliminary Inspection

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

5.12 Safety Requirements

The Contractor shall furnish, erect and maintain at closures, intersections and throughout the Project, all necessary approved barricades, suitable and sufficient red lights, torches, approved reflectors, danger signals, warning, and closure signs, provide a sufficient number of watchmen and take all necessary precautions for the protection of the work and safety of the public. All barricades, danger signals, warning signs and obstructions shall be illuminated at night and all lights shall be kept burning from sunset until sunrise. All materials and safety devices (i.e., barricades, flashing warning lights, torches, reflectors and signs) which the Contractor provides for the purpose of protecting the work and safety of the public and for maintaining and protecting traffic must conform to the requirements specified in Section 901 of the current edition of the Commonwealth of Pennsylvania Department of Transportation Specifications Form 408 and to the requirements specified in the current edition of Bulletin 43 which complements Section 901.

If, and when the use of explosives is necessary for the prosecution of the work, the Contractor shall observe the utmost care, so as not to endanger life or property. All explosives shall be stored in a secure and safe manner in strict conformity to all State and local regulations, and all such storage shall be clearly marked "DANGEROUS EXPLOSIVES", and shall be in care of a competent watchman at all times. Where required, permits for blasting shall be obtained.

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 the 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 and local laws.

The provisions of the "Occupational Safety and Health Act of 1970" of the U.S. Department of Labor and Industry shall be complied with in the performance of all work. Observance of and compliance with said act shall be solely and without qualification the responsibility of the Contractor, without

reliance on superintendence of or direction by the Township or Engineer. The duty of enforcement of the provisions of the act lies with the U.S. Department of Labor, not with the Township or Engineer.

5.13 Competent Workmen

The Contractor shall employ only competent and efficient superintendents, foremen, clerks, timekeepers, equipment operators, laborers and mechanics or artisans for every kind of work. These requirements shall not operate against the employment of physically handicapped persons, otherwise employable, where such persons may be safely assigned to work which they can ably perform.

5.14 Notice

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

- 1) When delivered, in writing, to the person in charge of the office used by the addressee to conduct business;
- 2) When delivered, in writing, to the addressee or any of his authorized agents in person;
- 3) 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;
- 4) When deposited in the United States Mail, postpaid, and addressed to the party intended for such service at his office for conducting the business of the Contract at the Site of the Work, or his last known place of business; or
- 5) When filed at any company operated office of the Western Union Telegraph Company and addressed to the party intended for such service at his last known place of business or for conducting the business of the Contract at the Site of the Work.

5.15 Cleaning Site

The Contractor shall at all times keep the Project Site free from accumulations of waste material or rubbish caused by the work. Before the work will be considered as having been completed, the Contractor shall clean and remove from the Project and adjacent property all surplus and discarded materials, equipment and temporary structures. The Contractor shall also restore all cultivated lawns and shrubbery which he may have damaged in the course of construction.

SECTION 6

MATERIALS AND INSTALLATION METHODS

6.1 General

All materials used in the construction of sanitary sewage facilities shall conform to the following specifications. Exceptions to the material specifications will be considered but only at the time of submission of the sewerage plans to the Township for review. All plans shall clearly indicate the materials to be used.

6.2 Gravity Sewer Pipe

Gravity sewer pipe shall be asbestos-cement, ductile iron or PVC and shall conform to the following specifications.

6.3 Asbestos - Cement Sewer Pipe

Asbestos-Cement sewer pipe shall be non-pressure sewer pipe conforming to the current ASTM Specification C-644 for four (4) inch, five (5) inch and six (6) inch in diameter and ASTM Specification C428 for eight (8) inch diameter and above. All Asbestos-Cement sewer pipe shall have a maximum length of thirteen (13) feet. Asbestos-Cement sewer pipe furnished under these specifications shall be of Class 3300 at a minimum.

Joints shall be composed of two rubber rings and an Asbestos-Cement coupling having machined recesses to receive the rings when the two sections are jointed.

Couplings shall be capable of withstanding the same crushing strength requirements as specified for the pipe.

Asbestos-Cement pipe shall be laid in accordance with all applicable Specifications contained herein and as recommended by the manufacturer. Only pipe manufactured in the continental United States will be acceptable.

6.4 Ductile Iron Pipe

Ductile iron pipe shall be centrifugally cast in metal molds or sandlined molds in accordance with latest revisions ANSI A21.51. The length shall be in nominal sixteen (16) foot, eighteen (18) foot, or twenty (20) foot lengths. The minimum wall thickness shall be in accordance with latest revisions ANSI A21.50, Class 50, laying Condition Type 2.

Underground ductile iron pipe joints shall be either of the mechanical joint or push-on joint conforming to ANSI A21.11 of latest revision.

All exposed pipe, unless otherwise specified, shall have flanged joints and flanges shall be faced and drilled 125# standard in accordance with latest revisions ANSI Designation B16.1 or AA21.10.

Fittings shall conform to the latest revisions ANSI Designation A21.10, Class 250 minimum. Joints for pipe and fittings shall be mechanical joint or push-on, ANSI A21.11.

Push-on joint for bell and spigot pipe shall be of short body type conforming to latest revision ANSI Designation A21.10 (Fittings) Class 250, and ANSI A21.11 (AWWA C-111) Rubber Gasket Joints. In certain cases, long pattern fittings conforming to AWWA Specifications G100, Class D, may be used.

Ductile iron pipe shall be laid at such places as shown on the plans, as called for in these specifications, or as may be directed by the Engineer. Either bell and spigot pipe with the gasketed joint, or mechanical joint pipe may be used but all pipe shall be of the same type.

6.5 PVC Sewer Pipe

PVC sewer pipe and fittings shall conform to current ASTM Specification D-3034, SDR 35.

Joints for four (4) inch and six (6) inch diameter pipe shall be bell and spigot rubber gasketed or twin gasket couplings. Joints for pipe eight (8) inch in diameter and greater shall be bell and spigot rubber gasketed.

PVC pipe shall be installed in accordance with all applicable specifications contained herein and as recommended by the manufacturer.

6.6 Bedding Conditions

Pipe bedding and backfill around pipe shall be in accordance with the provisions of Section 7.4 of these Specifications. Where required, stone bedding shall consist of Pennsylvania No. 1B stone, as specified by the Pennsylvania Department of Transportation.

6.7 Laying Sewer Pipe

All pipe shall be laid in strict accordance with the details shown on the drawings. The laying of pipes in finished trenches shall be commenced at the lowest points so that the spigot end is pointing in the direction of flow. All pipes shall be laid with ends abutting and true to line and grade. They shall be fitted and matched so that when laid in the work, they will form a sewer with a smooth and uniform invert. Sockets shall be carefully cleaned before pipe are lowered into trenches. The pipe shall be set firmly according to line and grade.

At all times when the work is not in progress, all open ends of the pipes and fittings shall be securely closed with tight stoppers so that no water, earth or other substances will enter the pipe or fittings. Any section of pipe already laid and found to be defective shall be taken up and replaced with a new pipe at no additional cost to the Owner.

6.8 Building Sewers

Pipe materials and installation methods used in the construction of building sewers shall conform to specifications applicable to materials and installation of sanitary sewer mains.

In connecting house laterals to the Y-branch in the main sewer, an approved fitting shall be used. Open ends of house connections shall be securely closed with stoppers so that no trench water, earth or other substance will enter the pipe or fittings.

Where it is necessary to install a building sewer where no Y-branch has been furnished, the connections must be made with an approved type saddle and encased in Class C concrete.

Where curb is available, the Contractor, installing building sewers, shall mark the locations of curb ends by cutting into the stone or concrete curb directly above it. This work shall be done neatly and with care, so as to disfigure the curb as little as possible, but shall be cut large enough to be permanent and easily visible.

6.9 Manholes

Manholes shall be constructed at the point shown on the plans. Manholes shall conform to the specifications set forth on the plan for sanitary manholes contained in the Appendix to these Specifications. Deviations to this specification must be approved by the Engineer.

6.10 Manhole Channels

The invert channel shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer section. The size of the inverts will vary to suit the size of the pipe with a depth of at least one-half (1/2) diameter of the pipe.

Changes in grade shall be made gradually and evenly. Changes in the direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the structure will permit and will be constructed in accordance with the details on "Sewer Construction Details". Changes in pipe shall be made gradually and evenly by dropping the invert in the manhole a distance equal to the difference in

diameter of the pipe entering and leaving the manhole. At no time should the elevation of the top of the incoming pipe be lower than that of the outgoing pipe. All elevations given on the plans indicate the invert elevations of the center of the manhole. Pipe connections to existing manholes shall be made by cutting a hole in the wall of the manhole and setting up a length of sewer pipe through the opening, shaping the bottom of the manhole to fit the invert of the construction, filling around the pipe with 1:2 cement mortar and troweling the cement mortar inside and outside the manhole at the connection to a neat finish.

6.11 Drop Connections

Where the drop in sewer inverts across a manhole exceeds two feet, an outside drop connection shall be provided as shown in the standards in the Appendix. Drop connections shall be fabricated from pipe and fittings of the same material as the sewer pipe and shall be encased in 2500 psi concrete to support the piping against undisturbed soil.

6.12 Force Main

Force main shall be ductile iron pipe, Class 50, conforming to ANSI A21.51 with cement mortar lining conforming to ANSI A21.4. Joints shall be push-on or mechanical joint.

SECTION 7

EXCAVATION AND BACKFILL

7.1 General

The Contractor shall perform all excavation of every description and of whatever substances encountered in the lines and grades indicated on the Drawings as specified herein, or as directed by the Engineer. Excavation shall be made by open cut, unless written permission to excavate in tunnels is given by the Engineer or is specifically shown on the construction Drawings.

7.2 Stripping

The Contractor shall remove all paving, sub-paving, curbing, gutters, brick paving block, granite curbing or flagging, or grub and clear the surface over the area to be excavated and shall properly classify the materials removed, separating them as required. Where pipe trenches underlie permanent paving surfaces, the surface material shall be machine cut before excavation is begun.

The Contractor shall properly store, guard and preserve material as may be required for future use in backfilling, surfacing, repaving, etc. All materials which may be removed and all rock, earth and sand taken from the excavation shall be stored, if practical, in certain parts of the roadway or such other suitable place. The Contractor shall be responsible for any loss or damage to the said materials because of careless removal or neglectful or wasteful storage, disposal or use of these materials.

In case more materials are created from any trench than can be backfilled over the completed pipe or stored in the street, leaving space for traffic, the excess material shall be removed to some convenient place provided by the Contractor. The Contractor shall bring back as much of the material so removed as may be required to properly refill the trench, if of the proper kind, or if so directed by the Engineer, he shall furnish such other material as may be necessary.

7.3 Width of Trench

Pipe trenches shall be sufficiently straight between designated angle points to permit the pipe to be laid true to line in the approximate center of the trench. The trench widths shall be such as to provide a free working space on each side of the pipe as laid, but shall not exceed the outside diameter of the barrel of the pipe plus sixteen (16) inches at a point one (1) foot above the top of the pipe.

Where sheeting and shoring are used, the maximum allowable width shall be measured between the closet interior faces of the sheeting or shoring as placed.

If the Contractor is required to excavate the trench to a width greater than that specified above, because of slides, caves, obstructions, or by reason of the condition and character of the material, he shall refill any cavities so caused with suitable and satisfactory material, including concrete or other masonry if so directed.

7.4 Depth of Trench

The Contractor shall excavate all materials to the depths indicated on the plans. The depth of trench shall be sufficiently below the invert of the pipe to account for pipe wall and bells. Bell holes shall be excavated to insure the pipe resting for its entire length upon the trench bottom. In earth trenches, the bottom thereof shall be carefully rounded to fit the bottom of the pipe for a depth of at least one-sixth ($1/6$) of the outside diameter of the pipe and so that the lower partial circumference of the pipe, determined by such depth, will rest firmly on undisturbed soil. Care shall be taken not to excavate below the depths specified, and any such excess excavation shall be refilled with crushed stone bedding and compacted. When rock is encountered, it shall be removed below the invert of the pipe, to a depth of six (6) inches. When the material encountered at subgrade is unstable and in the opinion of the Engineer does not afford a sufficiently firm foundation, the Contractor shall excavate to such increased depth as may be directed and then shall bring the bottom of the trench to the required level with crushed stone bedding compacted to the satisfaction of the Engineer. When the pipe is to be laid in fill, the embankment shall be brought to a height of at least nine (9) inches above the proposed of the pipe before the trench is excavated. If rock below the specified grade is shattered due to excessive drilling or blasting or other negligence of the Contractor, and if in the opinion of the Engineer it is unfit for foundations, such shattered rock shall be removed and the area backfilled to the proper grade with crushed stone bedding.

7.5 Length of Trench

No trench shall be opened more than two hundred (200) feet in advance of the pipe lines laid, without the permission of the Engineer, who reserves the right to limit the length or distance through which a trench may be opened. Where rock excavation is encountered, all trenches must be fully opened at least thirty (30) feet in advance of any pipe being laid.

7.6 Rock Excavation

All blasting operations shall be conducted in a safe and satisfactory manner. All buried or exposed pipe lines or other

utilities and other structures shall be carefully protected from the effect of blasts and any damage done to them by blasting shall be properly repaired by the Contractor, at his own expense. Sufficient warning shall be given to all persons in the vicinity of the work before blasting. The site of the blast shall be covered with heavy timbers, blasting mats or other devices to prevent damage from flying rock. Blasting shall be performed by experienced persons.

7.7 Pumping and Draining

The Contractor shall remove by pumping, draining, or otherwise, any water which may accumulate in the trenches and other excavations and shall build all dams and do all other work necessary to keep the trenches or other excavation as free from water as possible. While the pipe lines are being laid, the Contractor shall at all times have sufficient pumping machinery ready for immediate use. All surface waters shall be prevented from entering the open ditches or excavations by proper grading of the ground surface in the vicinity of the excavation or by temporary curbs.

7.8 Maintenance of Gutters

The Contractor shall at all times keep the gutters open so that the storm or other waters shall not have their flow obstructed, if, in any case, the material excavated from the trenches must temporarily extend over the gutters, it shall be the duty of the Contractor to plank or bridge over the gutters so that the flow of water is not prevented.

7.9 Maintenance of Traffic

Work at all times shall be so conducted as to cause a minimum of inconvenience to pedestrian and vehicular traffic and to private and public properties along the line of work. It shall be the duty of the Contractor during the progress of the work to maintain crossing, walks, sidewalks, and other roadways open to traffic, and in a satisfactory condition, to keep all fire hydrants, water valves, fire alarm boxes, and letter boxes accessible for use. Whenever it is necessary to maintain pedestrian traffic over open trenches, a timber bridge of at least three (3) feet in width and equipped with side railings shall be provided. Where the trench is so close to the curb line that the excavated material would encroach upon the sidewalk, or private property, the Engineer may order planking together with other necessary lumber to be placed so as to keep the sidewalk clear.

In important thoroughfares, highways, or in narrow streets, the material excavated from the trench shall, if the Engineer so directs, be removed from the site of the work as soon as excavated, in order to provide suitable space for traffic. The Contractor shall bring back as much of the material as necessary

to properly refill the trench if of the proper kind or if so directed by the Engineer, he shall furnish such other suitable materials as may be necessary.

7.10 Sheeting and Shoring

The Contractor shall furnish material for and do all timber shoring, bracing and sheeting necessary to perform and protect the excavation in accordance with all laws, ordinances, rules and regulations bearing thereon. Such sheeting and shoring shall be removed as the work progresses, but where, in the opinion of the Engineer, damage may result through removal, it shall be left in place. The right of the Engineer to order sheeting and shoring left in place, shall not render the issuance of such orders obligatory on the part of the Engineer. All sheeting shall be arranged so that it may be withdrawn as the trenches are backfilled, without injury to the pipe and its appurtenances and without injury to, or settlement of adjacent structures and pavements. All voids caused by withdrawal shall be immediately filled with sand or other satisfactory material and compacted by ramming or other methods satisfactory to the Engineer.

7.11 Trench Backfilling

Backfilling shall be started immediately after preliminary alignment inspection is made and shall continue without interruption to completion.

The side fills and a minimum depth of eighteen (18) inches above the top of the pipe shall be filled and clean earth placed in six (6) inch layers and carefully compacted with pneumatic or hard tampers. Above the point to a depth of eighteen (18) inches below the finished grade, the backfill material may contain small stones not larger than six (6) inches in their greatest dimension in an amount not greater than twenty percent (20%) of the volume of backfill and well distributed throughout the mass. The remaining eighteen (18) inches of backfill shall consist of ten (10) inches of clean earth, six (6) inches of coarse aggregate and two (2) inches temporary surfacing as hereinafter specified.

From the height of eighteen (18) inches above the top of the pipe the backfill material shall be placed in six (6) inch or eight (8) inch layers mechanically tampered to obtain maximum compaction. If the backfill material is of non-cohesive nature, jetting or puddling may be permitted if, in the opinion of the Engineer, adequate compaction may be obtained by these methods.

The satisfactory compaction of all backfills shall be the responsibility of the Contractor regardless of the methods used and he shall protect the Township from any loss, damage or claims occasioned by trench settlement.

7.12 Backfill Around Structures

The ground around structures shall be brought to the grades shown on the plans or as directed by the Engineer. Generally, backfilling shall be made in accordance with the Specifications for backfilling trenches, except where practical, by ploughing, harrowing, scraping or by other methods to bring the ground to the required elevations in preparing the ground for deposition of the topsoil. When the site has been properly graded to provide drainage, the topsoil shall be placed to a depth of six (6) inches and then harrowed to provide a reasonably smooth surface, ready for seeding. Where compaction is made by rollers, the rollers shall weigh not less than ten (10) tons and shall not be permitted within 8 feet of any wall or structure or where damage may result to existing underground piping.

The Contractor shall be responsible for the stability of the fill and shall replace any portion thereof damaged by natural causes, or by careless or negligent work.

Sufficient grading shall be done during the progress of the work so that no water is allowed at any time to flow towards the walls or structures or to accumulate in large puddles on the project site.

7.13 Leveling and Cleaning Up

Whenever the trenches have not been properly filled, or if settlement occurs they shall be refilled, compacted, smoothed off and finally made to conform to the surface of the ground. Trenches in streets, sidewalks, alleys, etc., shall be refilled with crushed stone graded as shown on the plans. Trenches in open fields or unpaved plant areas shall be mounded with clean earth to a minimum depth of three (3) inches. As the work is completed, the Contractor shall remove and dispose of all surplus earth, stone or other material from the work in such manner and at such point or points as he may select or provide and shall leave all roads, sidewalks and other places free, clear and in good order.

SECTION 8

CONCRETE WORK

8.1 Materials

The Contractor shall furnish Class AA Cement Concrete and reinforcement steel as specified in the latest edition of the Pennsylvania Department of Transportation Specifications, Form 408 (PennDOT Form 408).

8.2 Preparation of Equipment and Place of Deposit

Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the places to be occupied by the concrete, forms shall be thoroughly wetted (except in freezing weather) or oiled, and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather) and the reinforcement shall be thoroughly cleaned of ice or other coatings.

Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer.

8.3 Mixing of Concrete

The concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

For job-mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for at least one (1) minute after all materials are in the mixer.

Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in PennDOT Form 408.

8.4 Conveying

Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of the materials.

8.5 Depositing

Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. The concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the space between the bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used.

When concreting is once started, it shall be carried on as a continuous operation until the placing of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made in accordance with these Specifications.

All concrete shall be thoroughly compacted by approved mechanical vibration during the operation of placing, and shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of the forms.

Where conditions make compacting difficult, or where the reinforcement is congested, batches or mortar containing the same proportion of cement to sand as used in the concrete shall first be deposited in the forms.

8.6 Finishing

IMMEDIATELY AFTER REMOVAL of forms, all unsightly ridges of lips shall be removed and undesirable local bulging on the surfaces shall be remedied. All voids and holes left by the removal of the tie rods shall be reamed and neatly filled with dry-patching mortar (Pre-shrunk). The cement used in the mortar will be the same as the color of the surrounding concrete. Defective concrete shall be repaired by cutting out the unsatisfactory material and placing new concrete which shall be formed with keys, dovetails or anchors to attach it securely in place. Concrete for patching shall be drier than the usual mixture and shall be thoroughly tamped into place. All finishing, filling of voids and tie-rod holes and patching of exposed surfaces shall be performed immediately after the forms are removed. All unformed surfaces of concrete that are not to be covered by additional concrete or backfill, shall have a wood float finish without additional mortar and shall be true to elevation shown on the Drawings.

Care shall be taken to see that all excess water is removed before making any finish. Other surfaces shall be brought to the specified finish elevation and left true and regular. Joints shall be carefully made by a jointing tool. Every precaution shall be taken by the Contractor to protect finished surfaces from stains or abrasions. Surfaces or edges likely to be injured during the construction period shall be properly protected.

8.7 Curing

Provision shall be made for maintaining concrete in a moist condition for at least seven (7) days after the placement of the concrete.

8.8 Cold Weather Requirements

Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice shall be used.

All concrete materials and all reinforcement, forms, fillers and ground with which the concrete is to come in contact shall be free from frost. Whenever the temperature of the surrounding air is below 40 degrees F, and adequate means shall be provided for maintaining a temperature of not less than 70 degrees F for three (3) days or 50 degrees F for five (5) days except when the high-early strength concrete is used for temperature shall be maintained at not less than 70 degrees F for two (2) days or 50 degrees F for three (3) days. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

8.9 Removal of Forms

Forms shall be removed in such a manner as to insure the complete safety of the structure. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to support safely their weight and the load thereon.

8.10 Design of Forms

Forms shall conform to the shape, lines and dimensions of the members as called for on the plans and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape.

8.11 Cleaning and Bending Reinforcements

Metal reinforcement, at the time concrete is placed, shall be free from rust scale or other coatings that will destroy or reduce the bond. Bends for stirrups and ties shall be made around a pin having a diameter not less than two (2) times the minimum thickness of the bar. Other bends shall be made around pins having a diameter not less than six (6) times the minimum thickness of the bar, except that for bars larger than one (1) inch the pin shall not be less than eight (8) times the minimum thickness of the bar. All bars shall be bent cold.

8.12 Placing Reinforcement

Metal reinforcement shall be accurately placed in accordance with the plans and shall be adequately secured in position by concrete or metal chairs and spacers.

8.13 Splices in Reinforcements

All splices in reinforcement shall be according to the latest A.C.I. Code, and as shown on the Drawings or as directed by the Engineer.

8.14 Concrete Protection for Reinforcement

The metal reinforcement shall be protected by the thickness of concrete indicated in the plans. Where not otherwise shown the thickness of the concrete over the reinforcement shall be as follows:

- 1) Where concrete is deposited against ground without the use of forms, not less than three (3) inches.
- 2) Where concrete is exposed to the weather, or exposed to the ground but placed in forms, not less than two (2) inches for bars more than five-eighths (5/8) inches or less in diameter.
- 3) In slabs and walls not exposed to the ground or to the weather, not less than three-quarter (3/4) inches.
- 4) In all cases the thickness of concrete over the reinforcement shall be at least equal to the diameter of round bars and one and a half (1-1/2) times the side dimension of square bars.

Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

8.15 Construction Joints

Joints not indicated on the plans shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. In addition, vertical joints shall be thoroughly wetted and slushed with a coat of neat cement grout immediately before place of new concrete.

SECTION 9

CONTROL OF EROSION, SEDIMENTATION AND WATER POLLUTION

9.1 Erosion Control

Each Contractor shall be responsible for complying with the provisions of the latest edition of Chapter 102 - "Erosion Control", as contained in the Rules and Regulations of the Department of Environmental Resources. The provisions of this Chapter 102 impose requirements on earthmoving activities which create accelerated erosion or a danger of accelerated erosion. Intended conservation practices will be submitted in a soil erosion and sedimentation control plan. The Contractor shall be responsible for carrying out erosion controls contained in the plans as approved by the Township.

Where applicable to this project, temporary control measures to conform with Chapter 102, shall be for the duration of the project. All materials shall be as deemed necessary to effectively control and land erosion and water pollution.

In the event of conflict between these requirements and pollution control laws, rules and regulations of other agencies, state or local, the more stringent shall apply.

9.2 Excavating, General Standards for Sanitary Sewer Trenches

The following general standards apply to all sanitary sewer construction. Any special potential erosion problems and erosion controls for the specific site are explained in the soil erosion and sedimentation control plan for the project.

- 1) Reduce as much as possible the area subjected to a potential erosion hazard by disturbing the smallest possible area during excavation.
- 2) Be familiar with the pertinent engineering characteristics of the soil series being excavated as explained in the soil erosion and sedimentation control plan.
- 3) During one day's construction, the length of trench excavation shall not exceed the distance required for each day's pipe installation (200 foot maximum open trench during working hours).
- 4) Trenches shall be backfilled at the end of each day's work except at the last section of pipe as needed to facilitate the next day's operations.
- 5) All backfilled trenches will be stabilized on a regular schedule as soon as a segment of trench has been backfilled. On pavement and stabilized road

shoulder, the backfilled trench will be stabilized temporarily with crushed stone and asphaltic hot mix. In unpaved areas, the soil shall be stabilized by grass seeding and mulching.

- 6) All temporarily stockpiled fill at the construction site will be covered or otherwise suitably stabilized to prevent washoff when precipitation is imminent.
- 7) Where pumping is necessary, discharge shall be over extensive vegetation or discharge shall be against a strawbale sediment trap.

9.3 Control of Wind Erosion and Dust

Where dust and wind erosion is a problem, the unstable surface will be sprinkled or a dust suppressor shall be applied.

Prompt establishment of vegetative soil cover will minimize erosion and dust problems.

9.4 Dewatering Sanitary Sewer Trenches

When using a pump, make use of one of the following methods, whichever is most applicable:

- 1) Discharge over areas with extensive vegetation. Check for signs of soil removal over discharge area. If so, discontinue pumping and use one of the following methods:
- 2) Construct a strawbale sediment trap. Bales should be staked with two (2) two (2) inch by two (2) inch by three (3) foot wooden stakes or #6 reinforcing bars. Effluent of the sediment trap should be over a vegetated area.
- 3) Construct a temporary lagoon (silt holding basin) for pumping discharge or apply silt laden runoff. Allow for the following conditions:
 - a) A detention time of approximately two (2) hours.
 - b) A two (2) foot freeboard.
 - c) Prevent short circuiting with the use of plywood baffles.

9.5 Stream Preservation

The Contractor shall use all due care to preserve the stream, prevent siltation and pollution of the waters of the Commonwealth of Pennsylvania during the construction of this project.

Where sewer construction crosses a waterway, its banks shall be rock rip rapped in the disturbed area. Surrounding disturbed areas shall be seeded and jute netting applied to protect critical areas.

In small streams or runs, the Contractor shall pump around the sanitary sewer stream crossing to minimize erosion. Where it is not possible, cofferdams must be constructed. Care must be taken in the construction of such obstacles so that maximum sedimentation control will be maintained.

SECTION 10

TEST

10.1 General

During construction and at the completion of the work, the Contractor shall make tests as may be directed by the Engineer to ascertain if the pipe is properly aligned and the joints are tight. The Contractor shall furnish all apparatus required in order to perform the air and infiltration tests that may be deemed necessary. Defective work shall be repaired immediately.

10.2 Gravity Sewers

After installation, gravity sewers shall be given the following inspections and tests:

- 1) A visual inspection for correct alignment and cleanliness.
- 2) A low pressure air test of the sewer pipe.
- 3) An infiltration test of the pipe and manholes.

The Engineer shall be notified twenty-four (24) hours in advance of all inspections and test.

The visual inspection shall be made by shining a light from one manhole through the pipe to an adjacent manhole. The sewer shall be free of all foreign material, if this is not so, it shall be flushed until clean. The visual inspection shall also determine that uniform grade and alignment has been provided. If, in the judgement of the Engineer, significant deviations from the proper grade and alignment exist, corrections will be required.

For the air test, low pressure air shall be slowly introduced into a sealed section of pipe sewer line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. To establish the assumed back pressure from groundwater, the maximum height in feet between the invert of the pipe sewer and the existing ground surface in the section of pipe sewer to be tested shall be determined, and this height shall be divided by two point three (2.3). After this differential pressure of 4.0 psig is obtained, allow at least two (2) minutes for the air temperature to stabilize adding only the amount of air required to maintain pressure.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air supply shall be disconnected, and then the rate of air loss shall be determined by measuring the time

interval required for the differential pressure to decrease from 3.5 psig to 2.5 psig.

The requirements of this specification shall be considered satisfied if the time required in seconds for the differential pressure to decrease from 3.5 psig to 2.5 psig is not less than shown for the given diameters in the Air Test Tables included in the Appendix.

In addition to the above, an inspection for infiltration of groundwater shall be made of the complete system. Where infiltration is found, it shall be measured and shall not exceed one hundred (100) gallons per one (1) inch of pipe diameter per one (1) mile of pipe per day.

If the sewer system fails any of the above inspections or test, the source of the problem shall be determined and repaired in a manner satisfactory to the Engineer.

10.3 Force Mains

All force mains shall be tested by subjecting them to a pressure of 50 psig in excess of working pressure as measured at the pump for a period of time not less than two (2) hours, using water as the test medium. During this time, the pressure drop in the force main shall not exceed 2 psig.

All defects found in force mains shall be repaired with new materials and no caulking of threaded joints, cracks or holes will be allowed. Where replacement of a piece of pipe becomes necessary, in the opinion of the Engineer, the replacement shall be of the same length, material and thickness as the pieces being replaced. Upon repair of all defects disclosed by the tests, the test procedure shall again be applied until all defects are repaired and the test conditions are met.

All piping shall be adequately braced and supported during the testing so that no movement, displacement or damage shall result from the application of the test pressures. All equipment used in the testing shall be subject to the approval of the Engineer and shall be suitable to properly develop, maintain and test the pressures specified.

SECTION 11

RESTORATION AND RESURFACING

11.1 Restoration of Township Streets

After the trench has been backfilled to a depth of eleven (11) inches below the surface of the street, the Contractor shall fill the trench with eight (8) inches of well compacted coarse Pennsylvania 3A aggregate choked with Pennsylvania #1 aggregate conforming to the latest edition of PennDOT Form 408.

Upon completion of this installation, three (3) inches of approved temporary paving shall be added to match the existing surface of paving. Temporary paving shall be maintained for a period of not less than thirty (30) days with replacement as necessary to maintain the grade of paving to match the existing paving. After the settlement period, the Contractor shall remove all temporary paving and install sufficient ID-2 surface course, properly rolled, to match the adjacent paving. Paving joints shall be sealed.

11.2 Restoration of State Highways

The Contractor shall restore state highways including shoulders in accordance with the terms of the permit issued by PennDOT and subject to inspection and approval by the Department.

11.3 Concrete Sidewalk Resurfacing

Where the pipe underlies a concrete sidewalk, the entire slab between scorings or joint shall be carefully removed to avoid damaging adjoining slabs. After backfill, the entire area exposed by removal of sidewalk shall be temporarily resurfaced, as specified hereinbefore, to a depth of three (3) inches below the finished grade.

The concrete sidewalks shall be constructed of Class A Concrete and finished similar to that of the existing pavement. Slabs shall be separated by transverse pre-molded expansion joints one-quarter (1/4) inch thick for the full depth of the concrete and joints shall be placed adjacent to existing structures where directed. The slabs between joints shall be divided into blocks five (5) feet in length by scoring transversely for a depth of at least one-third (1/3) of the thickness of the slab with an edger having one-quarter (1/4) inch radius.

Any defects which become evident within a period of twelve months after completion of the work, such as settlement, cracks, deterioration of surface, etc., must be repaired by removing the entire block and replacing the new concrete.

11.4 Concrete Curbing

Whenever the pipeline crosses or underlies concrete curbing, the Contractor shall replace any damaged portion of such curbing with new curbing constructed of Class A concrete finished in a manner similar to the existing curbing. If the Contractor damages any curbing not underlying or crossing the sewer trench, he shall replace all such curbing.

11.5 Select Trench Backfill

Wherever so directed the Contractor shall install selected backfill. Such backfill shall commence at a point halfway up the pipe barrel, at the sides and above the pipe for entire width of the trench, a minimum depth of 18 inches of cover over the top of the pipe and a maximum depth as directed by the Engineer.

The material shall consist of Pennsylvania Department of Transportation #2A modified.

11.6 Landscaping

The Contractor shall grade and seed all disturbed areas and all other adjacent areas that have been damaged, compacted or otherwise disturbed during construction. All work to be performed by qualified landscape workmen. All disturbed areas to be replaced to a condition similar to the condition that existed prior to the initial construction.

11.7 Maintenance of Unpaved Areas

The Contractor shall be responsible for establishing a complete cover of growth and shall resod, reseed or apply additional lime and fertilizer so as to establish good coverage. The Contractor shall correct any settlement and rutting that may occur by regrading, reseeding or resodding.

11.8 Unimproved Areas

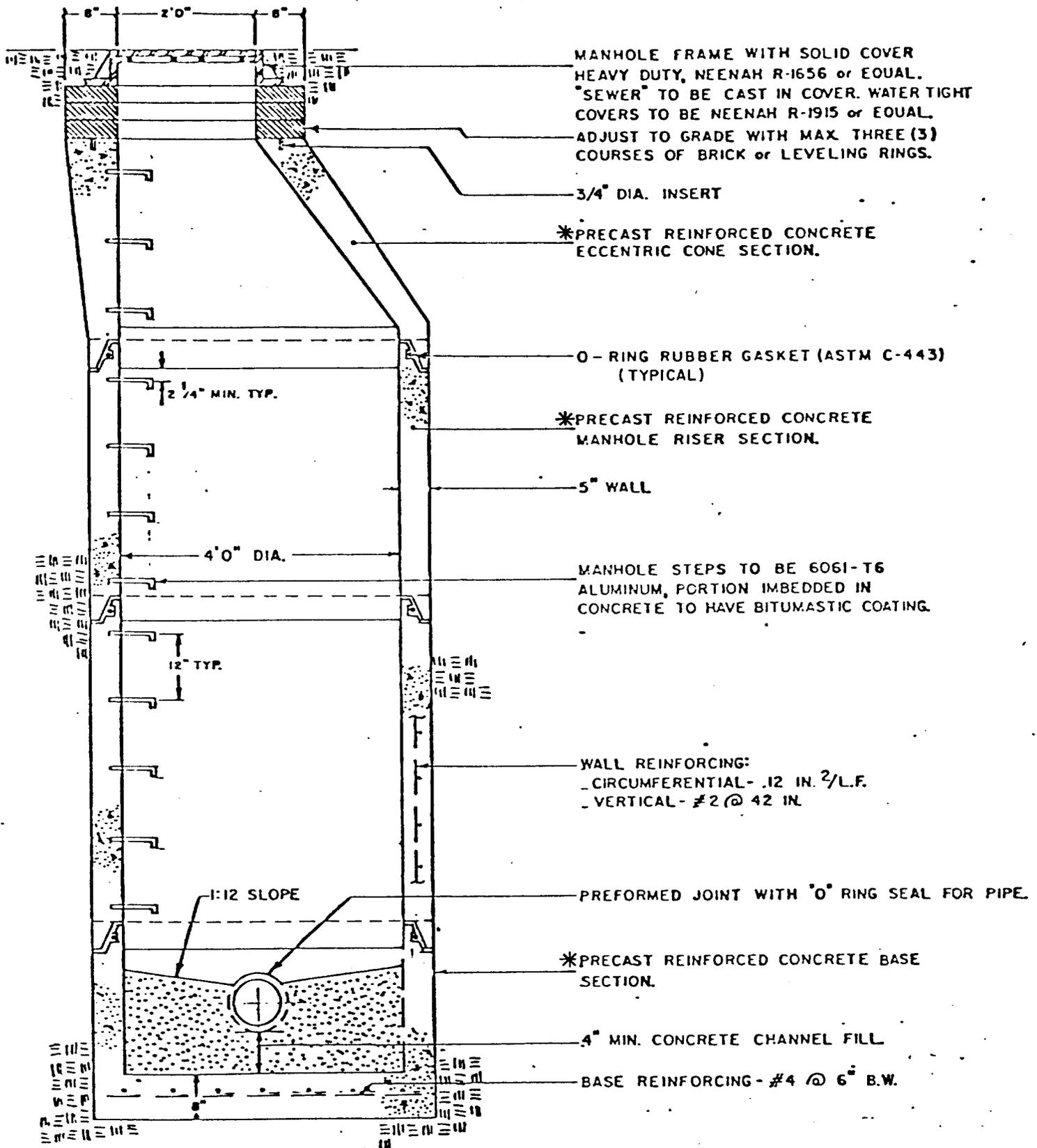
All unimproved areas such as woods, pastures, unused field, unopen streets and creek banks shall have all construction material and excess dirt removed and left in a smooth graded condition. The backfill shall be mounded over the trench. The excavated material shall be graded and shaped, before loosening to a depth of at least two (2) inches by plowing, discing, or harrowing. All stones or debris over six (6) inches in any dimension shall be removed and then reseeded.

11.9 Improved Areas

All improved areas such as lawns shall be prepared as specified for the unimproved areas with the exception that the backfill shall not be humped and will be flush with the

surrounding area. Any debris, such as sticks and stones, greater than two (2) inches in any direction shall be removed. The Contractor shall stockpile the existing topsoil and supplement as necessary or supply new topsoil in sufficient quantity to provide four (4) inches of topsoil. After tilling, fertilizer and lime shall be applied along with an approved lawn mix or seed. Within forty-eight (48) hours of seeding, the area shall be covered with a mulch at a rate of two and a half (2-1/2) tons per acre in order to provide a uniform continuous blanket. After grass has been established, the Contractor shall remove excess mulch.

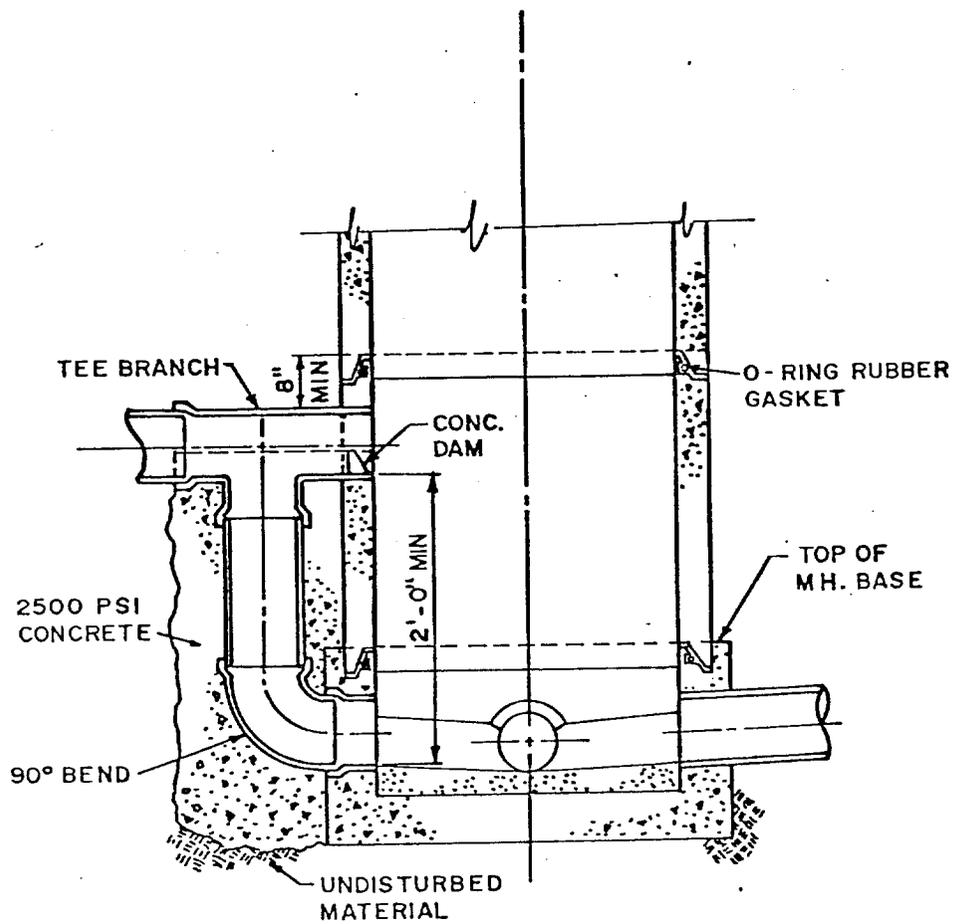
APPENDIX



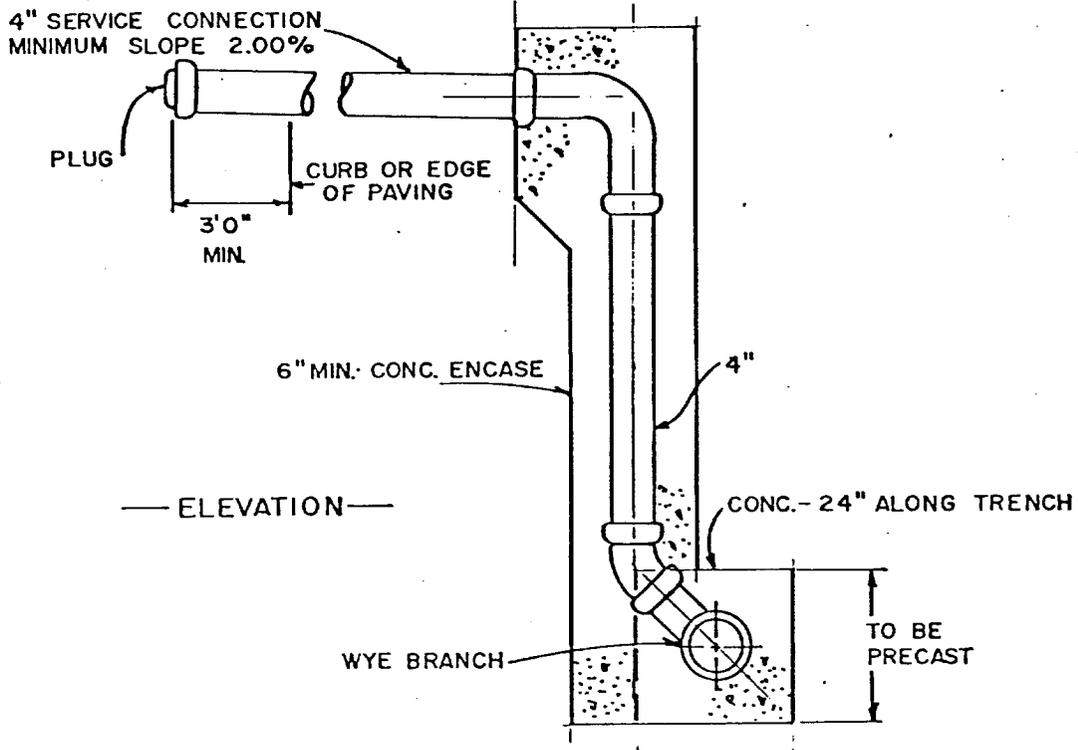
TYPICAL SANITARY MANHOLE

* PRECAST MANHOLES TO CONFORM TO ASTM SPECIFICATION C-478.

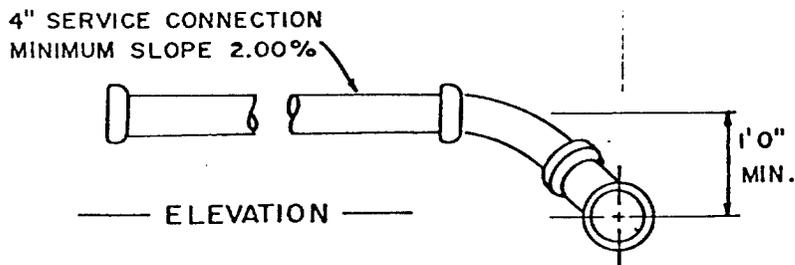
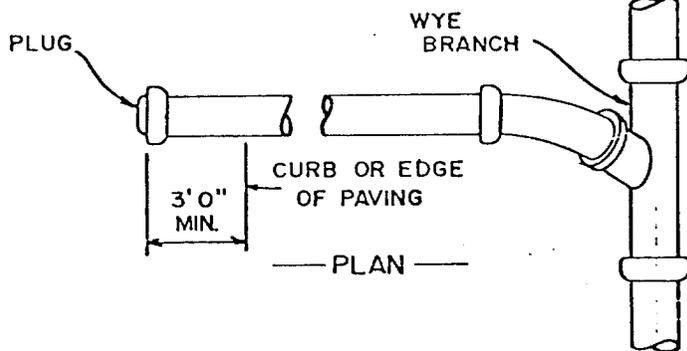
EAST BRADFORD TOWNSHIP



TYPICAL DROP CONNECTION



DEEP SEWER



SHALLOW SEWER

SERVICE CONNECTION

AIR TEST TABLE

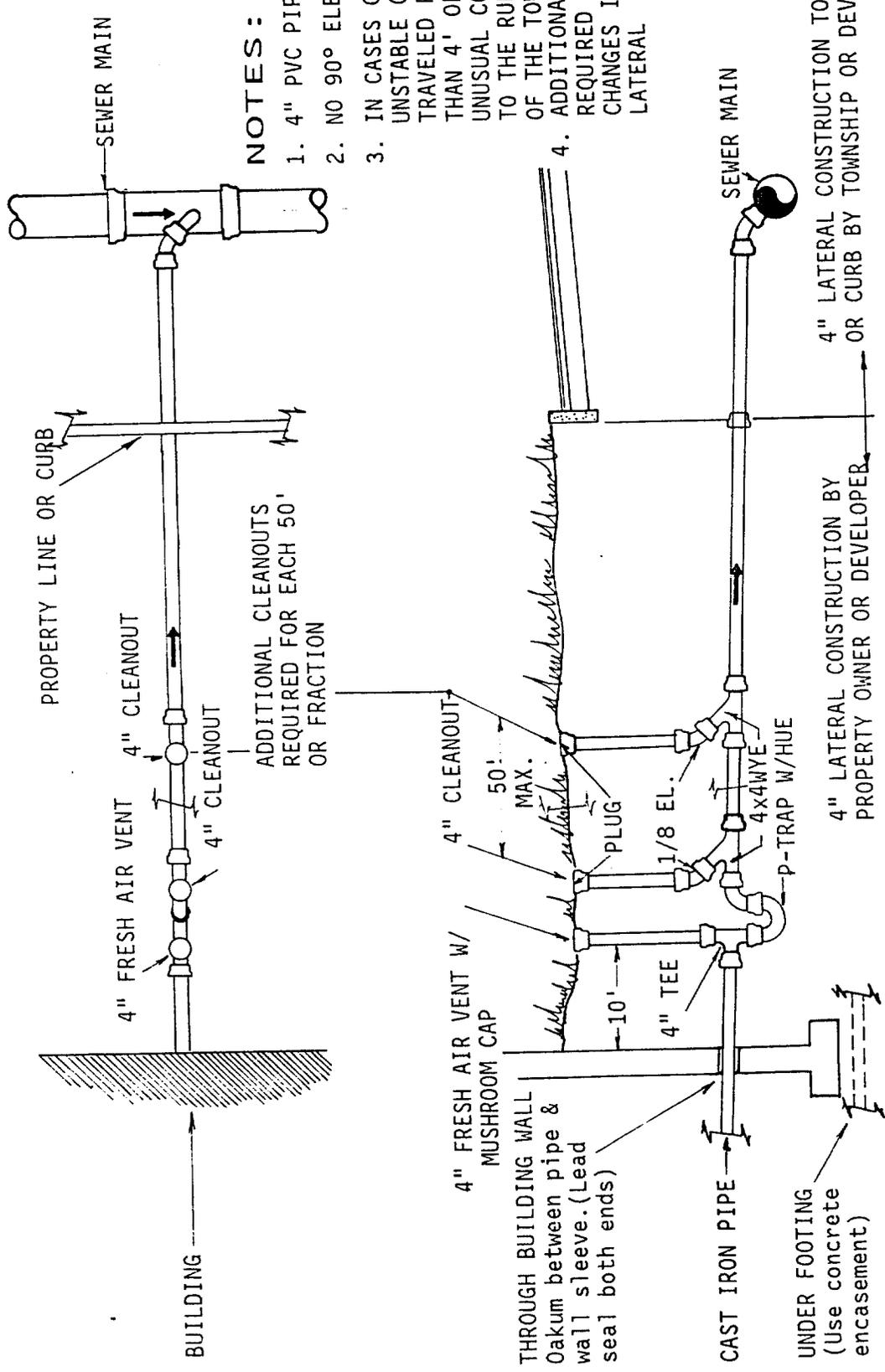
Minimum Holding Time in Seconds Required
for Pressure to Drop from 3-1/2 to 2-1/2 Psig

<u>LENGTH</u> <u>OF</u> <u>IN</u> <u>FEET</u>	<u>PIPE DIAMETER</u>													
	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
100	18	40	70	110	158	248	356	485	634	765	851	935		
125	22	50	88	138	198	309	446	595	680					
150	26	59	106	165	238	371	510							
175	31	69	123	193	277	425								
200	35	79	141	220	317									
225	40	89	158	248	340									
250	44	99	176	275										
275	48	109	194	283										
300	53	119	211											
350	62	139	227											
400	70	158												

Note: To Be Used When Testing One Diameter Only

The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blow outs.

Pressurizing equipment should include a regulator set to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be permitted in the manholes during testing.



NOTES:

1. 4" PVC PIPE (SDR 35).
2. NO 90° ELBOWS.
3. IN CASES OF GROUNDWATER, UNSTABLE GROUND, UNDER TRAVELED ROADWAY WITH LESS THAN 4' OF COVER, OR OTHER UNUSUAL CONDITIONS, REFER TO THE RULES AND REGULATIONS OF THE TOWNSHIP.
4. ADDITIONAL CLEANOUTS MAY BE REQUIRED BY THE TOWNSHIP AT CHANGES IN DIRECTION OF THE LATERAL

4" LATERAL CONSTRUCTION TO PROPERTY LINE OR CURB BY TOWNSHIP OR DEVELOPER

4" LATERAL CONSTRUCTION BY PROPERTY OWNER OR DEVELOPER

**EAST BRADFORD TOWNSHIP
CHESTER COUNTY, PENNSYLVANIA**

Date	10-04-1985	Sheet	
Scale	NONE	Drawn	RA
Checked		Dwg. No.	A 101
Issued		of	

**STANDARDS FOR
BUILDING SEWERS**

ROBERT E HARSCH & ASSOCIATES, INC.
CONSULTING ENGINEERS
222 N. Walnut St. West Chester, Penna. 19380 '215-696-3835